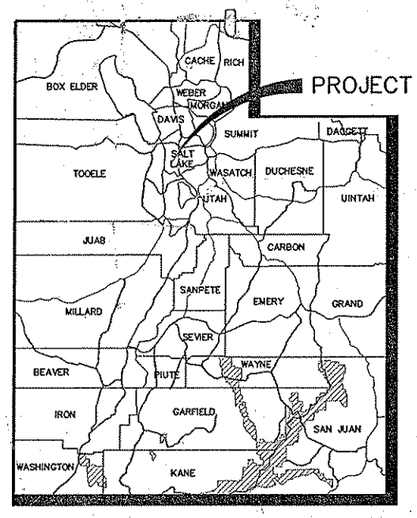
THE VILLAGE AT RIVERWALK

- A PLANNED UNIT DEVELOPMENT -



FINAL CONSTRUCTION DRAWINGS

A DEVELOPMENT BY:

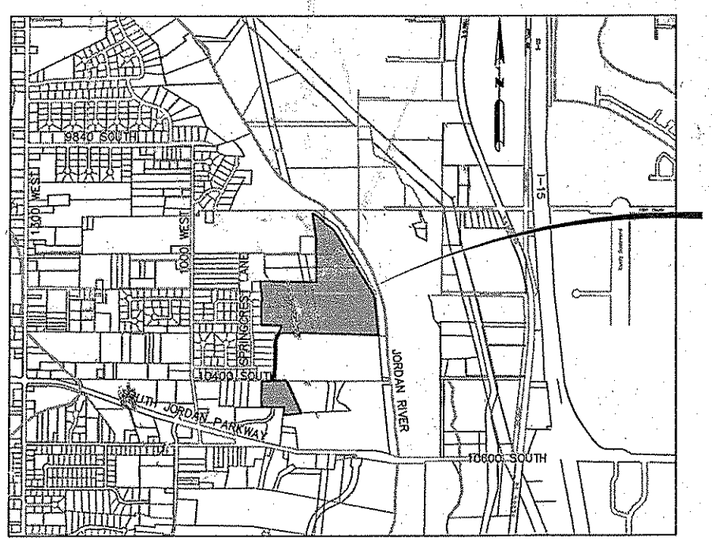
ARBOR COMMERCIAL/RESIDENTIAL

45 WEST 10000 SOUTH
SUITE 301
SANDY, UTAH 84070
801-561-8594

AUGUST 2005

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

APPROVED
10/17/05



VICINITY MAP

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
(801) 756-7200

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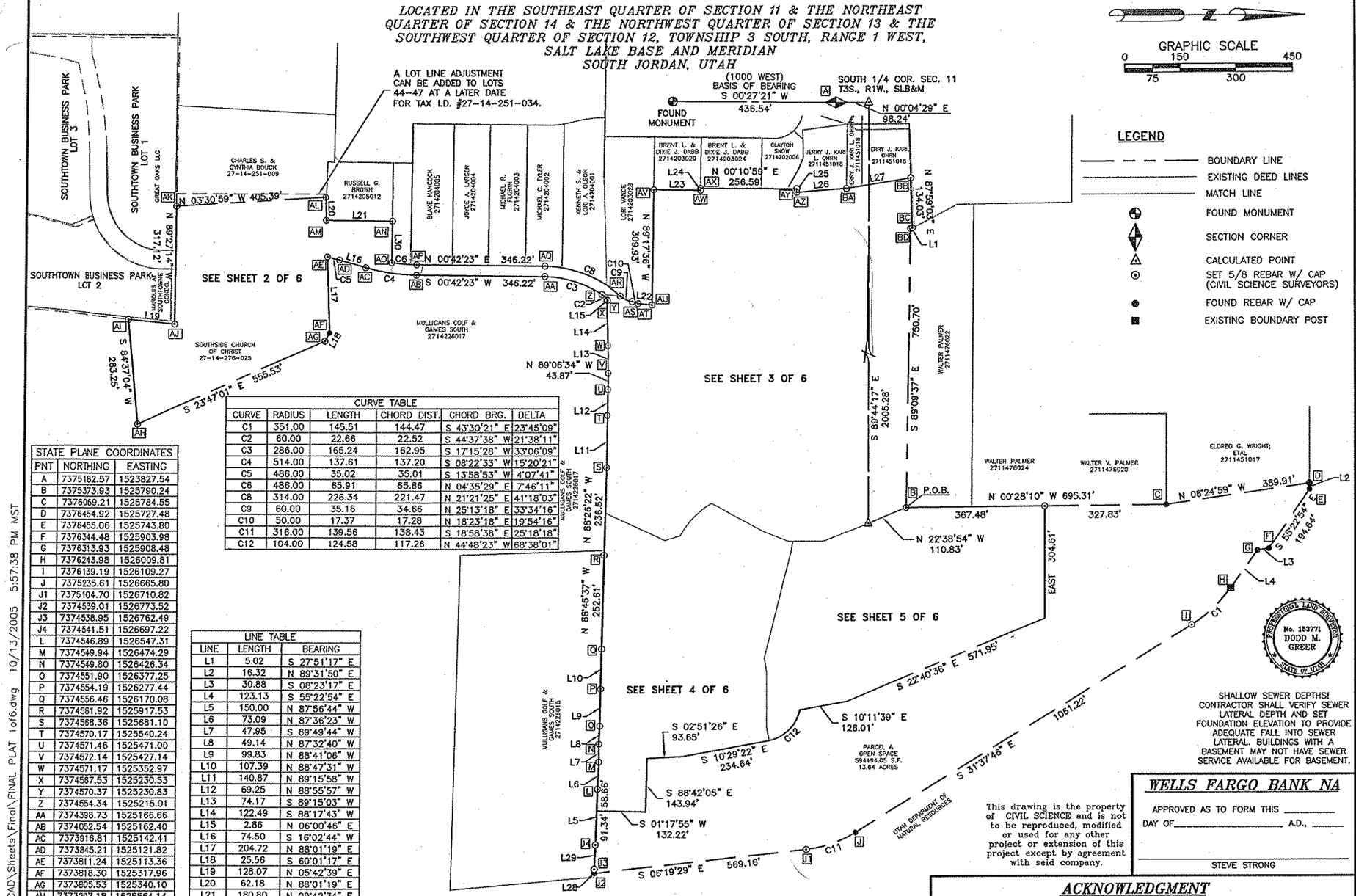
SHEET INDEX

COVER SHEET	G-01
PLAN INDEX & LEGEND SHEET	G-02
SOUTH JORDAN NOTES	G-03
FINAL SUBDIVISION PLATS	PLAT-01 - PLAT-06
OVERALL UTILITY PLAN	UP-01 - UP-04
SEWER & WATER LATERAL SHEET	L-01 - L-02
OVERALL GRADING & DRAINAGE PLAN	GP-01 - GP-04
STORM WATER POLLUTION PREVENTION PLAN	GP-05 - GP-06
NORTH OFFSITE STORM DRAIN PLAN & PROFILE	SD-01
NORTH OFFSITE STORM DRAIN PLAN & PROFILE	SD-02
LOTS 1-5 OFFSITE STORM DRAIN PLAN & PROFILE	SD-03
SOUTH WEST OFFSITE STORM DRAIN PLAN & PROFILE	SD-04
EASTERN ONSITE STORM DRAIN PLAN & PROFILE	SD-05
ROAD PROFILES	PP-01 - PP-25
RETAINING WALL SHEETS	RW-01 - RW-02
LANDCAPE PLAN	LS-01
SPRINKLER PLAN	S-01
DETAIL SHEETS	DT-01 - DT-08

J:\Riverwalk Subdivision\CAD\Sheets\Prelim\01-PRE-PLAT COVER.dwg 5/2/2005 1:50:11 PM MST

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11 & THE NORTHEAST QUARTER OF SECTION 14 & THE NORTHWEST QUARTER OF SECTION 13 & THE SOUTHWEST QUARTER OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN
SOUTH JORDAN, UTAH



CURVE TABLE					
CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C1	351.00	145.51	144.47	S 43°30'21" E	23°45'09"
C2	60.00	22.66	22.52	S 44°37'38" W	21°38'11"
C3	286.00	165.24	162.95	S 17°15'28" W	33°06'09"
C4	514.00	137.61	137.20	S 08°22'33" W	15°20'21"
C5	486.00	35.02	35.01	S 13°58'53" W	4°07'41"
C6	486.00	65.91	65.86	N 04°35'29" E	7°46'11"
C8	314.00	226.34	221.47	N 21°21'25" E	41°18'03"
C9	60.00	35.16	34.66	N 25°13'18" E	33°34'16"
C10	50.00	17.37	17.28	N 18°23'18" E	19°54'16"
C11	316.00	139.56	138.43	S 18°58'36" E	25°18'18"
C12	104.00	124.58	117.26	N 44°48'23" W	68°38'01"

STATE PLANE COORDINATES		
PNT	NORTHING	EASTING
A	7375182.57	1523827.54
B	7375373.93	1525790.24
C	7376069.21	1525784.55
D	7376454.92	1525727.48
E	7376455.06	1525743.80
F	7376344.48	1525903.98
G	7376313.93	1525908.48
H	7376243.98	1526009.81
I	7376139.19	1526109.27
J	7375235.61	1526665.80
J1	7375104.70	1526710.82
J2	7374539.01	1526773.52
J3	7374538.95	1526762.49
J4	7374541.51	1526697.22
L	7374546.89	1526547.31
M	7374549.94	1526474.29
N	7374549.80	1526426.34
O	7374551.90	1526377.25
P	7374554.19	1526277.44
Q	7374556.46	1526170.08
R	7374561.92	1525917.53
S	7374568.36	1525681.10
T	7374570.17	1525540.24
U	7374571.46	1525471.00
V	7374572.14	1525427.14
W	7374571.17	1525352.97
X	7374567.53	1525230.53
Y	7374570.37	1525230.83
Z	7374554.34	1525215.01
AA	7374398.73	1525166.66
AB	7374052.54	1525162.40
AC	7373916.81	1525142.41
AD	7373845.21	1525121.82
AE	7373811.24	1525113.36
AF	7373818.30	1525317.96
AG	7373805.53	1525340.10
AH	7373297.18	1525564.14
AI	7373270.61	1525282.14
AJ	7373398.04	1525294.88
AK	7373401.07	1524977.77
AL	7373805.69	1524952.91
AM	7373807.84	1525015.05
AN	7373988.63	1525017.29
AO	7373987.24	1525129.13
AP	7374052.89	1525134.40
AQ	7374399.08	1525138.67

LINE TABLE		
LINE	LENGTH	BEARING
L1	5.02	S 27°51'17" E
L2	16.32	N 89°31'50" E
L3	30.88	S 08°23'17" E
L4	123.13	S 55°22'54" E
L5	150.00	N 87°56'44" W
L6	73.09	N 87°36'23" W
L7	47.95	S 89°49'44" W
L8	49.14	N 87°32'40" W
L9	99.83	N 88°41'06" W
L10	107.39	N 88°47'31" W
L11	140.87	N 89°15'58" W
L12	69.25	N 88°55'57" W
L13	74.17	S 89°15'03" W
L14	122.49	S 88°17'43" W
L15	2.86	N 06°00'46" E
L16	74.50	S 16°02'44" W
L17	204.72	N 88°01'19" E
L18	25.56	S 60°01'17" E
L19	128.07	N 05°42'39" E
L20	62.18	N 88°01'19" E
L21	180.80	N 00°42'34" E
L22	37.45	N 06°00'46" E
L23	127.00	N 00°42'23" E
L24	4.78	N 89°17'37" W
L25	9.51	S 89°17'37" E
L26	133.06	N 04°08'44" W
L27	176.44	N 09°02'05" W
L28	11.03	S 89°43'10" W
L29	65.32	N 87°45'24" W
L30	111.85	S 89°17'26" E

STATE PLANE COORDINATES		
PNT	NORTHING	EASTING
AR	7374605.34	1525219.32
AS	7374636.70	1525234.09
AT	7374653.10	1525239.54
AU	7374690.34	1525243.46
AV	7374694.16	1524933.56
AW	7374821.15	1524935.12

STATE PLANE COORDINATES		
PNT	NORTHING	EASTING
AX	7374821.21	1524930.34
AY	7375077.80	1524931.16
AZ	7375077.68	1524940.66
BA	7375210.40	1524931.04
BB	7375384.65	1524903.34
BC	7375389.36	1525037.29
BD	7375384.93	1525039.63

LEGEND

- BOUNDARY LINE
- EXISTING DEED LINES
- MATCH LINE
- FOUND MONUMENT
- SECTION CORNER
- CALCULATED POINT
- SET 5/8 REBAR W/ CAP (CIVIL SCIENCE SURVEYORS)
- FOUND REBAR W/ CAP
- EXISTING BOUNDARY POST

PROFESSIONAL LAND SURVEYOR No. 153771 DODD M. GREER STATE OF UTAH

SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

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CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

SURVEYOR'S CERTIFICATE

I, DODD M. GREER, DO HEREBY CERTIFY THAT I AM A REGISTERED LAND SURVEYOR AND THAT I HOLD CERTIFICATE NO. 153771 AS PRESCRIBED UNDER THE LAWS OF THE STATE OF UTAH. I FURTHER CERTIFY THAT BY AUTHORITY OF THE OWNERS, I HAVE MADE A SURVEY OF THE TRACT OF LAND SHOWN ON THIS PLAT AND DESCRIBED HEREON, AND HAVE SUBDIVIDED SAID TRACT OF LAND INTO LOTS, STREETS, AND EASEMENTS AND HEREAFTER TO BE KNOWN AS:

THE VILLAGE AT RIVERWALK

AND THAT THE SAME HAS BEEN CORRECTLY SURVEYED AND STAKED ON THE GROUND AS SHOWN ON THIS PLAT.

SURVEYOR _____ DATE _____

BOUNDARY DESCRIPTION

BEGINNING AT A POINT WHICH IS N0°04'29"E 98.24 FEET AND S89°44'17"E 2005.28 FEET AND N22°38'54"W 110.83 FEET FROM THE SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN;

RUNNING THENCE N00°28'10"W 695.31 FEET; THENCE N08°24'59"W 389.91 FEET; THENCE N89°31'50"E 16.32 FEET TO A POINT ON THE WEST LINE OF THE JORDAN RIVER PARKWAY AS SURVEYED BY FLOYD LYLE PAGE (LS NO.4614) OF THE UTAH DEPARTMENT OF TRANSPORTATION (SALT LAKE COUNTY SURVEYORS OFFICE RECORD OF SURVEY (S89-07-0333); THENCE SOUTHERLY ALONG THE WEST LINE OF SAID RIVER PARKWAY THE FOLLOWING SIX (6) COURSES AND DISTANCES: (1) S55°22'54"E 194.64 FEET; (2) S08°23'17"E 30.88 FEET; (3) S55°22'54"E 123.13 FEET TO A POINT OF CURVATURE; (4) THENCE SOUTHEASTERLY 145.51 FEET ALONG THE ARC OF A 351.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS S43°30'21"E 144.47 FEET) TO A POINT OF TANGENCY; (5) S31°37'46"E 1061.22 FEET TO A POINT OF CURVATURE; (6) SOUTHERLY 139.56 FEET ALONG THE ARC OF A 316.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS S18°58'38"E 138.43 FEET) TO A POINT OF TANGENCY; THENCE S06°19'29"E 569.16 FEET TO A POINT ON AN EXISTING OLD ESTABLISHED FENCE LINE; THENCE WESTERLY ALONG SAID OLD ESTABLISHED FENCE LINE THE FOLLOWING TEN (10) COURSES AND DISTANCES: (1) S89°43'10"W 11.03 FEET; (2) N87°45'24"W 65.32 FEET; (3) N87°56'44"W 150.00 FEET; (4) N87°36'23"W 73.09 FEET; (5) S89°49'44"W 47.95 FEET; (6) N87°32'40"W 49.14 FEET; (7) N88°41'06"W 99.83 FEET; (8) N88°47'31" WEST 107.39 FEET; (9) N88°45'37"W 252.61 FEET; (10) N88°26'22"W 236.52 FEET; THENCE N89°15'58"W 140.87 FEET; THENCE N88°55'57"W 69.25 FEET; THENCE N89°06'34"W 43.87 FEET; THENCE S89°15'03"W 74.17 FEET; THENCE S88°17'43"W 122.49 FEET; THENCE N06°00'46"E 2.86 FEET; THENCE SOUTHWESTERLY 22.66 FEET ALONG THE ARC OF A 60.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS S44°37'38"W 22.52 FEET); THENCE SOUTHERLY 165.24 FEET ALONG THE ARC OF A 286.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS S17°15'28"W 162.95 FEET); THENCE S00°42'23"W 346.22 FEET; THENCE SOUTHERLY 137.61 FEET ALONG THE ARC OF A 514.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS S08°22'33"W 137.20 FEET); THENCE S16°02'44"W 74.50 FEET; THENCE SOUTHERLY 35.02 FEET ALONG THE ARC OF A 486.00 FOOT RADIUS CURVE TO THE LEFT (CHORD BEARS S13°58'53"W 35.01 FEET); THENCE N88°01'19"E 204.72 FEET; THENCE S60°01'17"E 25.56 FEET; THENCE S23°47'01"E 555.53 FEET; THENCE S84°37'04"W 283.25 FEET; THENCE N05°42'39"E 128.07 FEET; THENCE N89°27'14"W 317.12 FEET; THENCE N03°30'59"W 405.39 FEET; THENCE N88°01'19"E 62.18 FEET; THENCE N00°42'34"E 180.80 FEET; THENCE S89°17'26"E 111.85 FEET; THENCE ON A 486.00 FOOT RADIUS CURVE TO THE LEFT 65.91 FEET, (CHORD BEARS N04°35'29"E 65.86 FEET); THENCE N00°42'23"E 346.22 FEET; THENCE NORTHERLY 226.34 FEET ALONG THE ARC OF 314.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS N21°21'25"E 221.47 FEET); THENCE NORTHEASTERLY 35.16 FEET ALONG THE ARC OF A 60.00 RADIUS CURVE TO THE LEFT (CHORD BEARS N25°13'18"E 34.66 FEET); THENCE NORTHERLY 17.37 FEET ALONG THE ARC OF A 50.00 RADIUS CURVE TO THE RIGHT (CHORD BEARS N18°23'18"E 17.28 FEET); THENCE N06°00'46"E 37.45 FEET; THENCE N89°17'36"W 309.93 FEET; THENCE N00°42'23"E 127.00 FEET; THENCE N89°17'37"W 4.78 FEET; THENCE N00°10'59"E 256.59 FEET; THENCE S89°17'37"E 9.51 FEET; THENCE N04°08'44"W 133.06 FEET; THENCE N09°02'05"W 176.44 FEET; THENCE N87°59'03"E 134.03 FEET; THENCE S27°51'17"E 5.02 FEET; THENCE S89°09'37"E 750.70 FEET TO THE POINT OF BEGINNING.

CONTAINS 49.73 ACRES.

OWNER'S DEDICATION

THE OWNER(S) OF THE PARCEL OF LAND WHICH IS SHOWN UPON THE PLATS OF THE VILLAGE AT RIVERWALK DOES CONSENT TO THE PREPARATION AND RECORDATION OF THIS PLAT AND DOES HEREBY OFFER AND CONVEY TO ALL PUBLIC UTILITY AGENCIES AND THEIR SUCCESSORS AND ASSIGNS A PERMANENT EASEMENT AND RIGHT-OF-WAY AS SHOWN AND MARKED "JOINTLY OWNED/MAINTAINED BY THE RIVERWALK SINGLE FAMILY & RIVERWALK TOWNHOME HOME OWNERS ASSOCIATION (HOA)", AND "OWNED/MAINTAINED BY THE RIVERWALK TOWNHOME HOME OWNERS ASSOCIATION (HOA)", AND "PRIVATE ROAD" ON THE WITHIN PLATS FOR THE CONSTRUCTION AND MAINTENANCE OF SUBTERRANEAN ELECTRICAL, TELEPHONE, NATURAL GAS, SEWER AND WATER LINES AND OTHER PUBLIC UTILITY APPURTENANCES, TOGETHER WITH THE RIGHT OF ACCESS THERETO. IN WITNESS HEREOF WE HAVE HEREUNTO SET OUR HANDS THIS _____ DAY OF _____ A.D., 20__

ARBOR GARDNER L.C. _____ LIBERTY VENTURES L.C. _____

WELLS FARGO BANK NA

APPROVED AS TO FORM THIS _____
DAY OF _____ A.D., _____
STEVE STRONG

ACKNOWLEDGMENT

STATE OF UTAH }
COUNTY OF SALT LAKE } S.S.

ON THIS _____ DAY OF _____ A.D., 20__, PERSONALLY APPEARED BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY OF SALT LAKE IN SAID STATE OF UTAH, THE SIGNER ( ) OF THE ABOVE OWNER'S DEDICATION, ____ IN NUMBER, WHO DULY ACKNOWLEDGED TO ME THAT _____ SIGNED IT FREELY AND VOLUNTARILY AND FOR THE USES AND PURPOSES THEREIN MENTIONED.

MY COMMISSION EXPIRES _____ _____
NOTARY PUBLIC
RESIDING IN SALT LAKE COUNTY

JUNE 30, 2005

THE VILLAGE AT RIVERWALK

A PLANNED RESIDENTIAL DEVELOPMENT

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN
SOUTH JORDAN, UTAH
SCALE: 1' = 150'

SHEET 1 OF 6

SOUTH VALLEY SEWER DISTRICT

APPROVED THIS _____ DAY OF _____ A.D., _____
DIRECTOR, SOUTH VALLEY SEWER DISTRICT

BOARD OF HEALTH

APPROVED THIS _____ DAY OF _____ A.D., _____
DIRECTOR, S.L. CO. BOARD OF HEALTH

PLANNING COMMISSION

APPROVED THIS _____ DAY OF _____ A.D., _____ BY THE SOUTH JORDAN CITY PLANNING COMMISSION.
PLANNING COMMISSION CHAIRMAN

CITY ENGINEER

I HEREBY CERTIFY THAT THIS OFFICE HAS EXAMINED THIS PLAT AND IT IS CORRECT IN ACCORDANCE WITH THE INFORMATION ON FILE IN THIS OFFICE
CITY ENGINEER

CITY ATTORNEY

APPROVED AS TO FORM THIS _____
DAY OF _____ A.D., _____
SOUTH JORDON CITY ATTORNEY

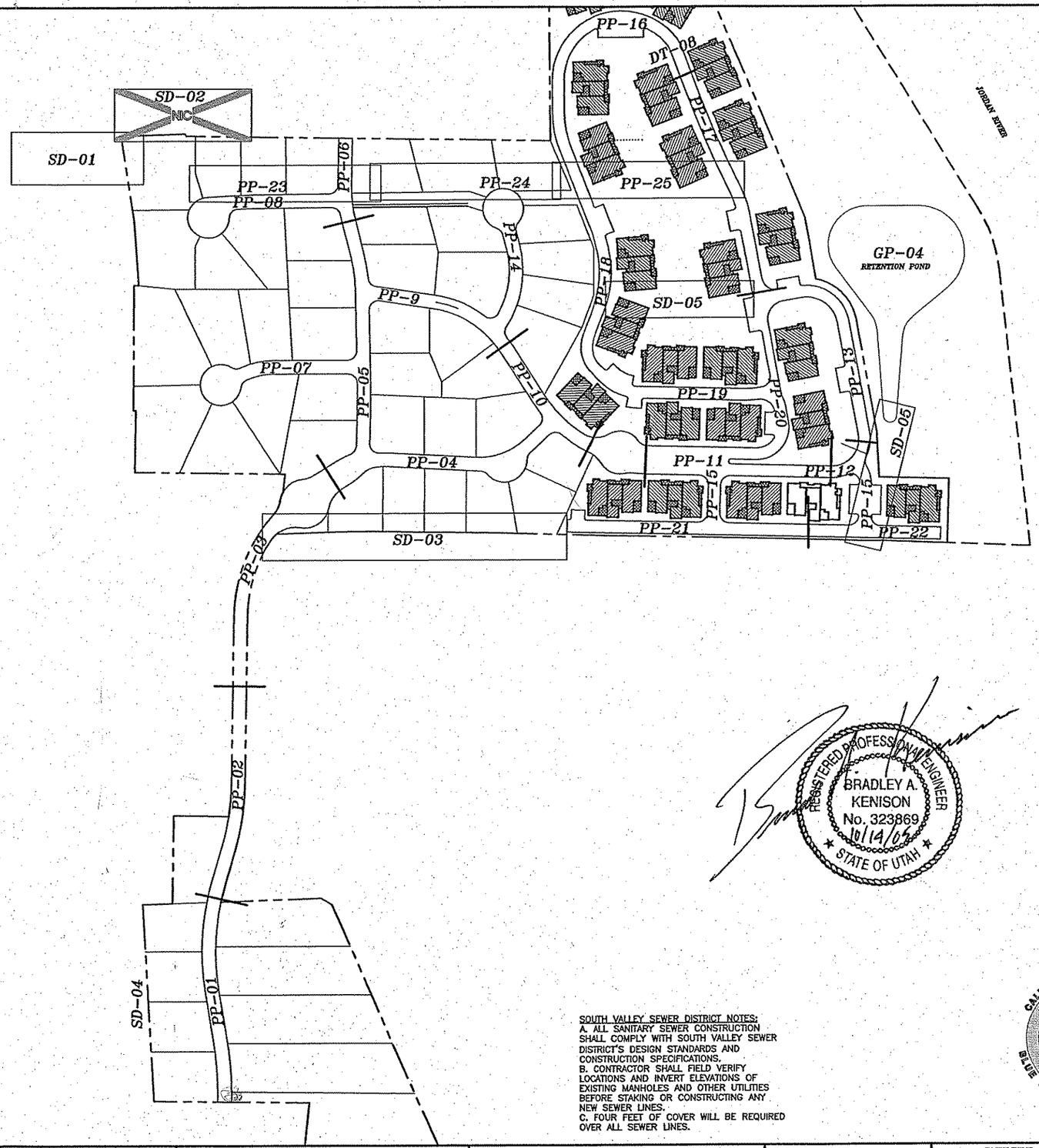
CITY APPROVAL

PRESENTED TO THE BOARD OF SOUTH JORDON CITY COMMISSIONERS THIS ____ DAY OF _____ A.D. _____. AT WHICH TIME THIS SUBDIVISION WAS APPROVED AND ACCEPTED.
ATTEST: SOUTH JORDAN CLERK MAYOR, SOUTH JORDAN, UTAH

RECORDED

STATE OF UTAH, COUNTY OF SALT LAKE, RECORDED AND FILED AT THE REQUEST OF _____
DATE _____ TIME _____ BOOK _____ PAGE _____
FEE$ _____ SALT LAKE COUNTY RECORDER

...\2004\04122 - Riverwalk Subdivision\CAD\Sheets\Final\FINAL PLAT 1of6.dwg 10/13/2005 5:57:38 PM MST



LEGEND

- FUTURE DEVELOPMENT BOUNDARY LINE
- BOUNDARY LINE
- FOUND MONUMENT
- SECTION CORNER
- CALCULATED POINT
- SET 5/8 PIN
- PROPOSED RIGHT-OF-WAY
- PROPOSED LOT LINE
- PROPOSED CENTERLINE
- PROPOSED BUILDING SETBACK
- PROPOSED EASEMENT
- PROPOSED CURB & GUTTER
- PROPOSED 8" PVC C-900 DR18 (BLUE) CULINARY WATERLINE
- PROPOSED 16" DUCTILE IRON CULINARY WATERLINE
- PROPOSED 8" SEWER LINE
- PROPOSED STORM DRAIN LINE
- PROPOSED DRAINAGE CHANNEL
- PROPOSED 6' HIGH WHITE VINYL FENCE
- PROPOSED 6' WROUGHT IRON FENCE WITH BRICK MASONRY PILLARS
- PROPOSED PRECAST MASONRY WALL
- PROPOSED 100 YR FLOODPLAIN LINE
- PROPOSED 500 YR FLOODPLAIN LINE
- PROPOSED 6' HIGH NO-CLIMB FIELD FENCE
- PROPOSED 8" TEE W/(3) 8" VALVES W/THRUST BLOCKS (SEE DT-01)
- PROPOSED 8" CROSS W/(4) 8" VALVES W/THRUST BLOCKS (SEE DT-01)
- PROPOSED AIR VAC ASSEMBLY
- PROPOSED UTILITY CROSSING WITH (2) 4" PVC-40 PIPE
- PROPOSED DOUBLE CATCHBASIN
- PROPOSED CATCHBASIN (APWA #310)
- PROPOSED FIRE HYDRANT
- PROPOSED WATER VALVE
- PROPOSED BLOW-OFF
- PROPOSED WASHNUT VALVE ASSEMBLY
- PROPOSED CATEGORY 4 STREETLIGHT
- PROPOSED MANHOLE (APWA #331)
- PROPOSED STOP SIGN (SOUTH JORDAN STANDARD)
- PROPOSED STREET SIGN (SOUTH JORDAN STANDARD)
- PROPOSED WATER VALVE (SOUTH JORDAN STANDARD)
- PROPOSED 5' CONCRETE SIDEWALK
- EXISTING WATER VALVE
- EXISTING SEWER MANHOLE
- EXISTING STORM DRAIN MANHOLE
- EXISTING TREE
- EXISTING FIRE HYDRANT
- EXISTING PROPERTY LINES
- EXISTING CURB & GUTTER
- EXISTING EDGE OF ASPHALT
- EXISTING EDGE OF GRAVEL
- EXISTING WIRE FENCE
- EXISTING WOOD FENCE
- EXISTING VINYL FENCE
- EXISTING CHAINLINK FENCE
- EXISTING DITCH
- EXISTING WETLANDS
- EXISTING TREELINE
- EXISTING 36" SEWER LINE
- EXISTING 48" SEWER LINE
- EXISTING STORM DRAIN LINE
- EXISTING WATERLINE
- EXISTING BUILDING
- EXISTING CULVERT

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

SOUTH VALLEY SEWER DISTRICT NOTES:
A. ALL SANITARY SEWER CONSTRUCTION SHALL COMPLY WITH SOUTH VALLEY SEWER DISTRICT'S DESIGN STANDARDS AND CONSTRUCTION SPECIFICATIONS.
B. CONTRACTOR SHALL FIELD VERIFY LOCATIONS AND INVERT ELEVATIONS OF EXISTING MANHOLES AND OTHER UTILITIES BEFORE STAKING OR CONSTRUCTING ANY NEW SEWER LINES.
C. FOUR FEET OF COVER WILL BE REQUIRED OVER ALL SEWER LINES.

CALL BEFORE YOU DIG! IT'S THE LAW BLUE STAKES 1 800 662 4111

GRAPHIC SCALE
0 60 120 180 240
HORIZONTAL
11x17 - 1"=240'
24x36 - 1"=120'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

NO	REVISIONS	BY	DATE

DRAWN GSB	7/8/05	DATE
CHECKED RWA (PROJECT ENGINEER)	7/8/05	DATE
APPROVED BAK (PROJECT MANAGER)	7/8/05	DATE

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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CIVIL SCIENCE
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3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

THE VILLAGE AT RIVERWALK

PLAN INDEX & LEGEND SHEET

PROJECT NO.: 04122
SHEET NO. G-02
FILE NAME: IP-01
SCALE: AS SHOWN

J:\04122 - Riverwalk Subdivision\CAD\Sheets\Final\IP-01.dwg 8/24/2005 10:11:20 AM MST

1.1 South Jordan City General Notes

1. All construction and materials shall be in accordance with APWA standard plans and Specifications 2002 edition; and other applicable approved standards issued by the controlling agency; the International Building Code; and all local city codes and ordinances applicable.
2. The existence and location of any overhead or underground utility lines, pipes, or structures shown on these plans are obtained by a research of the available records. Existing utilities are located on plans only for the convenience of the Contractor. Existing utility service laterals may not be shown on the plans. The Contractor shall, at his own expense, locate all underground and overhead interferences, which may affect his operation during construction and shall take all necessary precautions to avoid damage to same. The Contractor shall use extreme caution when working near overhead utilities so as to safely protect all personnel and equipment, and shall be responsible for all cost and liability in connection therewith.
3. The Contractor shall take all precautionary measures necessary to protect existing utility lines, structures and street improvements which are to remain in place, from damage, and all such improvements or structures damaged by the Contractor's operations shall be repaired or replaced satisfactory to the City Engineer and owning utility company at the expense of the Contractor.
4. All construction shall be as shown on these plans, any revisions shall have the prior written approval of the City Engineer.
5. Class 4000 concrete shall be used in all off-site concrete work. Concrete to be 4000 P.S.I. minimum @ 28 days. Mix designs to be approved by the City, prior to the use on the project. Any concrete placed between October 1st and March 1st must be a 7.3 bag mix minimum & 5000 psi concrete.
6. Permits are required for any work in the public Right-of-way. The Contractor shall secure all permits and inspections required for this construction.
7. Expansion joints required, maximum every 100' when hand forming curb, and 300' when slipping curb.
8. AC pavement to be one-half inch (1/2") above lip of all gutters after compaction, except at sidewalk ramps and cross gutters.
9. Curb, gutter, and sidewalk, found to be unacceptable to the City shall be removed and replaced.
10. Sidewalk ramps shall be constructed in each quadrant of an intersection using a 2' by 4' insert with raised truncated dome per latest ADA requirements (dark grey in color) . Exact location of ramps may be adjusted in the field by a City Inspector.
11. Contractor shall provide all necessary horizontal and vertical transitions between new construction and existing surfaces to provide for proper drainage and for ingress and egress to new construction. The extent of transitions to be as shown on plans.
12. All grading work shall conform to the soils report as prepared by the Soils Engineer and approved by the City Engineer, and as shown on these plans.
13. Exact location of all sawcut lines may be adjusted or determined in the field by a City of South Jordan Engineer if location on plans is not clearly shown, or existing pavement condition requires relocation.
14. The Contractor shall take all precautions necessary to protect existing permanent surveying monuments. Any monuments disturbed shall be replaced and adjusted per available records at the Salt Lake County Surveyors Office.
15. Utility company meter boxes, manhole lids, valve covers, etc., shall be located out of driveways, driveway aprons, flowlines, and cross gutters unless written approval is granted by the utility company and the City Engineer.
16. All walls, new or existing, are only shown on civil plans for the purpose of reviewing grading relationships; flood control and sight distance at intersections. New walls require a separate permit and inspection by the Building Department.
17. Asphalt mix design must be submitted and approved by the City Engineer prior to the placement of Asphalt within City Right of Way.
18. Contractor shall adjust all new and existing inlets, valve boxes, manhole rims, and sewer clean outs, etc. to finish grade as applicable whether or not they are shown on the plans.
19. Application for inspection by the City of South Jordan engineering dept. shall be made by the contractor at least 48 hours before the inspection services will be required.
20. Work in public streets, once begun, shall be prosecuted to completion without delay as to provide minimum inconvenience to adjacent property owners and to the traveling public.
21. The contractor shall take all necessary and proper precautions to protect adjacent properties from any and all damage that may occur from storm water runoff and/or deposition of debris resulting from any and all work in connection with construction.
22. Prior to 90% bond release, a certified legible as-built drawing (Mylar and electronic file in dxf format) must be submitted to the City of South Jordan. As-builts must show all changes and actual field locations of storm drainage, waterlines, irrigation, street lighting, and power. In the absence of changes, a copy of the approved drawings on mylar will be required stating "installed as per drawings" and certified as such by the developers engineer along with the electronic file in dxf format.
23. Approval of these plans is for the construction of offsite improvements only. All onsite improvements, as defined by the City of South Jordan, including block walls, must be approved by the engineering and planning divisions of the City of South Jordan.
24. Existing utilities are located on plans for the convenience of the contractors only. The contractor shall bear full responsibility for the protection of utilities and the engineer bears no responsibility for utilities not shown on the plans or not in the location shown on the plans. This includes all service laterals of any kind.
25. Power poles and/or other existing facilities not in proper location based on proposed improvements shown hereon will be relocated at no expense to the City of South Jordan. Power poles are to be relocated and buried.
26. Curb and gutter with a grade of less than four-tenths of one percent shall be constructed by forming. Each joint shall be checked for a grade prior to construction and water tested as soon as possible after construction.
27. All grading shall conform to the soils report
Engineer:
Date:
Job Number:
28. All street structural sections shall be per the recommendation of the soils engineer. No paving or base work shall commence until a street structural section is approved by the City of South Jordan Engineer.
29. Before any work is started in the right-of-way, the contractor shall install all advance warning signs for the construction zone. The contractor shall install temporary stop signs at all new street encroachments into existing public streets. Immediately after the first grading work is accomplished and shall maintain said signs until permanent signs are installed. All construction signing, barricading, and traffic delineation shall conform to UDOT Standards and to the manual of uniform traffic control devices-current edition and be approved by the City of South Jordan before construction begins.
30. All stationing is referenced to centerline.
31. Protection and replacement of survey monuments or property stakes not delineated on the contract drawings shall be the contractor's responsibility. Replacement of survey monuments or property stakes shall be done to Salt Lake County Standards.
32. Affected utility companies shall be notified at least two (2) working days prior to commencement of construction.
33. Modifications to existing utilities shall conform to the owner's utility standards and specifications.
34. The contractor shall take reasonable measures to protect existing improvements from damage and all such improvements damaged by the contractors operation shall be repaired or reconstructed to the engineer's satisfaction at the expense of the contractor.
35. City approval of the improvement plans is granted for one (1) year only. Plans must be resubmitted for review and approval to the engineering dept. City of South Jordan, if work is not completed by _____, 20_____
36. Contractor to follow Salt Lake County Noise Ordinance Standards.
37. Contractors are responsible for all OSHA requirements on the project site.
38. All boundary corners and lot corners shall be marked with survey markers as shown in the standard plans.
39. Trench backfill material under pavements or surface improvements shall be clean, non-clumping, granular and flowable (A1-A4 soils are acceptable according to AASHTO 145 soil Classification System. Lime treated flowable fills, if approved, shall have a 28-day strength of 65 PSI.
40. Contractor to contact blue stakes for marking of existing utilities prior to performing any excavation.
41. A UPDES (Utah Pollutant Discharge Elimination System) permit is required for all construction activities 1 acre or more as well as providing a Storm Water Pollution Prevention Plan.
42. Developer is responsible for locating and repairing all underground streetlight wires, water lines, storm drain lines and irrigation lines until 90% of the bond has been released.
43. All City maintained utilities including; waterline, fire hydrants, streetlight wiring, and storm drain must be in public right of way or recorded in easements.
44. Before two-year warranty period can begin a gazbee disk must be submitted and reviewed.
45. Contractor shall work South Jordan City regular working hours of Monday through Friday. If Contractor permits overtime work or work on a Saturday, Sunday or any legal holiday, Contractor shall receive prior approval by City Engineer. Contractor shall obtain all permits and pay Overtime Inspection Fee's to The City of South Jordan on the Thursday prior to the Saturday, Sunday or legal holiday requested.
6/17/05

1.2 City of South Jordan Traffic Notes

1. All construction signing, barricading, and traffic delineation shall conform to the "Manual on Uniform Traffic Control Devices", Latest Edition & have a MUTCD on site.
2. The street Sign Contractor shall obtain street names and block numbering from the Planning Department prior to construction.
3. Before any work is started in the right-of-way, the Contractor shall install all advance warning signs for the construction zone. The Contractor shall install temporary stop signs at all new street encroachments into existing City streets where warranted immediately after first grading work is accomplished, and shall maintain said signs until permanent signs are installed.
4. When a designated "Safe Route To School" is encroached upon by a construction work zone and Public Services Staff identifies a need for students to be assisted in the safe crossing through that work zone, the School needs to be notified and the Contractor shall be required to provide a qualified "crossing guard". The guard shall be present for the full duration of time that children are likely to be present.
5. If the improvements necessitate the obliteration, temporary obstruction, temporary removal or relocation of any existing traffic pavement marking, such pavement marking shall be restored or replaced with like materials to the satisfaction of the Street Division.
6. The Contractor shall be responsible for providing and installing all permanent signs shown on the plans. Street name signs shall conform in their entirety to current City Standards. All other signs shall be standard size unless otherwise specified on the plans. All sign posts shall be installed in accordance with the current City Standards.
7. All permanent traffic control devices called for hereon shall be in place and in final position prior to allowing any public traffic onto the portions of the road(s) being improved hereunder, regardless of the status of completion of paving or other off-site improvements called for by these plans.
8. Street signs and stop signs shall be installed per City Standard Specifications.
9. The Contractor shall provide barricades, signs, flashers, other equipment and flag persons necessary to insure the safety of workers and visitors.
10. The Contractor shall be responsible for notifying Utah Transit Authority (UTA) if the construction interrupts or relocates a bus stop or has an adverse effect on bus service on that street to arrange for temporary relocation of stop. 4/1/05

1.3 City of South Jordan Streetlight Notes

1. No deviation of street light, pull box, conduits (etc.) locations shall be permitted without written approval of the City Engineering Department. Any deviation from the plan location will require written notice from the Engineering Department.
2. All existing street lighting shall remain operational during construction.
3. All empty conduit shall have pull strings installed prior to final inspection.
4. All streetlights shall be 120 V ONLY.
5. Any structure such as block walls, chain link fences, retaining walls, etc., shall leave a minimum clearance of eighteen inches (18") to the face of street lightning pole on all sides when streetlight is installed behind sidewalk, and shall at no time completely enclose the street lighting pole.
6. Detailed As-built drawings shall be supplied to South Jordan City prior to any pre-final inspection. The as-built drawing needs to be stamped as -built and signed by the preparer.
7. Service point shall be coordinated with Utah Power and Light, and wherever possible, be located near the center of the circuit. Service points shall be shown on the plans.
8. It shall be assumed that in the absence of an existing, workable circuit to attach to, all installations shall require a new service for operation of the circuit. In this case contact Utah Power and Light.
9. Wherever there is an overhead utility that may conflict with the installation of street lighting circuits and/or poles, these conflicts must be resolved between the developer and the Utilities involved before streetlight bases are installed at no expense to the City of South Jordan and UPL.
10. The Contractor shall furnish complete service to transformers and control systems if required on plans, and is deemed necessary by UPL.
11. Install street light to SJC Design Standards with Tracer Wire.
12. Street light wiring shall be installed a maximum of 8" from the top back of curb and buried 18" deep.
13. Street light plan showing wiring location, wiring type, voltage, power source location and conduit size and location. Plan shall be submitted to the City for review at least 10 days prior to installation of streetlights.
14. A Junction box needs to be installed between the power source and light fixture. Contractor is to install Junction box with inline fuse. The box is to be located 4 feet from UP&L transformer or UP&L secondary box. Leave 8 feet excess wire to transformer or 6 feet excess wire to secondary box, so UP&L will make connection. The inline fuse holder shall be a Busman Tron HEB-JJ. The fuse should be, 10A, 250V, KTK, FNM, FNQ, BAF, or equivalent. The Junction box, should be a small plastic with disposable lock, underground type box for little or no traffic, with "streetlight" on lid.
15. Contractor shall bury wiring from light pole to junction box and from junction box to UP&L transformer or secondary box.
16. After being connected by UP&L, all streetlights must have photocell eye covered and pass a 10-day burn test.
17. When required by Section 1604.210, subsection 2, of the South Jordan City Development Code, or under other city, county or state requirements Street lights shall be installed under the above requirements as per the table below:

Streetlight Category & TypeStreets	Streets
1-Six-sided Utility Arlington double head fixture with Cincinnati cross Arms and Charleston Pole	Redwood Road, South Jordan Parkway (10400 South), 11400 South, and Jordan Gateway
2-Six sided Utility Arlington single fixture with Charleston Pole	1300 West, 2700 West, 4000 West, 4800 West, 9800 South, and River Heights Drive
3-Utility Granville with trim tabs and North Yorkshire pole	1000 West, 2200 West, 3200 West, 3600 West, and 10200 South, and Riverfront Parkway (south of 11400 South)
4-Utility Post Top with Wadsworth pole	Residential Neighborhood Streets

18. 1 Residential developments may, at the developer's expense, upgrade streetlight fixtures to category 3 types. All fixtures within the development shall be the same type. 4/1/05

1.4 City of South Jordan Grading Notes

1. In the event that any unforeseen conditions not covered by these notes are encountered during grading operations, the Owner and City Engineer shall be immediately notified for direction.
2. It shall be the responsibility of the Contractor to perform all necessary cuts and fills within the limits of this project and the related off-site work, so as to generate the desired subgrade, finish grades and slopes shown.
3. Contractor shall take full responsibility for all excavation. Adequate shoring shall be designed and provided by the Contractor to prevent undermining of any adjacent features or facilities and/or caving of the excavation.
4. The Contractor is warned that an earthwork balance was not necessarily the intent of this project. Any additional material required or leftover material following earthwork operations becomes the responsibility of the Contractor.
5. The Grading Contractor is responsible to coordinate with the owner to provide for the requirements of the project Storm Water Pollution Prevention Plan (SWPPP) and associated permit. All contractor activities 1 acre or more are required to provide a Storm Water Pollution Prevention Plan.
6. Contractor shall grade to the lines and elevations shown on the plans within the following horizontal and vertical tolerances and degrees of compaction, in the areas indicated:
Horizontal Vertical Compaction
a. Pavement Area Subgrade 0.1'+ +0.0' to -0.1' See soils Report
b. Engineered Fill 0.5'+ +0.1' to -0.1' See Soils Report
Compaction Testing will be performed by the developer or his representative.
7. All cut and fill slopes shall be protected until effective erosion control has been established
8. The use of potable water without a special permit for building or construction purposes including consolidation of backfill or dust control is prohibited. The Contractor shall obtain all necessary permits for construction water from the Public Services Department.
9. The Contractor shall maintain the streets, sidewalks and all other public right-of-way in a clean, safe and usable condition. All spills of soil, rock or construction debris shall be promptly removed from the publicly owned property during construction and upon completion of the project. All adjacent property, private or public shall be maintained in a clean, safe and usable condition.
10. In the event that any temporary construction items is required that is not shown on these drawings, the Developer agrees to provide and install such item at his own expense and at the direction of the City Engineer. Temporary construction includes ditches, berms, road signs and barricades, etc. 4/1/05

1.5 City of South Jordan Fire Department Notes

1. The standard hydrant for South Jordan City is the:
Mueller a-423 Centurion with auxiliary valve
2. Fire hydrants and auxiliary valves shall be separated by an 18 inch spool piece.
3. On any new home or building installation, accessible fire hydrants shall be installed before combustible construction commences and said fire hydrants shall be in good working order with an adequate water supply.
4. Contractor shall call the Public Services Department and Engineering Inspector for underground inspection, pressure and flush verification of all fire hydrants and fire lines before back filling.
5. Painting of the curbs and hydrant and any work necessary for protection of hydrants from physical damage shall be completed before approval.
6. A flow test must be witnessed by the Fire Department prior to occupancy for verification of required on-site water supply.
7. All on-site fire main materials must be U.L. listed and A.W.W.A. approved.
8. Maximum Fire Hydrant Spacing is 500 feet for Residential streets and 400 feet for Commercial areas, including multi-family. Fire Hydrant spacing is reduced by 50 feet on dead-end streets and dead-end waterlines
9. No fire hydrant shall be located within five feet (5') of any curb return, driveway, power pole, street light or any other obstruction.
10. Not more than two (2) hydrants can be out of service due to a single main break. Two sources of supply are required whenever there are two (2) or more fire hydrants installed on a single system.
11. Fire apparatus access roads shall have an unobstructed width of not less than twenty feet (20') provided no parking is allowed, not less than twenty - eight feet (28') if parallel parking is allowed on one side, and not less than thirty - six feet (36') if parallel parking is allowed on both sides. Vertical clearance shall not be less than thirteen-feet-six - inches (13' 6") and shall be paved.
12. The turning radius for any fire apparatus access road and/or fire lane, public or private, shall be not less than forty-five feet (45') outside radius and twenty-two feet (22') inside radius and shall be paved.
13. A fire apparatus road shall be required when any portion of an exterior wall of the first story is located more than one-hundred fifty feet (150') from Fire Department vehicle access roads and/or fire lanes, public or private, in excess of one-hundred fifty feet (150') in length shall be provided with an approved turn around area.
14. Access roads shall be marked by placing approved signs at the start of the designated fire lane, one sign at the end of the fire lane and width signs at intervals of one-hundred feet (100' along all designated fire lanes. Signs to be placed on both sides of an access roadway if needed to prevent parking on either side. Signs to be installed no higher than ten feet (10') or less than six feet (6') form roadway level. The curb along or on the pavement or cement if curb is not present, shall be painted with red weather resistant paint in addition to the signs.
15. Electrically controlled access gates shall be provided with an approved emergency vehicle detector/receiver system. Said system shall be installed in accordance with the South Jordan City F.D. Approval. Gates are only allowed with prior Approval.
16. All underground fire lines that service automatic fire sprinkler systems shall be no smaller than six (6) inches in diameter. All fire lines material shall be Ductile Iron. (Ductile Iron from the PIV to the building shall be permitted or Ductile Iron from the main water line to the WIV).
17. Post Indicator Valves (PIV) shall be between 6 and 40 feet from buildings not exceeding three stories or equivalent in height and between 30 and 40 feet on buildings in excess of three or more stories in height or equivalent.
18. Roads and accesses shall be designed and maintained to support the imposed loads of fire apparatus. Surface shall be psved before the application of combustible material. 4/1/05

1.6 South Jordan City Water Notes

1. No work shall begin until the water plans have been released for construction by the Engineering Department. Following water plan approval, forty-eight (48) hour notice shall be given to the Public Services Department (253- 5230) prior to the start of construction. Notice must be given by 2:00 P.M. the business day prior to an inspection.
2. All work within South Jordan City shall conform to APWA, City Provisions, & AWWA.
3. For Residential Developments - The developer shall purchase and install meter boxes and setters satisfactory to the Public Services Department on newly developed lots and real property at the time of water main installation. The developer shall also provide the site address, lot number, meter size and pay meter fees prior to plan check approval.
4. For Commercial and Condominium Developments - The developer shall purchase and install water meters, meter boxes and setters satisfactory to the Public Services Department.
5. All water meters are to be a Badger Meter equipped with an Absolute Digital Encoder with pit set Itron ERT (Encoder Receiver Transmitter) module. All meter lids need to be recessed for transmitter.
6. All service laterals two inches (2") in diameter and smaller shall be IPS Poly tubing with South Jordan City approved service saddles.
7. All water meter boxes shall be located outside of driveway areas, no concrete within 2' of edge of lid.
8. All valves shall be located outside of driveways, gutters, curbs and alley gutters.
9. Warning tape placed 18" over pipe & tracer wire shall be required over all mains, all six-inch (6") diameter and larger service laterals, and any service lateral not installed perpendicular to the main.
10. All water facilities shall be filled, disinfected, pressure tested, flushed, filled and an acceptance water sample obtained prior to connection to the South Jordan City Distribution System.
11. Construction may interrupt service, with South Jordan City Public Services approval and proper notification, between the hours of 10:00 P.M. and 6:00 A.M. Sunday through Thursday. Circumstances that may require temporary service feed must have prior South Jordan City Public Services approval.
12. All water facility construction materials used must be as listed on the South Jordan City Services Works pre-approved materials and manufacturers listing for new facilities, latest revision or specifically approved on these plans.
13. Approval of these plans for the water stubout installation will not be construed as a commitment for water service to this property.
14. CONDITIONAL APPROVAL OF VALVED OUTLET (6" AND LARGER):
In the event the water plans show one or more valved outlets extending out of paved areas, installations of these outlets is acceptable, however, if the outlets are incorrectly located or not used for any reason when the property is developed, the developer shall abandon the outlets at the connection to the active main in accordance with the city standards and at the developer's expense.
15. WATER CROSSING NOTE:
The following are the requirements that must be met when there is a water-sewer or water-storm crossing:
When protection of the water line is considered, the minimum vertical distance eighteen inches (18") must be maintained when the water line is installed over the sewer/storm line. If this distance cannot be maintained because of physical obstructions or the water line must be placed under the sewer/storm line, the sewer/storm line must be constructed with any one of the following:
A) Extra heavy cast iron or ductile iron pipe
B) Encasement with 4 inches minimum of concrete or sleeving with water quality pipe.
Each of these provisions must be extended for ten feet (10') on either side of the water line at 90 degrees to the crossing.
16. All work shall conform to the South Jordan City standards and specifications.
17. Service saddles or tapped collars will be required on all services.
18. Sewer and other Pollution Sources which are parallel with water lines shall have a minimum separation of 10 foot horizontal, at points where water and sewer lines cross a minimum vertical separation of 18 inches is required.
19. Deflection angle shall not exceed 2 ½ degrees per 13-foot section of pipe for pipe sizes smaller than 14 inches and shall not exceed 2 degrees for pipe sizes between 14 inches and 16 inches.
20. Contractor to provide thrust blocks as required.
21. All lines to be pressure tested according to AWWA standards and chlorinated prior to use and final acceptance.
22. All fittings to be coated poly fm grease and wrapped with 8-mil thick polyethylene.
23. All valve boxes shall have concrete collars at surface of paved areas per South Jordan City Standards. Fire Hydrants, auxiliary valves and valve boxes to be set in 4'x5'x6" concrete.
24. No other utility lines may be placed in the same trench with water line.
25. No water meter boxes are to be placed in the driveway area. Service lateral locations shall be field verified prior to paving of street.
26. Culinary water lines shall be sized as shown on the approved plans. Residential services shall be ¾" diameter IPS as shown on plans, unless approved by City Water Division. Non-residential services shall be sized as shown on plans.
27. All water lines installed on project shall be PVC C-900 DR18 minimum PR 150 (waterline must be blue unless sewer is green) Secondary water lines installed on project shall be purple PVC C-900 DR18 minimum PR 150.
28. All gate valves are to be Mueller and resilient seated.
29. The contractor shall be responsible for removal of all material spilled on existing roadways on a daily basis.
30. Any conflict with existing utilities shall be immediately called to the attention of the engineer.
31. All water vaults will be constructed per City of South Jordan standard drawings and specifications. No vaults are allowed in traffic areas without prior approval of engineering.
32. Landscaping and irrigation adjacent to vaults shall drain away from vaults.
33. Contractor shall provide appurtenances to perform pressure tests and disinfections as required by the City Engineer.
34. Culinary water lines shall have a minimum of 48 inches of cover to finish grade. Secondary water lines shall have a minimum of 36 inches of cover to finish grade.
35. Culinary water services and meters for residential developments shall be centered on the front of the lot and located within the park strip. Secondary water services shall also be located in the park strip with the stop and waste valve adjacent to the sidewalk and offset 7 feet from the side property line.
36. The contractor shall place a brass disk in the top back of the curb at the locations of the house services. Stamped "W" for culinary water, and "S" for sanitary sewer. The disks are supplied and installed by the contractor.
37. The contractor shall provide positive isolation of proposed culinary water lines from existing lines, as approved by the City, during construction, testing, chlorinating, and final connection procedures, as specified in section 4.8 and section 9 of AWWA C651 standards.
38. Once the waterline has been tested, approved and city water is flowing through the pipe, only City personnel are authorized to shut down and charge the waterline. 4/1/05

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
6/24/05
STATE OF UTAH

REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
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THE VILLAGE AT RIVERWALK

SOUTH JORDAN NOTES

PROJECT NO.: 04122
SHEET NO. G-03
FILE NAME: NT-01
SCALE: AS SHOWN

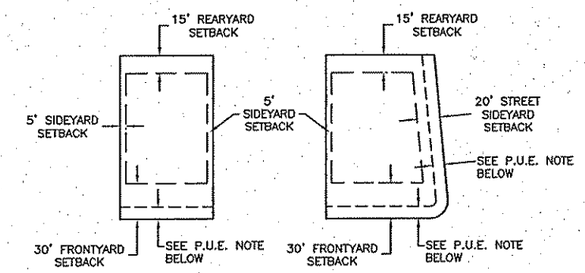
04122 - Riverwalk Subdivision\CAD\Sheets\Prelim\02-PRE-PLAT A.dwg 5/6/2005 2:54:47 PM MST

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11,
TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE
AND MERIDIAN

LEGEND

- BOUNDARY LINE
- PROPOSED RIGHT-OF-WAY LINE
- PROPOSED LOT LINE
- EASEMENT LINE
- CENTER LINE
- PROPOSED SETBACK (LOT 4)
- SET 5/8" REBAR W/ CAP
- CALCULATED POINT, NOT SET
- SUBDIVISION MONUMENT
- 852 S. — STREET ADDRESS BLOCK



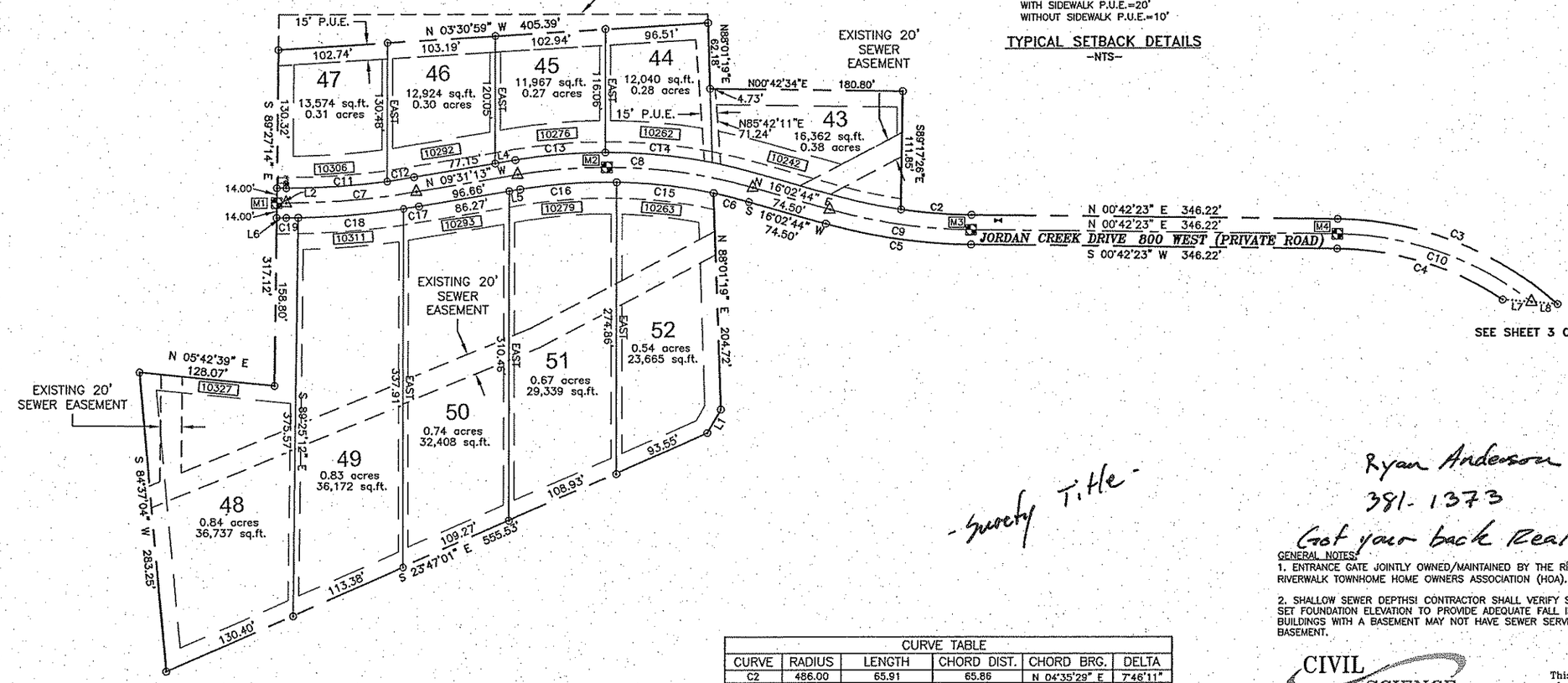
P.U.E. NOTE:
PUBLIC UTILITY EASEMENT, WIDTH VARIES
WITH SIDEWALK P.U.E.=20'
WITHOUT SIDEWALK P.U.E.=10'

TYPICAL SETBACK DETAILS
-NTS-

GRAPHIC SCALE
0 60 180
30 120

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

A LOT LINE ADJUSTMENT CAN BE ADDED TO LOTS 44-47 AT A LATER DATE FOR TAX I.D. #27-14-251-034.



SEE SHEET 3 OF 6

SUBDIVISION MONUMENTS		
PNT	NORTHING	EASTING
M1	7373399.69	1525122.09
M2	7373710.88	1525088.89
M3	7374052.71	1525148.40
M4	7374398.91	1525152.67

LINE TABLE		
LINE	LENGTH	BEARING
L1	25.56	S 60°01'17" E
L2	9.11	S 00°00'00" E
L3	8.98	S 00°00'00" W
L4	19.51	N 09°31'13" W
L5	10.39	S 09°31'13" E
L6	9.24	S 00°00'00" E
L7	26.98	N 04°50'15" E
L8	24.20	N 04°50'15" E

CURVE TABLE					
CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C2	486.00	65.91	65.86	N 04°35'29" E	7°46'11"
C3	314.00	226.34	221.47	S 21°21'25" W	41°18'03"
C4	286.00	165.24	162.95	S 17°15'28" W	33°06'09"
C5	514.00	137.61	137.20	N 08°22'33" E	15°20'21"
C6	486.00	35.02	35.01	S 13°58'53" W	4°07'41"
C7	750.00	124.62	124.48	N 04°45'37" W	9°31'13"
C8	500.00	223.10	221.26	S 03°15'45" W	25°33'57"
C9	500.00	133.86	133.46	N 08°22'33" E	15°20'21"
C10	300.00	196.96	193.44	S 19°30'51" W	37°36'57"
C11	736.00	95.08	95.01	N 03°42'03" W	7°24'06"
C12	736.00	27.21	27.21	N 08°27'40" W	2°07'07"
C13	514.00	83.89	83.80	S 04°50'40" E	9°21'06"
C14	514.00	101.51	101.34	S 05°29'20" W	11°18'54"
C15	486.00	92.04	91.90	S 06°29'32" W	10°51'02"
C16	486.00	89.80	89.68	S 04°13'36" E	10°35'14"
C17	764.00	15.09	15.09	N 08°57'16" W	1°07'54"
C18	764.00	100.35	100.28	N 04°37'33" W	7°31'32"
C19	764.00	11.51	11.51	N 00°25'53" W	0°51'47"

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STATE OF UTAH

GENERAL NOTES:

1. ENTRANCE GATE JOINTLY OWNED/MAINTAINED BY THE RIVERWALK SINGLE FAMILY & RIVERWALK TOWNHOME HOME OWNERS ASSOCIATION (HOA).

2. SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
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CORNER LOT

JUNE 30, 2005

THE VILLAGE AT RIVERWALK

A PLANNED RESIDENTIAL DEVELOPMENT

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11,
TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE
AND MERIDIAN

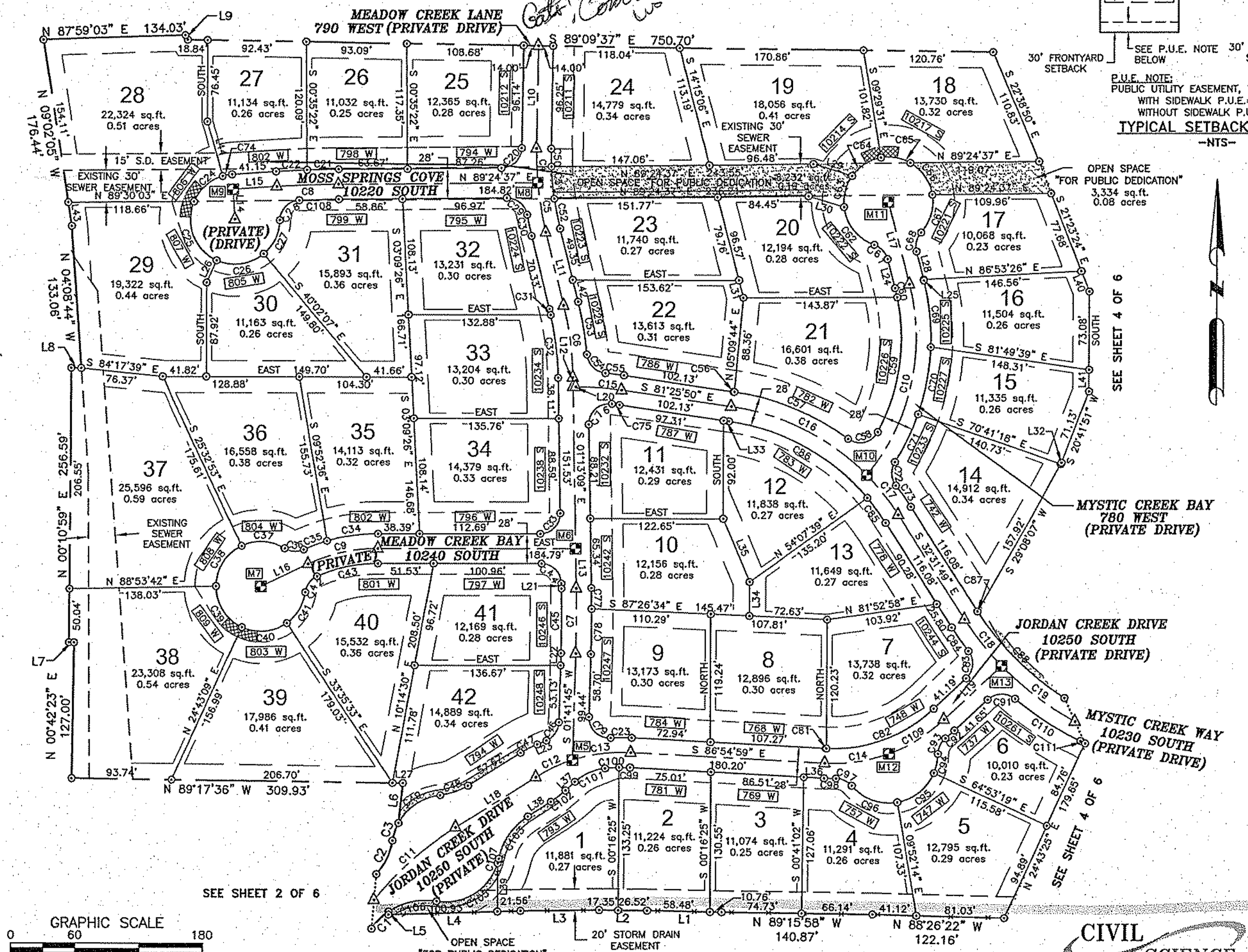
SOUTH JORDON, UTAH

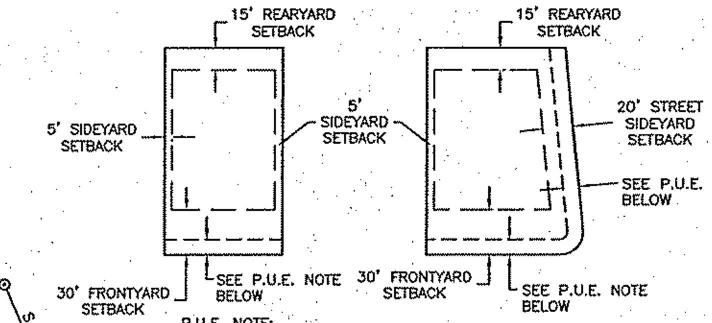
SCALE: 1" = 60'

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN

CURVE TABLE					
CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C1	60.00	22.66	22.52	S 44°37'38" W	21°38'11"
C2	60.00	35.16	34.66	N 25°13'18" E	33°34'17"
C3	50.00	17.37	17.28	S 18°23'18" W	19°54'16"
C4	300.00	32.09	32.08	S 02°13'30" E	6°07'45"
C5	300.00	46.93	46.88	S 09°46'14" E	8°57'44"
C6	300.00	68.24	68.09	N 07°44'07" W	13°01'57"
C7	1200.00	61.05	61.05	N 00°14'18" E	2°54'54"
C8	1000.00	57.76	57.75	S 87°45'20" W	3°18'33"
C9	150.00	66.92	66.37	S 77°13'08" W	25°33'44"
C10	200.00	189.62	182.60	N 12°30'27" E	54°19'17"
C11	300.00	102.00	101.51	S 48°03'45" W	19°28'51"
C12	151.50	38.50	38.40	S 65°05'00" W	14°33'40"
C13	151.50	54.79	54.49	S 82°43'26" W	20°43'11"
C14	150.00	61.12	60.70	N 81°24'37" E	23°20'49"
C15	250.00	42.71	42.66	N 86°19'29" W	9°47'19"
C16	225.00	144.40	141.93	N 63°02'42" W	36°46'15"
C17	225.00	47.63	47.54	N 38°35'41" W	12°07'47"
C18	275.00	55.32	55.23	S 38°17'37" E	11°31'36"
C19	275.00	86.63	86.27	S 53°04'54" E	18°02'59"
C20	19.00	29.37	26.53	N 45°07'30" E	88°34'14"
C21	1014.00	29.39	29.39	S 88°34'47" W	1°39'39"
C22	1014.00	29.17	29.17	S 86°55'31" W	1°38'54"
C23	165.50	19.42	19.41	S 89°43'21" W	6°43'20"
C24	42.00	37.18	35.97	S 48°33'04" W	50°42'58"
C25	42.00	65.33	58.94	S 21°22'07" E	89°07'25"
C26	42.00	46.99	44.58	N 82°01'02" E	64°06'17"
C27	42.00	35.90	34.82	N 25°28'40" E	48°58'27"
C28	19.00	28.61	25.98	S 44°07'38" W	86°16'25"
C29	19.00	26.54	24.44	N 50°34'06" W	80°02'34"
C30	314.00	20.30	20.30	S 12°23'57" E	3°42'17"
C31	286.00	5.61	5.61	N 13°41'22" W	1°07'28"
C32	286.00	59.44	59.33	N 07°10'23" W	11°54'29"
C33	19.00	30.25	27.15	N 44°23'25" E	91°13'09"
C34	164.00	47.95	47.78	S 81°37'26" W	16°45'08"
C35	164.00	23.24	23.22	S 69°11'20" W	8°07'05"
C36	19.00	18.76	18.01	S 86°35'02" E	56°34'21"
C37	42.00	41.97	40.24	N 86°55'22" W	57°15'01"
C38	42.00	47.09	44.66	S 32°19'53" W	64°14'29"
C39	42.00	48.01	45.44	S 32°32'07" E	65°29'29"
C40	42.00	44.18	42.17	N 84°35'08" E	60°16'02"
C41	42.00	34.63	33.66	N 30°49'54" E	47°14'26"
C42	19.00	19.33	18.51	S 36°21'38" W	58°17'53"
C43	136.00	58.13	57.69	S 77°45'17" W	24°29'26"
C44	19.00	29.44	26.58	N 45°36'35" W	88°46'51"
C45	1186.00	60.34	60.33	N 00°14'18" E	2°54'54"
C46	19.00	21.92	20.73	N 34°44'58" E	66°06'25"
C47	100.00	17.45	17.43	S 62°48'10" W	10°00'00"
C48	60.00	27.37	27.13	N 70°52'08" E	26°07'55"
C49	50.00	48.52	46.63	S 56°08'16" W	55°35'40"
C50	286.00	16.72	16.71	S 00°50'05" E	3°20'57"
C51	286.00	30.13	30.11	S 05°31'37" E	6°02'07"
C52	286.00	28.49	28.48	S 11°23'53" E	5°42'25"
C53	314.00	50.13	50.08	N 09°40'39" W	9°08'52"
C54	19.00	26.56	24.45	S 45°09'08" E	80°05'50"
C55	264.00	17.37	17.37	N 83°18'57" W	3°46'14"
C56	239.00	0.65	0.65	N 81°21'07" W	0°09'25"
C57	239.00	115.91	114.78	N 67°22'49" W	27°47'12"
C58	19.00	32.66	28.79	N 77°16'04" E	98°29'26"
C59	186.00	129.66	127.05	N 08°03'08" E	39°56'27"
C60	186.00	8.88	8.88	N 13°17'08" W	2°44'06"
C61	19.00	18.98	18.20	N 43°16'41" W	57°14'56"
C62	42.00	47.98	45.41	S 39°10'34" E	65°27'11"
C63	42.00	30.72	30.04	S 14°30'12" W	41°54'20"
C64	42.00	33.02	32.18	S 57°58'55" W	45°03'07"
C65	42.00	28.54	27.99	N 80°01'39" W	38°55'44"
C66	42.00	37.57	36.33	N 34°56'01" W	51°15'33"
C67	42.00	38.04	36.76	N 16°38'46" E	51°54'01"
C68	19.00	18.98	18.20	S 13°58'17" W	57°14'58"
C69	214.00	62.92	62.69	N 06°13'48" W	16°50'46"
C70	214.00	63.94	63.70	N 10°45'08" E	17°07'08"
C71	214.00	49.79	49.68	N 25°58'39" E	13°19'54"
C72	19.00	23.55	22.07	S 02°51'41" E	71°00'35"
C73	239.00	24.35	24.33	N 35°26'53" W	5°50'11"
C74	42.00	8.94	8.92	S 80°00'19" W	12°11'31"
C75	236.00	7.11	7.11	N 82°17'36" W	1°43'33"
C76	19.00	32.52	28.69	S 47°48'44" W	98°03'46"
C77	1214.00	19.62	19.62	N 00°45'22" W	0°55'34"
C78	1214.00	42.14	42.14	N 00°42'05" E	1°59'20"
C79	19.00	31.61	28.09	S 45°58'17" E	95°20'04"
C81	136.00	0.59	0.59	S 87°02'28" E	0°14'59"
C82	136.00	110.24	107.25	N 69°36'43" E	46°26'39"
C83	19.00	27.94	25.49	N 04°15'53" E	84°15'02"
C84	289.00	26.89	26.88	S 35°11'43" E	5°19'49"
C85	211.00	29.18	29.16	N 36°29'32" W	7°55'28"
C86	211.00	150.90	147.71	N 60°56'33" W	40°58'34"
C87	261.01	0.10	0.10	S 32°32'27" E	0°01'16"
C88	261.00	115.52	114.58	S 45°13'53" E	25°21'37"
C91	19.00	27.67	25.29	S 88°06'50" W	83°26'52"
C92	164.00	11.13	11.13	N 48°20'01" E	3°53'15"
C93	19.00	16.66	16.13	S 25°09'19" W	50°14'40"
C94	46.00	18.50	18.37	N 11°33'14" E	23°02'30"
C95	46.00	45.81	43.94	N 51°36'08" E	57°03'18"
C96	46.00	47.62	45.52	S 70°12'54" E	59°18'40"
C97	19.00	16.66	16.13	N 65°40'54" W	50°14'40"
C98	164.00	11.13	11.13	S 88°51'36" E	3°53'15"
C99	137.50	10.09	10.09	N 89°01'05" W	4°12'13"
C100	137.50	12.99	12.99	S 86°10'25" W	5°24'48"
C101	50.00	31.12	30.62	S 65°38'06" W	35°39'51"





P.U.E. NOTE:
PUBLIC UTILITY EASEMENT, WIDTH VARIES
WITH SIDEWALK P.U.E.=20'
WITHOUT SIDEWALK P.U.E.=10'

TYPICAL SETBACK DETAILS
-NTS-

SUBDIVISION MONUMENTS		
PNT	NORTHING	EASTING
M5	7374712.03	1525401.91
M6	7374909.63	1525404.32
M7	7374873.76	1525110.50
M8	7375251.84	1525366.47
M9	7375244.88	1525082.89
M10	7374978.89	1525673.73
M11	7375233.84	1525693.22
M12	7374718.30	1525695.92
M13	7374800.52	1525800.03

LINE TABLE		
LINE	LENGTH	BEARING
L1	69.25	N 88°55'57" W
L2	43.87	N 89°06'34" W
L3	74.17	S 89°15'03" W
L4	122.49	S 88°17'43" W
L5	2.86	N 06°00'46" E
L6	37.45	N 06°00'46" E
L7	4.78	N 89°17'37" W
L8	9.51	S 89°17'37" E
L9	5.02	S 27°51'17" E
L10	96.25	S 00°50'23" W
L11	70.33	S 14°15'06" E
L12	8.88	S 01°13'09" E
L13	37.16	S 01°13'09" E
L14	28.00	N 03°53'56" W
L15	41.15	N 86°06'04" E
L16	49.10	N 64°26'16" E
L17	79.26	S 14°39'12" E
L18	87.79	N 57°48'10" E
L19	72.64	N 46°23'24" E
L20	2.56	N 88°46'51" E
L21	4.86	S 01°13'09" E
L22	11.40	S 01°41'45" W
L23	9.65	N 67°48'10" E
L24	27.96	N 14°39'12" W
L25	0.82	S 14°39'12" E
L26	22.55	N 24°04'10" E
L27	9.49	N 89°17'36" W
L28	27.14	S 14°39'12" E
L29	37.73	S 72°36'22" E
L30	34.50	S 72°36'22" E
L31	16.81	S 14°15'06" E
L32	1.52	S 29°08'07" W
L33	4.81	N 81°25'50" W
L34	31.76	N 00°00'00" E
L35	64.44	S 22°10'10" E
L36	18.69	N 86°54'59" W
L37	12.03	S 47°48'10" W
L38	25.88	S 57°48'10" W
L39	45.11	S 00°16'25" W
L40	20.48	S 21°23'24" E
L41	20.17	S 00°00'00" E
L42	20.98	S 14°15'06" E
L43	22.33	S 09°02'05" E
L44	52.98	S 16°05'27" E

GRAPHIC SCALE
0 30 60 120 180

SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

CURVE TABLE					
CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C102	100.00	17.45	17.43	N 52°48'10" E	10°00'00"
C103	60.00	49.05	47.70	S 34°22'58" W	46°50'24"
C105	50.00	73.18	66.82	N 57°51'14" E	83°51'21"
C106	60.00	46.43	45.28	S 77°36'49" W	44°20'11"
C107	50.00	4.33	4.33	N 13°26'40" E	4°57'47"
C108	986.00	36.93	36.93	S 88°20'14" W	2°08'46"
C109	150.00	61.12	60.70	N 58°03'48" E	23°20'49"
C110	289.00	73.21	73.01	S 57°25'09" E	14°30'52"
C111	50.00	4.87	4.87	N 61°53'00" W	5°35'11"

PROFESSIONAL LAND SURVEYOR
No. 163771
DODD M. GREER
STATE OF UTAH

LEGEND

BOUNDARY LINE
PROPOSED RIGHT-OF-WAY LINE
PROPOSED LOT LINE
EASEMENT LINE
CENTER LINE
PROPOSED SETBACK (LOT 4)
SET 5/8" REBAR
CALCULATED POINT, NOT SET
SUBDIVISION MONUMENT
852 S. STREET ADDRESS BLOCK
JOINTLY OWNED/MAINTAINED BY THE RIVERWALK SINGLE FAMILY & RIVERWALK TOWNHOME HOME OWNERS ASSOCIATION (HOA)

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JUNE 30, 2005

THE VILLAGE AT RIVERWALK

A PLANNED RESIDENTIAL DEVELOPMENT

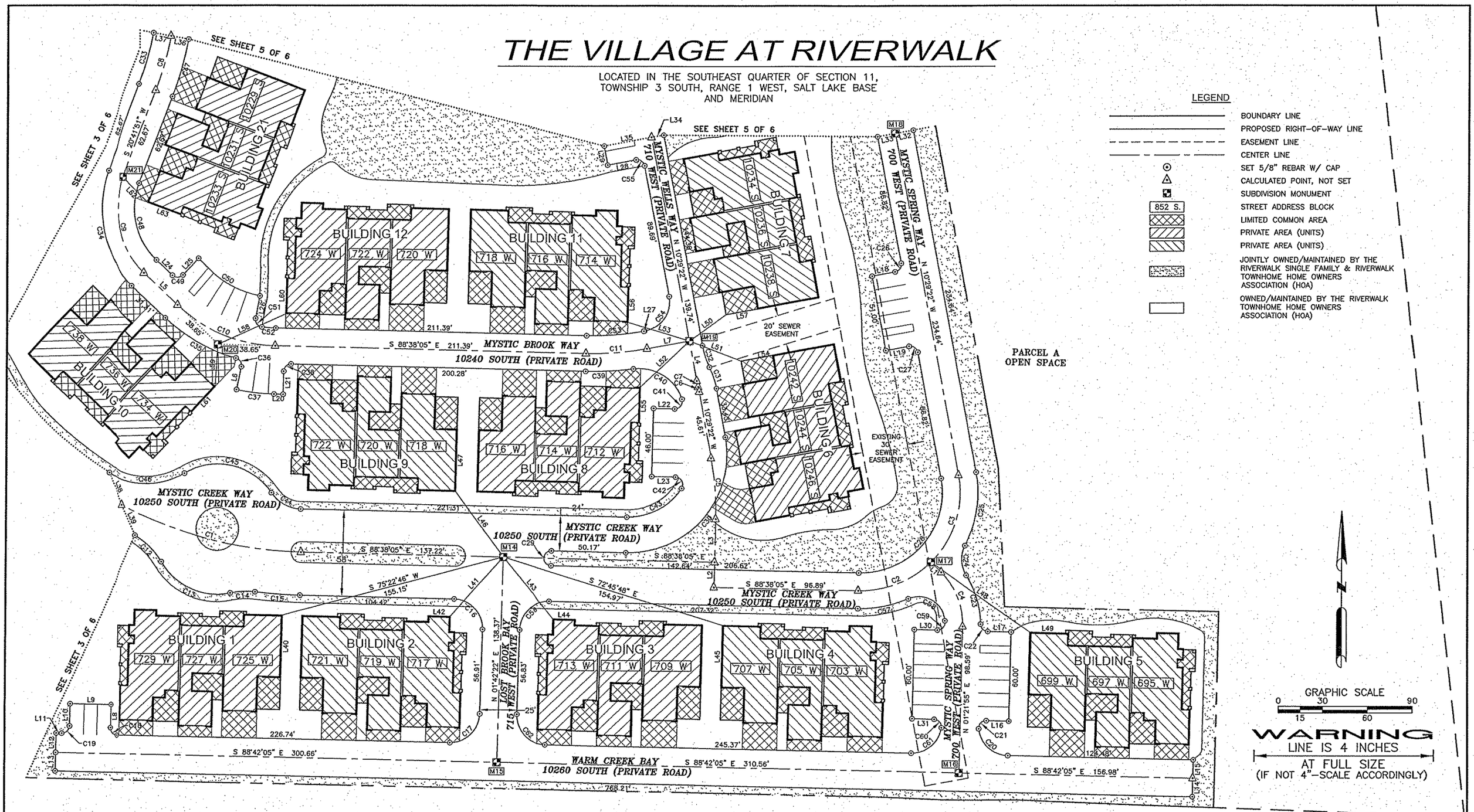
LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN

SOUTH JORDON, UTAH

SCALE: 1" = 60'

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11,
TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE
AND MERIDIAN



SUBDIVISION MONUMENTS		
PNT	NORTHING	EASTING
M14	7374713.55	1526128.28
M15	7374575.25	1526124.16
M16	7374568.21	1526434.65
M17	7374710.14	1526415.56
M18	7374999.57	1526391.09
M19	7374859.41	1526253.37
M20	7374856.89	1525934.18
M21	7374969.79	1525868.81

NOTE:
1. SEE SHEET 6 OF 6 FOR LINE AND CURVE DATA.
2. SEE SHEET 6 OF 6 FOR TYPICAL FLOOR PLAN DIMENSIONS.

SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

PROFESSIONAL LAND SURVEYOR
No. 153771
DODD M. GREER
STATE OF UTAH

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A PLANNED RESIDENTIAL DEVELOPMENT

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN

SOUTH JORDON, UTAH

SCALE: 1' = 30'

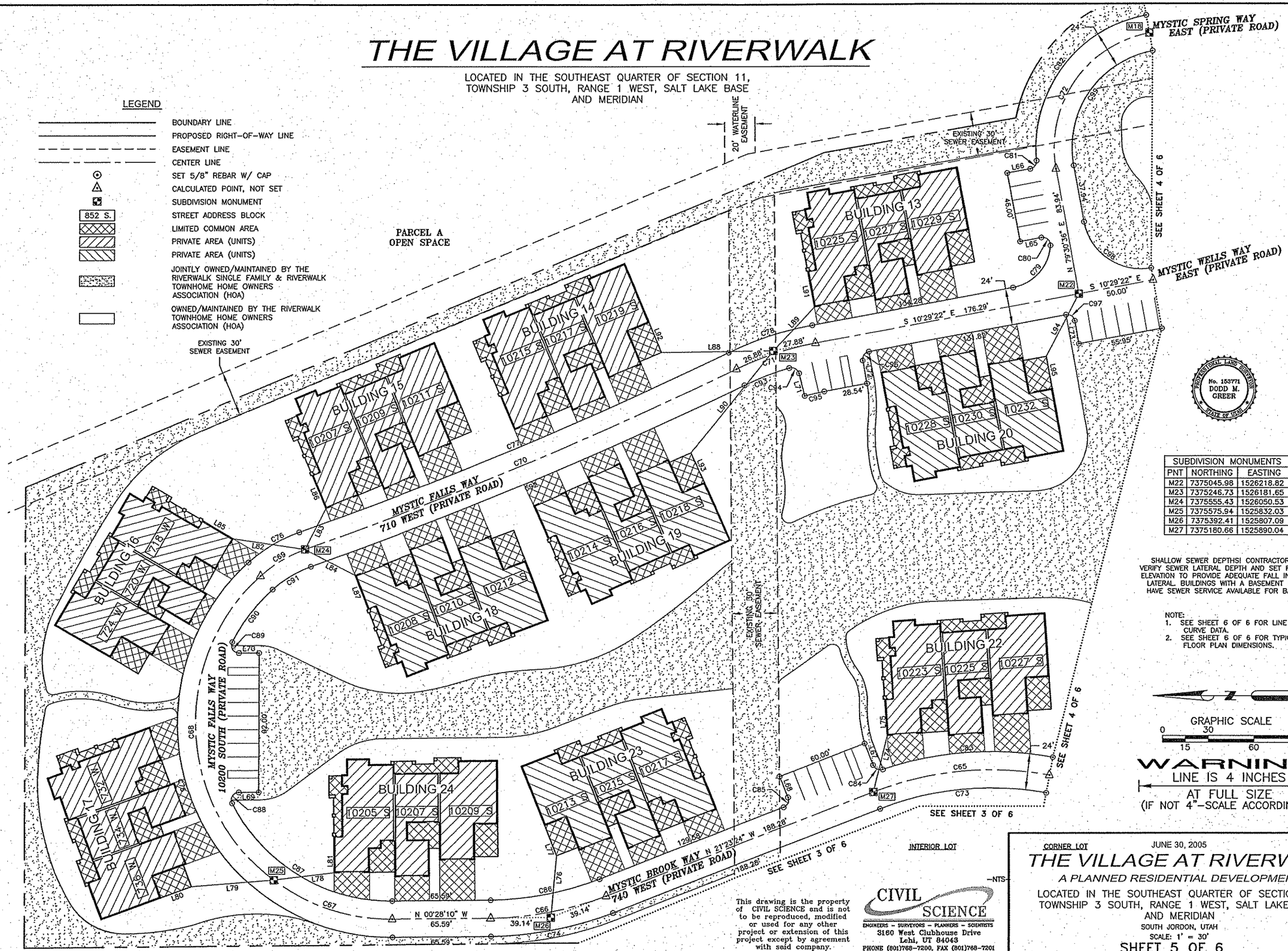
SHEET 4 OF 6

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11,
TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE
AND MERIDIAN

LEGEND

- BOUNDARY LINE
- PROPOSED RIGHT-OF-WAY LINE
- EASEMENT LINE
- CENTER LINE
- SET 5/8" REBAR W/ CAP
- CALCULATED POINT, NOT SET
- SUBDIVISION MONUMENT
- 852 S. — STREET ADDRESS BLOCK
- LIMITED COMMON AREA
- PRIVATE AREA (UNITS)
- PRIVATE AREA (UNITS)
- JOINTLY OWNED/MAINTAINED BY THE RIVERWALK SINGLE FAMILY & RIVERWALK TOWNHOME HOME OWNERS ASSOCIATION (HOA)
- OWNED/MAINTAINED BY THE RIVERWALK TOWNHOME HOME OWNERS ASSOCIATION (HOA)



SUBDIVISION MONUMENTS		
PNT	NORTHING	EASTING
M22	7375045.98	1526218.82
M23	7375246.73	1526181.65
M24	7375555.43	1526050.53
M25	7375575.94	1525832.03
M26	7375392.41	1525807.09
M27	7375180.66	1525890.04

SHALLOW SEWER DEPTHSI CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

NOTE:
1. SEE SHEET 6 OF 6 FOR LINE AND CURVE DATA.
2. SEE SHEET 6 OF 6 FOR TYPICAL FLOOR PLAN DIMENSIONS.

GRAPHIC SCALE
0 15 30 60 90

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

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JUNE 30, 2005

THE VILLAGE AT RIVERWALK

A PLANNED RESIDENTIAL DEVELOPMENT

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN

SOUTH JORDON, UTAH

SCALE: 1' = 30'

SHEET 5 OF 6

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11,
TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE
AND MERIDIAN

CURVE TABLE

CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C1	275.00	127.33	126.19	S 75°22'14" E	26°31'42"
C2	66.00	53.37	51.93	N 68°11'58" E	46°19'53"
C3	66.00	63.96	61.48	N 17°16'20" E	55°31'23"
C4	50.00	40.43	39.34	N 21°48'02" W	46°19'53"
C5	200.00	41.38	41.31	N 04°33'44" W	11°51'17"
C6	42.00	3.27	3.27	N 12°43'12" W	4°27'39"
C7	54.00	4.20	4.20	S 12°43'12" E	4°27'39"
C8	212.00	38.02	37.97	N 15°33'34" E	10°16'33"
C9	60.00	70.24	66.30	S 12°50'20" E	67°04'22"
C10	100.00	73.76	72.10	S 67°30'18" E	42°15'34"
C11	200.00	41.38	41.31	N 85°26'16" E	11°51'17"
C12	50.00	25.32	25.05	N 44°34'49" W	29°01'11"
C13	44.00	55.28	51.71	S 66°03'43" E	71°58'58"
C14	50.00	16.75	16.67	S 87°32'43" W	19°11'49"
C15	304.00	30.66	30.65	S 85°44'44" E	5°46'43"
C16	20.00	31.53	28.37	N 43°27'52" W	90°20'28"
C17	20.00	31.27	28.18	N 46°30'09" E	89°35'33"
C18	5.00	7.85	7.07	S 43°38'05" E	90°00'00"
C19	5.00	7.85	7.07	N 46°21'55" E	90°00'00"
C20	20.00	28.99	26.52	S 47°10'54" E	83°02'21"
C21	5.00	8.47	7.49	S 42°51'05" W	97°01'39"
C22	5.00	7.70	6.96	S 44°32'12" E	88°11'48"
C23	62.00	34.77	34.32	N 16°30'16" W	32°07'56"
C24	20.00	20.85	19.92	S 02°42'30" E	59°43'28"
C25	78.00	51.25	50.33	N 08°19'56" E	37°38'36"
C26	5.00	7.85	7.07	N 34°30'38" E	90°00'00"
C27	5.00	7.85	7.07	N 55°29'22" W	90°00'00"
C28	54.00	96.00	83.85	N 40°26'16" E	101°51'17"
C29	5.00	15.71	10.00	S 01°21'55" W	180°00'00"
C30	66.00	117.33	102.48	N 40°26'16" E	101°51'17"
C31	54.00	15.27	15.22	N 18°35'31" W	16°12'17"
C32	54.00	15.27	15.22	S 18°35'31" E	16°12'17"
C33	200.00	35.87	35.82	N 15°33'34" E	10°16'33"
C34	72.00	84.29	79.56	S 12°50'20" E	67°04'22"
C35	112.00	56.06	55.48	S 60°42'54" E	28°40'46"
C36	5.00	7.56	6.86	N 31°45'52" W	86°34'50"
C37	132.50	25.48	25.44	S 83°07'36" E	11°00'59"
C38	5.00	7.85	7.07	S 46°21'55" W	90°00'00"
C39	212.00	32.30	32.27	N 86°59'59" E	8°43'51"
C40	30.00	41.45	38.23	N 57°47'01" W	79°09'51"
C41	5.00	9.56	8.17	N 36°34'55" E	109°34'00"
C42	5.00	10.57	8.71	N 28°02'44" W	121°10'44"
C43	42.00	43.12	41.25	N 61°57'16" E	58°49'16"
C44	25.00	23.91	23.01	S 61°13'53" E	54°48'24"
C45	44.00	66.96	60.68	N 77°25'22" W	87°11'20"
C46	50.00	55.07	52.33	S 89°27'51" E	63°06'20"
C47	224.00	40.17	40.12	N 15°33'34" E	10°16'33"
C48	48.00	56.19	53.04	S 12°50'20" E	67°04'22"
C49	5.00	7.85	7.07	N 88°37'29" E	90°00'00"
C50	73.81	49.93	48.99	S 58°58'58" E	38°45'43"
C51	5.00	8.16	7.28	S 35°47'36" E	93°27'13"
C52	88.00	9.39	9.39	S 85°34'39" E	6°06'53"
C53	188.00	38.90	38.83	N 85°26'16" E	11°51'17"
C54	20.00	31.42	28.28	N 34°30'35" E	90°00'06"
C55	5.00	7.85	7.07	N 55°29'25" W	89°59'54"
C56	20.00	31.30	28.20	S 46°32'09" W	89°39'33"
C57	78.00	34.26	33.99	N 78°46'54" E	25°10'01"
C58	17.50	33.48	28.61	N 58°59'11" W	109°37'51"
C59	5.15	9.45	8.18	N 38°04'44" E	105°07'10"
C60	5.00	8.44	7.47	N 40°15'58" W	96°44'15"
C61	20.00	29.04	26.56	N 49°42'02" E	83°11'46"
C62	20.00	31.56	28.38	S 43°29'51" E	90°24'27"
C65	212.00	117.71	116.20	N 05°29'03" W	31°48'41"
C66	212.00	77.41	76.98	S 10°55'47" E	20°55'14"
C67	130.00	84.38	82.91	S 18°07'33" W	37°11'26"
C68	130.00	230.11	201.22	S 87°25'46" W	101°25'00"
C69	88.00	34.54	34.32	N 30°37'00" W	22°29'28"
C70	2638.85	308.73	308.56	S 22°43'22" E	6°42'12"
C71	200.00	54.40	54.23	N 18°16'55" W	15°35'06"
C72	73.78	141.41	120.74	N 64°24'41" W	109°48'46"
C73	175.98	111.02	109.18	N 04°39'27" W	36°08'42"
C74	224.00	81.79	81.34	S 10°55'47" E	20°55'14"
C75	142.00	343.52	265.67	S 68°50'03" W	138°36'26"
C76	100.00	39.25	39.00	N 30°37'00" W	22°29'28"
C77	2626.85	307.33	307.16	S 22°43'22" E	6°42'12"
C78	212.00	57.67	57.49	N 18°16'55" W	15°35'06"
C79	30.00	39.85	36.99	S 48°32'46" E	76°06'48"
C80	5.00	9.07	7.87	N 41°27'14" E	103°53'12"
C81	5.00	7.42	6.76	S 53°01'50" E	85°04'57"
C82	89.00	132.16	120.35	N 53°01'50" W	85°04'57"
C83	224.00	113.32	112.11	N 04°04'14" W	28°59'04"
C84	5.00	7.61	6.89	S 25°01'25" W	87°10'23"
C85	5.00	7.85	7.07	S 66°23'25" E	89°59'57"

CURVE TABLE

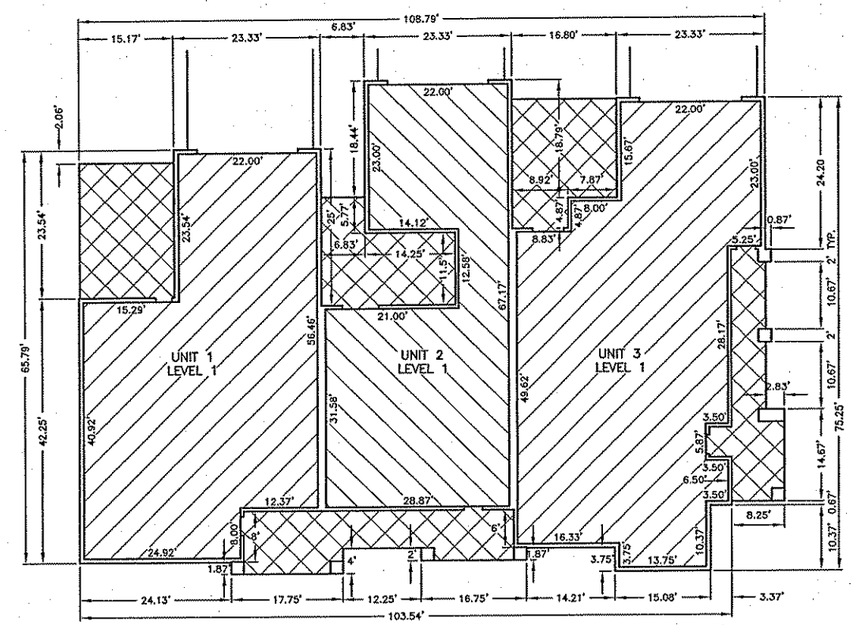
CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C86	200.00	73.03	72.62	S 10°55'47" E	20°55'14"
C87	118.00	130.98	124.36	S 31°19'45" W	63°35'49"
C88	5.00	10.21	8.53	N 58°22'59" W	116°58'44"
C89	5.00	10.18	8.51	S 58°26'45" W	116°40'45"
C90	118.00	43.97	43.72	N 52°32'18" W	21°21'08"
C91	76.00	29.83	29.64	N 30°37'00" W	22°29'28"
C92	2650.85	310.14	309.96	S 22°43'22" E	6°42'12"
C93	188.00	31.24	31.21	N 21°18'49" W	9°31'17"
C94	5.00	8.05	7.21	N 26°28'53" E	92°11'32"
C95	167.50	13.29	13.29	N 12°45'45" W	4°32'46"
C96	5.00	7.85	7.07	N 55°29'22" W	90°00'00"
C97	5.00	7.85	7.07	N 34°30'38" E	90°00'00"
C98	38.00	59.69	53.74	S 34°30'37" W	89°59'58"
C99	65.00	102.10	91.92	N 55°29'23" W	90°00'02"

LINE TABLE

LINE	LENGTH	BEARING
L1	9.67	N 44°57'59" W
L2	17.00	N 01°21'55" E
L3	29.09	N 01°21'55" E
L4	27.32	N 10°29'22" W
L5	31.31	S 46°22'31" E
L6	15.69	S 11°31'33" W
L7	28.52	N 79°30'38" E
L8	15.50	N 01°21'55" E
L9	28.00	N 88°38'05" W
L10	15.00	S 01°21'55" W
L11	3.64	N 88°38'05" W
L12	13.05	S 01°21'55" W
L13	12.50	S 01°17'55" W
L14	12.50	N 01°17'55" E
L15	12.50	N 01°25'54" E
L16	14.89	S 88°38'05" E
L17	15.53	N 88°38'05" W
L18	15.50	S 79°30'38" W
L19	15.50	N 79°30'38" E
L20	6.12	S 88°38'05" E
L21	15.50	N 01°21'55" E
L22	13.86	N 88°38'05" W
L23	15.67	S 88°38'05" E
L24	14.96	S 46°22'31" E
L25	15.50	N 43°37'29" E
L26	15.35	S 10°56'00" W
L27	0.52	N 79°30'38" E
L28	19.50	S 79°30'38" W
L29	13.05	N 10°29'22" W
L30	15.43	N 88°38'05" W
L31	14.90	S 88°38'05" E
L32	12.00	S 79°30'38" W
L33	12.00	S 79°30'38" W
L34	8.00	S 79°30'38" W
L35	32.50	S 79°30'38" W
L36	12.00	N 79°34'42" W
L37	12.00	N 79°34'42" W
L38	24.10	S 24°30'51" E
L39	22.50	S 24°30'51" E
L40	42.25	S 01°17'55" W
L41	53.94	S 42°08'53" W
L42	15.08	N 88°42'05" W
L43	53.82	S 39°23'52" E
L44	15.08	S 88°42'05" E
L45	42.25	S 01°17'56" W
L46	55.02	N 36°37'57" W
L47	42.25	N 01°21'55" E
L48	81.31	S 54°32'49" E
L49	24.12	S 88°42'05" E
L50	30.53	N 54°08'49" E
L51	37.42	S 68°54'22" E
L52	45.05	S 46°13'11" W
L53	42.92	N 72°49'43" W
L54	21.48	N 79°30'38" E
L55	24.21	N 01°21'55" E
L56	24.21	N 01°21'51" E
L57	21.48	N 79°30'38" E
L58	50.14	N 65°34'45" E
L59	28.39	S 03°50'17" W
L60	24.21	N 01°21'51" E
L61	24.21	S 43°37'29" W
L62	24.02	S 44°32'03" E
L63	24.21	S 69°18'09" E

LINE TABLE

LINE	LENGTH	BEARING
L65	14.27	N 10°29'22" W
L66	15.35	S 10°29'22" E
L67	15.28	N 68°36'36" E
L68	15.00	S 68°36'36" W
L69	12.94	S 00°06'23" W
L70	13.21	N 00°06'23" E
L71	15.37	S 72°34'39" W
L72	15.50	N 79°30'38" E
L73	15.50	S 79°30'38" W
L74	38.29	S 76°37'33" E
L75	24.21	N 85°58'09" E
L76	41.00	S 84°45'35" E
L77	21.48	N 68°36'36" E
L78	40.51	S 06°59'48" E
L79	55.07	N 04°26'51" W
L80	21.48	N 19°50'48" W
L81	24.21	N 89°31'50" E
L82	48.18	N 08°26'19" E
L83	30.31	S 62°48'43" E
L84	37.39	S 27°02'06" W
L85	24.21	N 30°20'03" E
L86	24.21	N 67°21'26" E
L87	24.21	S 69°09'04" W
L88	73.11	N 00°50'43" W
L89	39.22	S 47°18'03" E
L90	86.14	N 51°25'38" W
L91	21.21	N 79°30'38" E
L92	21.48	N 67°21'26" E
L93	21.48	S 66°14'14" W
L94	46.65	N 62°16'02" W
L95	21.48	S 79°30'38" W



TYPICAL FLOOR PLAN

-NO SCALE-

NOTE:
1. SEE SHEET 4 OF 6 AND 5 OF 6 FOR LINES AND CURVES.
2. SEE SHEET 4 OF 6 AND 5 OF 6 FOR FLOOR PLAN LOCATIONS.

SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

PROFESSIONAL LAND SURVEYOR
No. 153771
DODD M. GREER
STATE OF UTAH

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JUNE 30, 2005

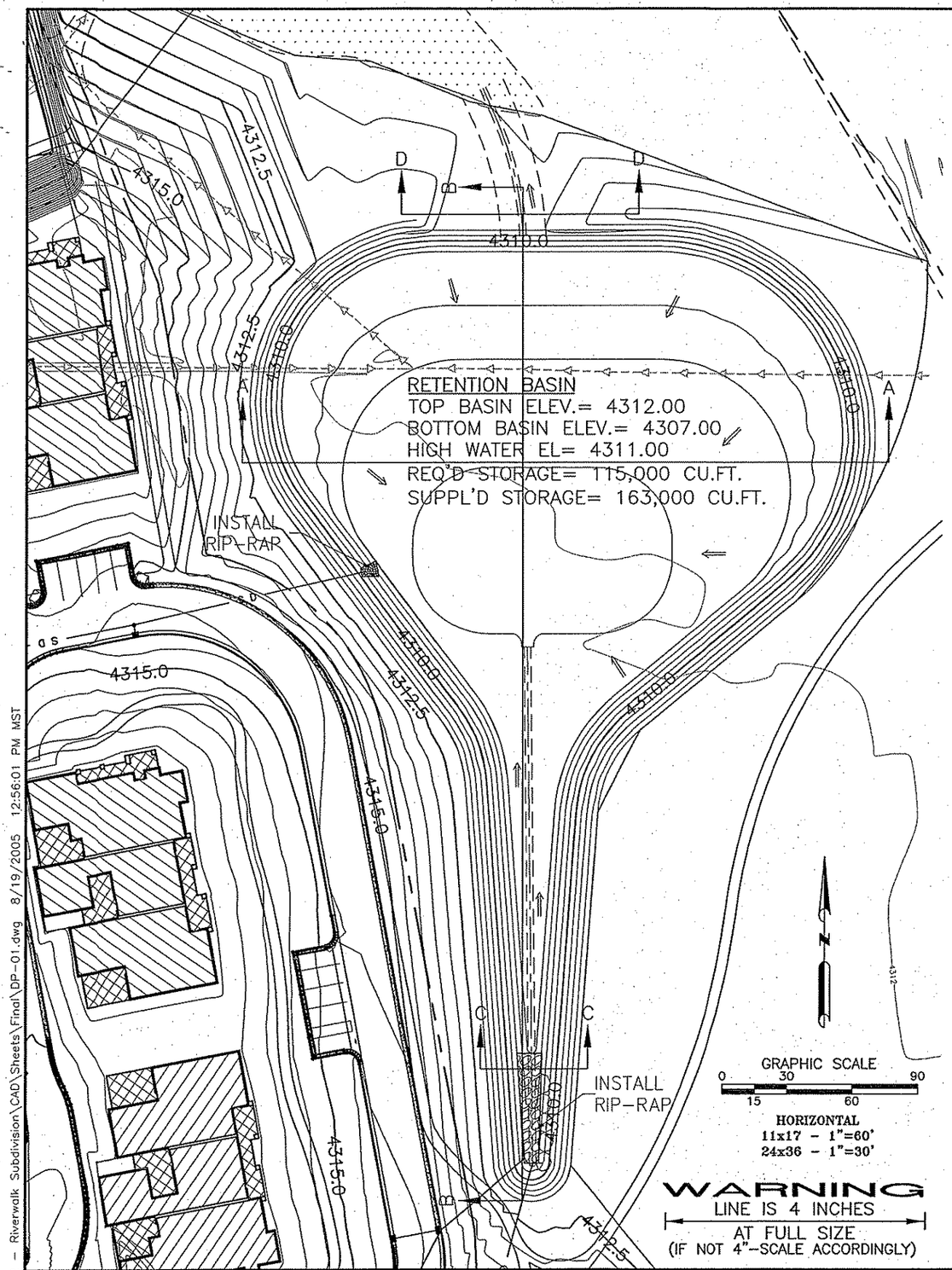
THE VILLAGE AT RIVERWALK

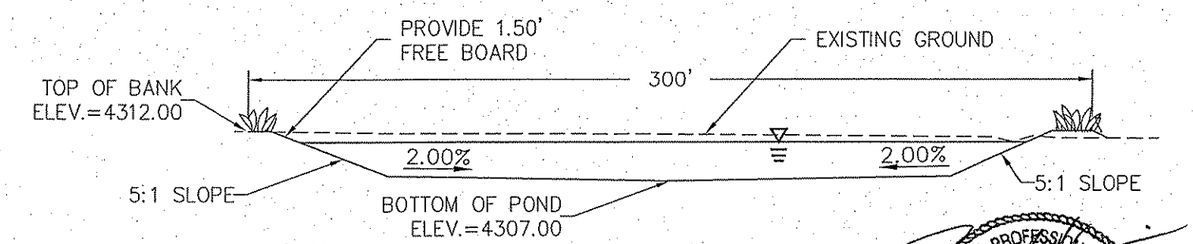
A PLANNED RESIDENTIAL DEVELOPMENT

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN

SOUTH JORDON, UTAH

SCALE: NO SCALE

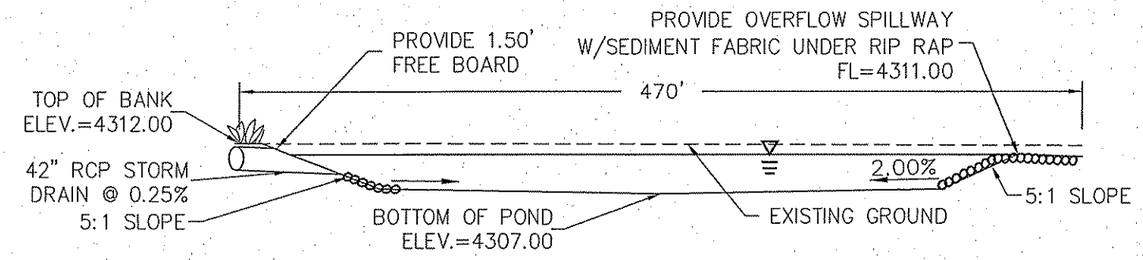




CROSS SECTION A–A

NOT TO SCALE

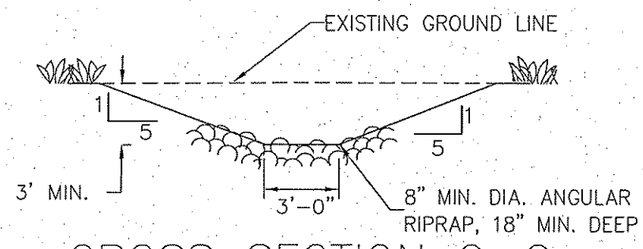
REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/24/05
STATE OF UTAH



CROSS SECTION B–B

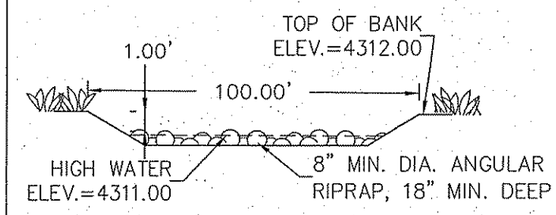
NOT TO SCALE

CALL BEFORE YOU DIG! IT'S THE LAW BLUE STAKES 1 800 662 4111



CROSS SECTION C–C

NOT TO SCALE



SPILLWAY CROSS SECTION D–D

NOT TO SCALE

Q:\2004\04122 – Riverwalk Subdivision\CAD\Sheets\Final\DP-01.dwg 8/19/2005 12:56:01 PM MST

NO	REVISIONS	BY	DATE

DRAWN GSB		7/8/05 DATE
CHECKED RWA	PROJECT ENGINEER	7/8/05 DATE
APPROVED BAC	PROJECT MANAGER	7/8/05 DATE

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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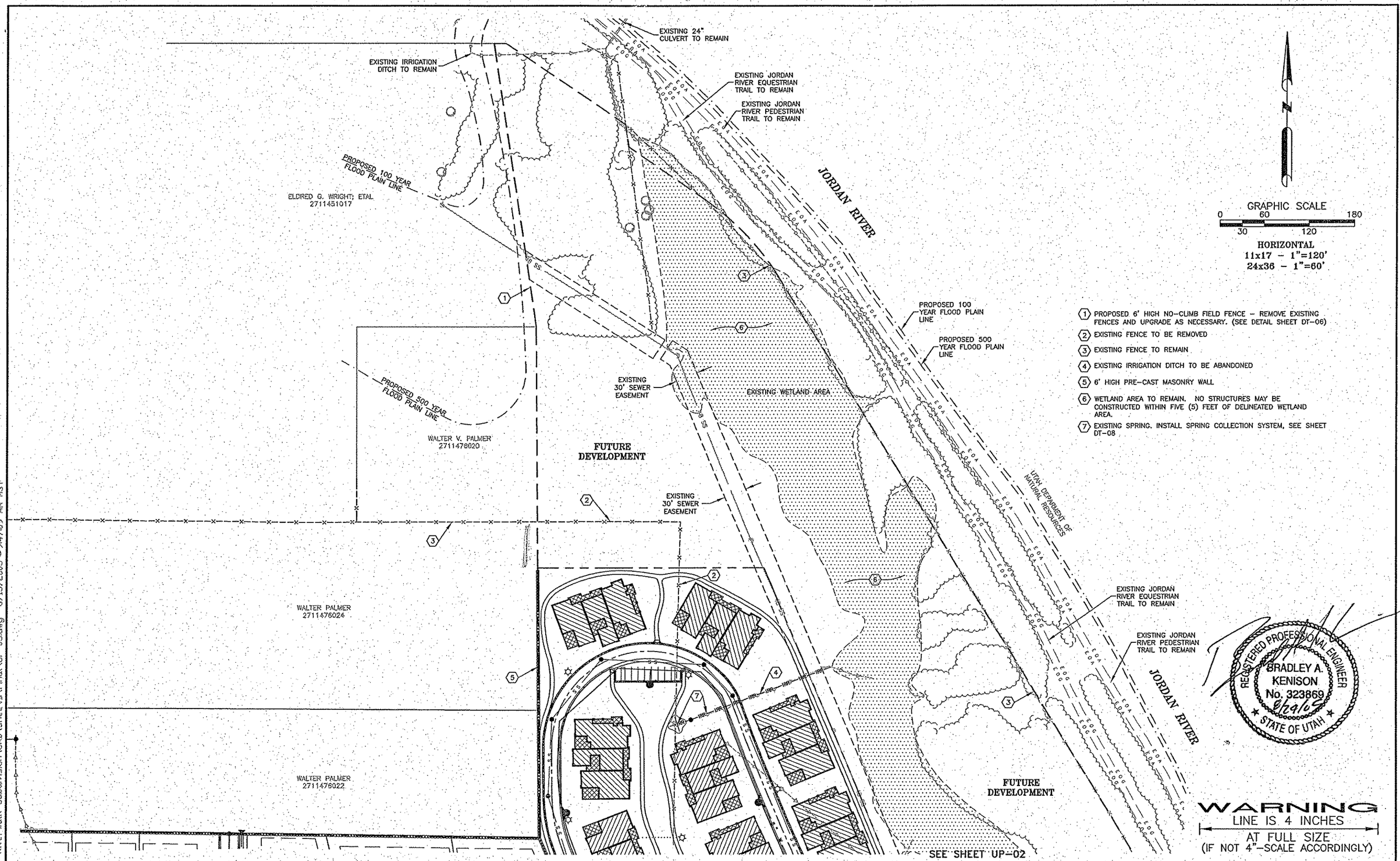
THE VILLAGE AT RIVERWALK

RETENTION POND DETAIL

PROJECT NO.: 04122
SHEET NO. GP-04
FILE NAME: DP-01
SCALE: AS SHOWN



1. PROPOSED 6' HIGH NO-CLIMB FIELD FENCE - REMOVE EXISTING FENCES AND UPGRADE AS NECESSARY. (SEE DETAIL SHEET DT-06)
2. EXISTING FENCE TO BE REMOVED
3. EXISTING FENCE TO REMAIN
4. EXISTING IRRIGATION DITCH TO BE ABANDONED
5. 6' HIGH PRE-CAST MASONRY WALL
6. WETLAND AREA TO REMAIN. NO STRUCTURES MAY BE CONSTRUCTED WITHIN FIVE (5) FEET OF DELINEATED WETLAND AREA.
7. EXISTING SPRING. INSTALL SPRING COLLECTION SYSTEM, SEE SHEET DT-08

Deadends for future project

G:\2004\04122 - Riverwalk Subdivision\CAD\Sheets\Final\UP-03.dwg 8/15/2005 9:47:09 AM MST

NO	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED RWA PROJECT ENGINEER 7/8/05 DATE
APPROVED BAK PROJECT MANAGER 7/8/05 DATE

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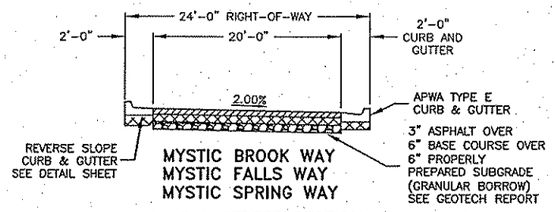
THE VILLAGE AT RIVERWALK

UTILITY PLAN

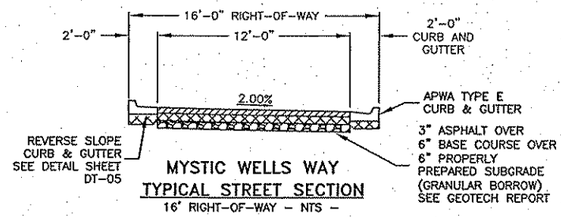
PROJECT NO.: 04122
SHEET NO. UP-03
FILE NAME: UP-03
SCALE: AS SHOWN



MYSTIC BROOK WAY
MYSTIC FALLS WAY
MYSTIC SPRING WAY

TYPICAL STREET SECTION

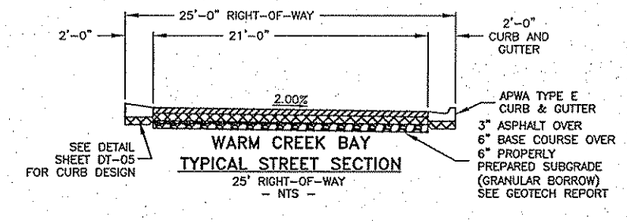
24' RIGHT-OF-WAY - NTS -



MYSTIC WELLS WAY

TYPICAL STREET SECTION

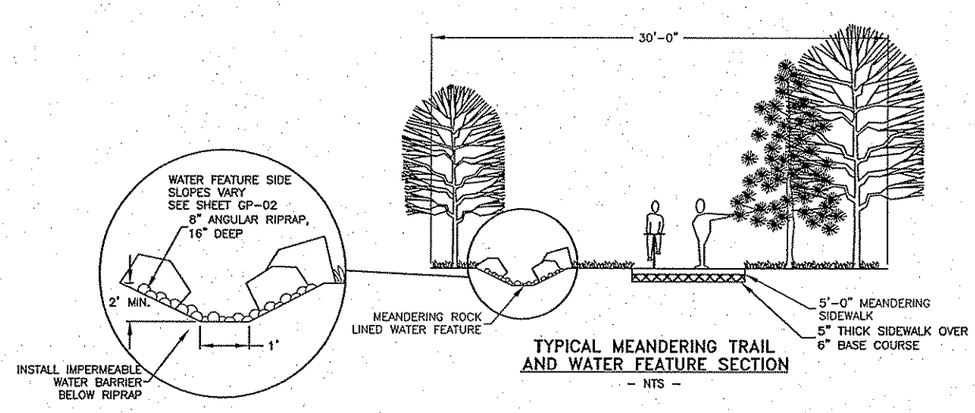
16' RIGHT-OF-WAY - NTS -



WARM CREEK BAY

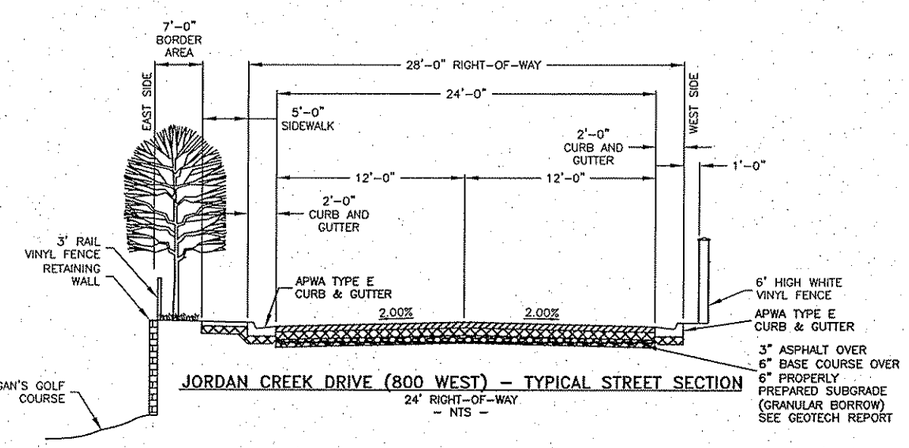
TYPICAL STREET SECTION

25' RIGHT-OF-WAY
- NTS -



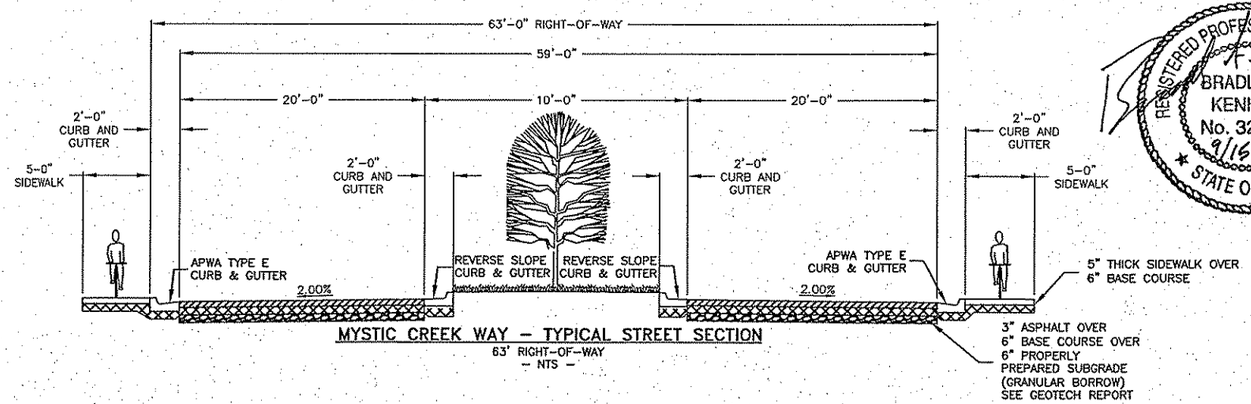
TYPICAL MEANDERING TRAIL
AND WATER FEATURE SECTION

- NTS -



JORDAN CREEK DRIVE (800 WEST) - TYPICAL STREET SECTION

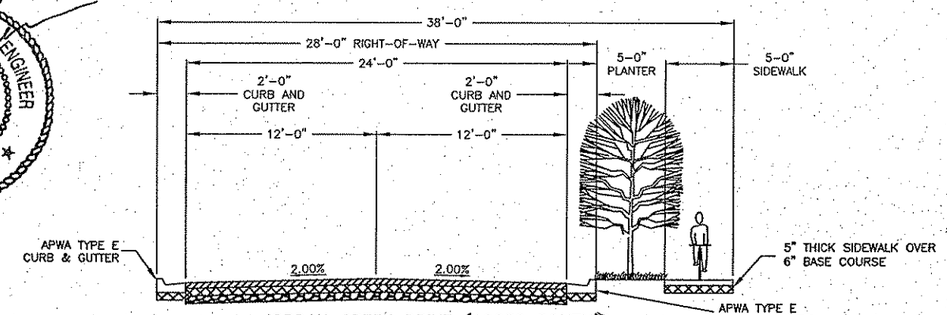
24' RIGHT-OF-WAY
- NTS -



MYSTIC CREEK WAY - TYPICAL STREET SECTION

63' RIGHT-OF-WAY
- NTS -

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
9/16/05
STATE OF UTAH



JORDAN CREEK DRIVE (10250 SOUTH)
MOSS SPRINGS BAY MYSTIC CREEK WAY
MEADOW CREEK BAY MYSTIC CREEK BAY

TYPICAL STREET SECTION

28' RIGHT-OF-WAY - NTS -

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
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801-561-8594

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THE VILLAGE AT RIVERWALK

UTILITY PLAN

PROJECT NO.: 04122
SHEET NO. UP-04
FILE NAME: UP-04
SCALE: AS SHOWN

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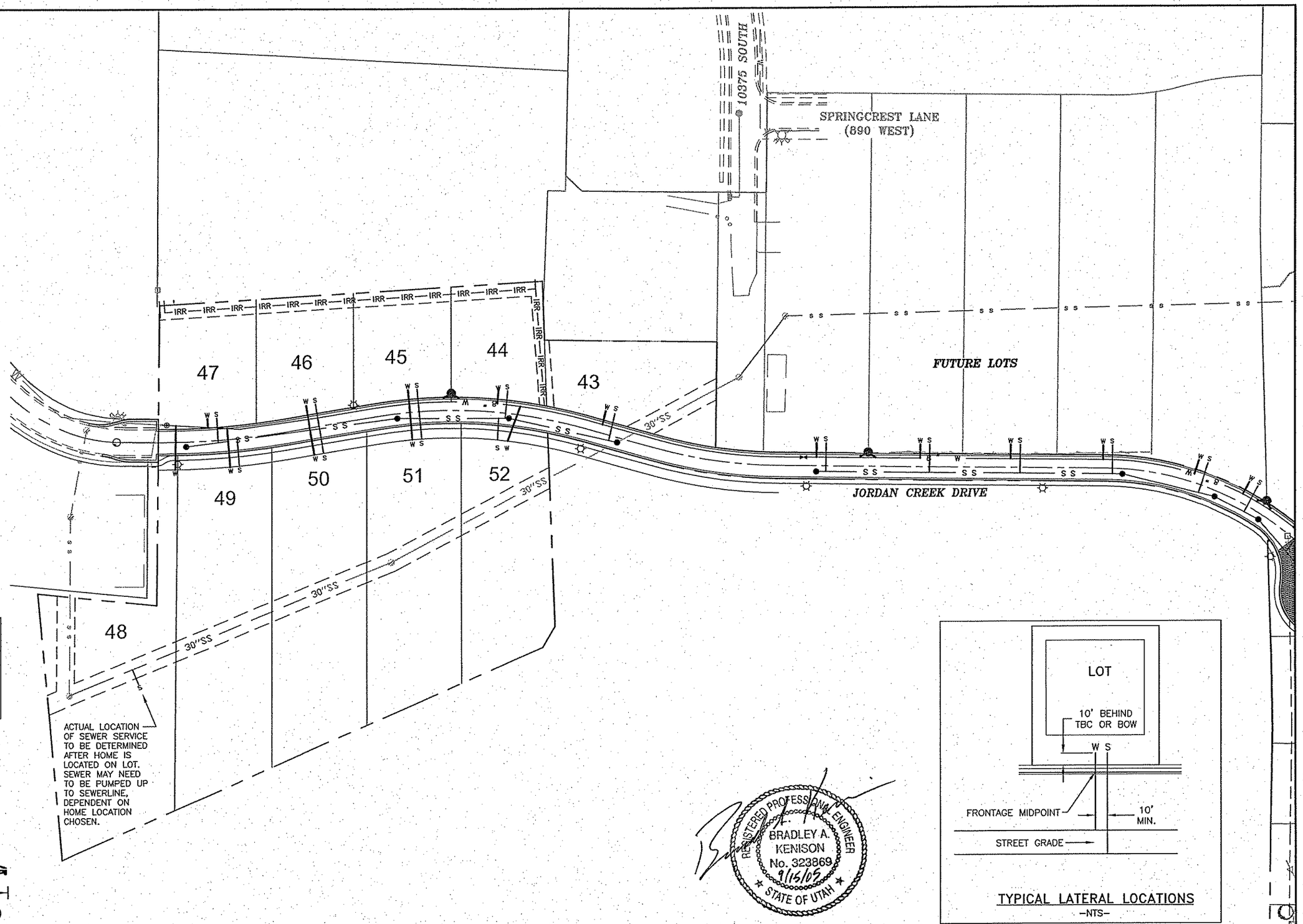

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BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

GRAPHIC SCALE
0 50 150
25 100

HORIZONTAL
11x17 – 1"=100'
24x36 – 1"=50'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 2"–SCALE ACCORDINGLY)

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
9/15/05
STATE OF UTAH

TYPICAL LATERAL LOCATIONS
–NTS–

NO.	REVISIONS	BY	DATE

DRAWN TT	7/8/05	DATE
CHECKED RWA (PROJECT ENGINEER)	7/8/05	DATE
APPROVED BAK (PROJECT MANAGER)	7/8/05	DATE

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SANDY, UTAH 84070
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THE VILLAGE AT RIVERWALK

SEWER & WATER LATERAL LOCATION PLAN

PROJECT NO.: 04122
SHEET NO. L–01
FILE NAME: LAT–01
SCALE: AS SHOWN

Q:\2004\04122 – Riverwalk Subdivision\CAD\Sheets\Final\LAT–01.dwg 8/24/2005 9:49:34 AM MST

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

NOTE: ALL SERVICES 2" AND SMALLER ARE TO BE EQUIPPED WITH A BADGER METER AND AN ADE WITH PIT SET ITRON ERT MODULE.

GRAPHIC SCALE
0 60 180
30 120
HORIZONTAL
11x17 – 1"=120'
24x36 – 1"=60'

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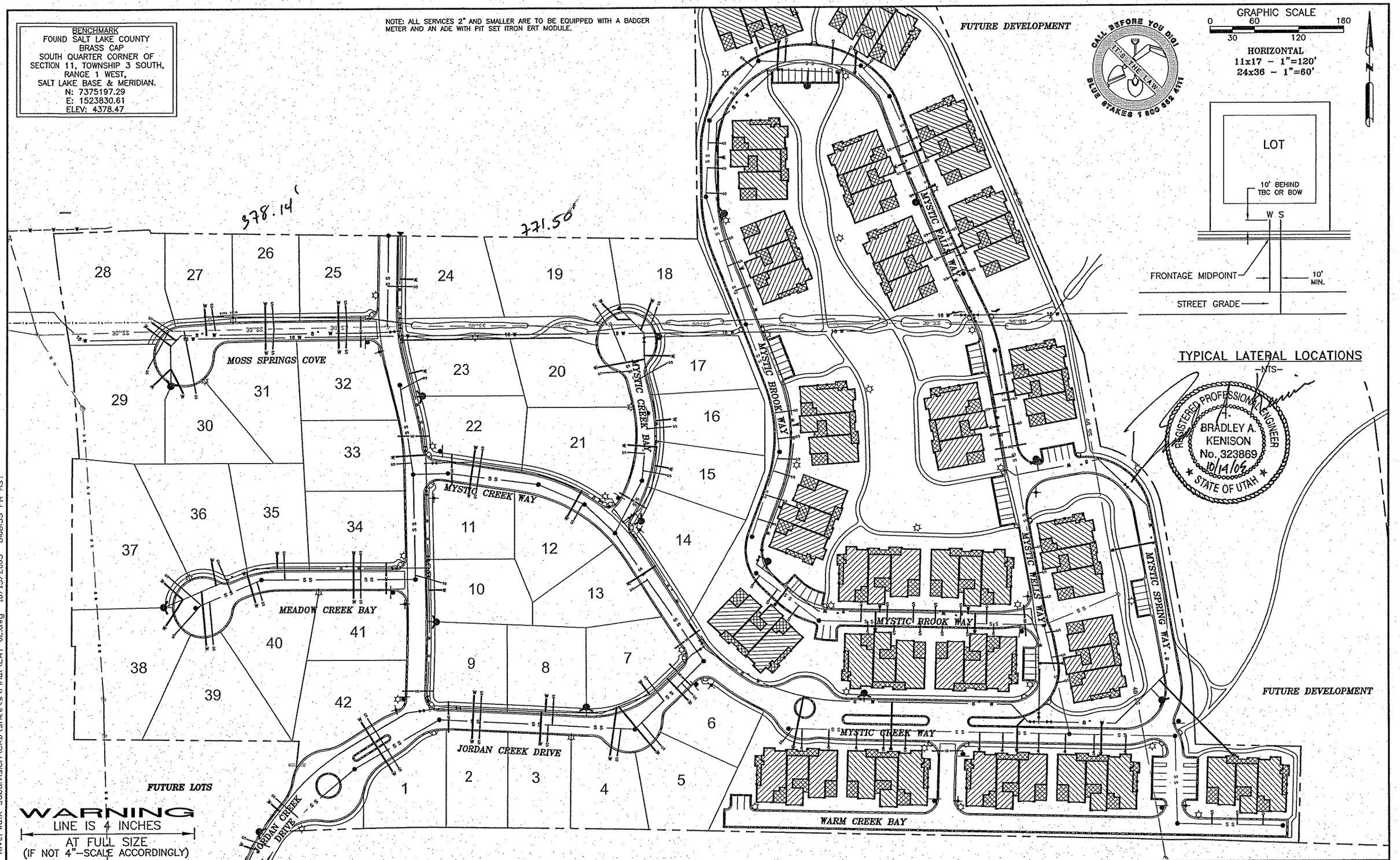

LOT
10' BEHIND TBC OR BOW
W S
FRONTAGE MIDPOINT
10' MIN.
STREET GRADE

TYPICAL LATERAL LOCATIONS
-NTS-

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"–SCALE ACCORDINGLY)

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DRAWN TT	7/8/05 DATE	
CHECKED RWA PROJECT ENGINEER	7/8/05 DATE	
APPROVED BAK PROJECT MANAGER	7/8/05 DATE	

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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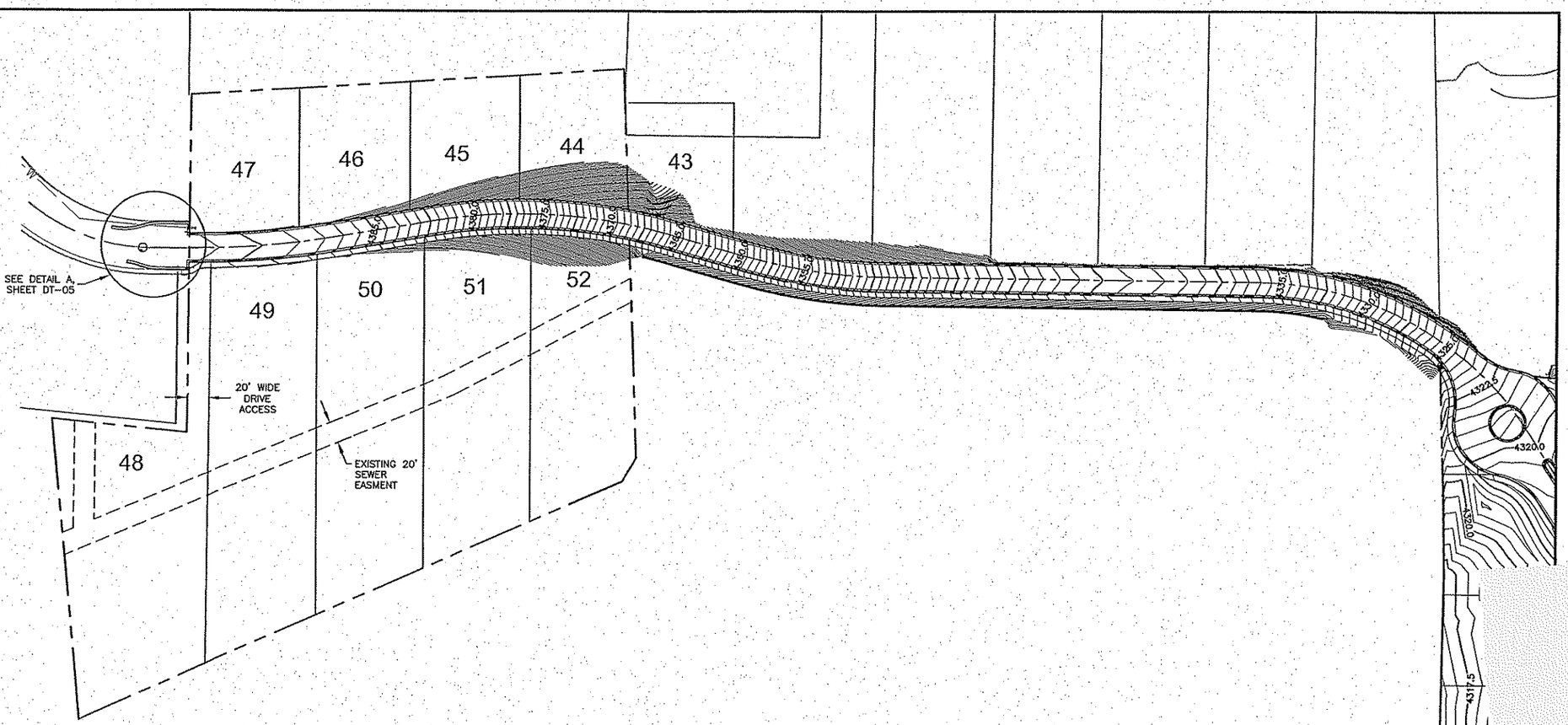
THE VILLAGE AT RIVERWALK

SEWER & WATER LATERAL LOCATION PLAN

PROJECT NO.: 04122
SHEET NO. L–02
FILE NAME: LAT–02
SCALE: AS SHOWN

NOTES:
1. ALL WORK TO BE IN ACCORDANCE WITH SOUTH JORDAN CITY STANDARDS & SPECIFICATIONS.
2. GRADING PLAN CONFORMS TO THE APPROVED DRAINAGE STUDY.



BENCHMARK
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APPROVED
10/17/05

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
9/24/05
STATE OF UTAH

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PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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THE VILLAGE AT RIVERWALK

GRADING PLAN

PROJECT NO.: 04122
SHEET NO. GP-01
FILE NAME: GP-01
SCALE: AS SHOWN

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BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP
SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
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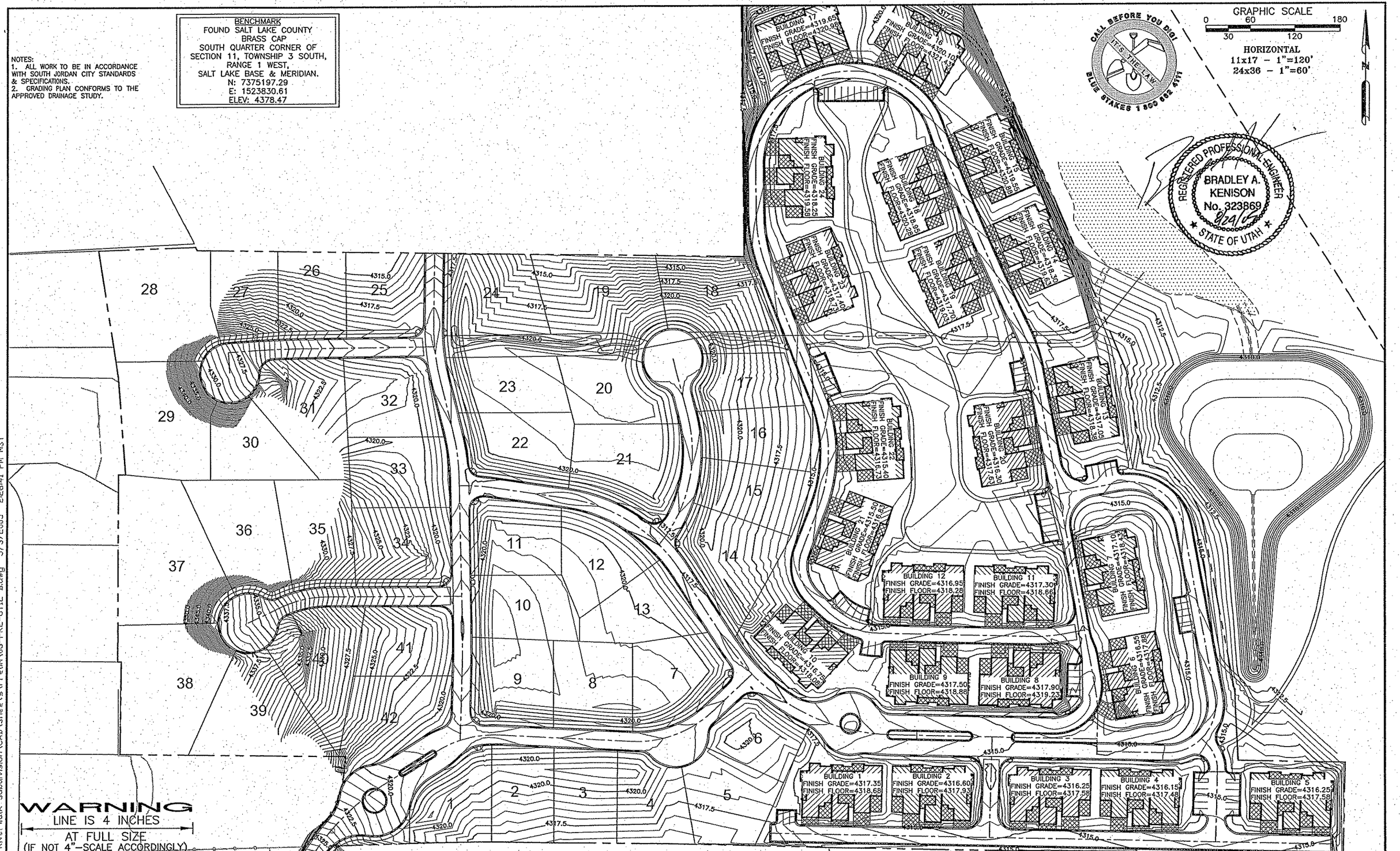
BRADLEY A. KENISON
No. 323869
8/24/05
STATE OF UTAH



NO.	REVISIONS	BY	DATE

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APPROVED BAK (PROJECT MANAGER)	7/8/05	DATE

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THE VILLAGE AT RIVERWALK

GRADING PLAN

PROJECT NO.: 04122
SHEET NO. GP-02
FILE NAME: GP-02
SCALE: AS SHOWN

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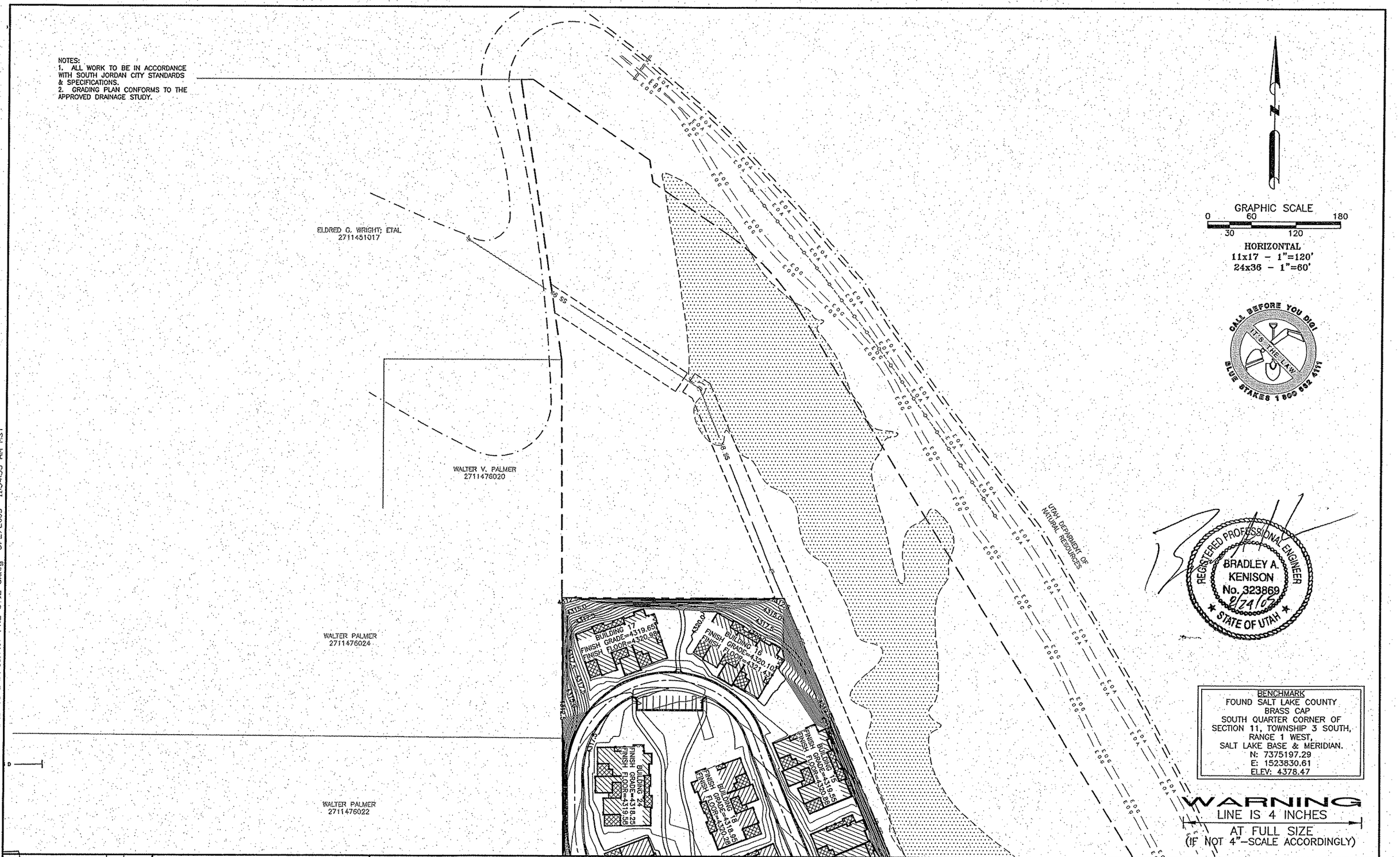

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APPROVED BAK	PROJECT MANAGER	7/8/05 DATE

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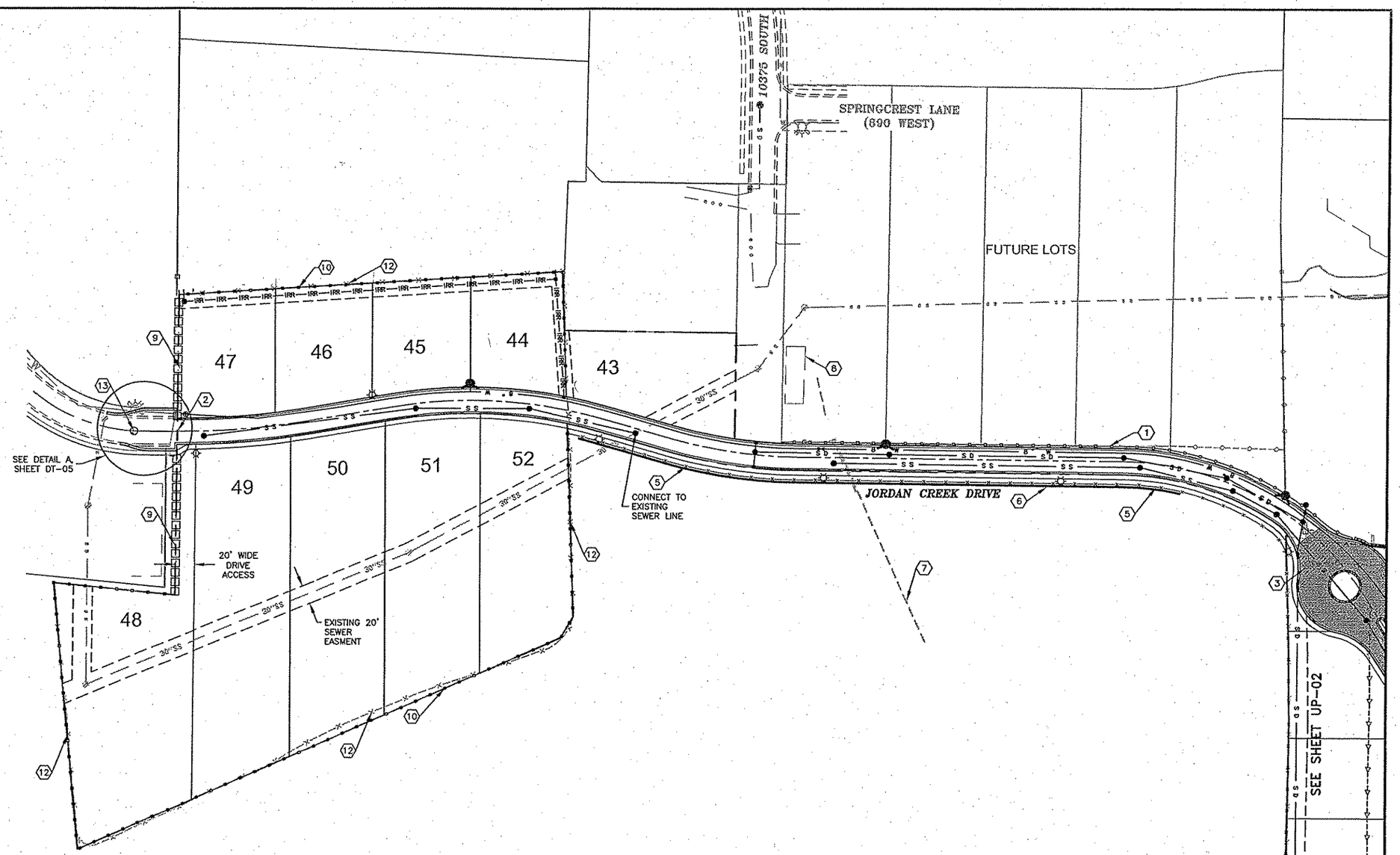
THE VILLAGE AT RIVERWALK

GRADING PLAN

PROJECT NO.: 04122
SHEET NO. GP-03
FILE NAME: GP-03
SCALE: AS SHOWN

1. INSTALL 6' HIGH WHITE VINYL FENCE
2. GATED ENTRANCE TO CONFORM TO ALL CITY, ZONING AND CITY FIRE DEPARTMENT STANDARDS.
3. "ASHLAR SLATE" STAMPED CONCRETE IN ENTRANCE AND AT CROSSWALKS.
4. SUBDIVISION ACCESS ROAD & ENTRANCE FEATURE. SEE LANDSCAPE PLAN FOR LANDSCAPING DETAILS.
5. INSTALL 3 RAIL WHITE VINYL FENCE
6. PROPOSED RETAINING WALL SEE SHEET RW-01 & RW-02
7. EXISTING 6" CULVERT TO REMAIN
8. EXISTING BUILDING TO REMAIN
9. INSTALL 6' HIGH PRE-CAST MASONRY WALL
10. INSTALL 6' HIGH BLACK VINYL-COATED CHAINLINK FENCE
11. INSTALL 6' WROUGHT IRON FENCE W/ BRICK MASONRY PILLARS
12. EXISTING FENCE TO BE REMOVED
13. BRICK KEYPAD PEDESTAL, AS PER GATE MANUFACTURER

NOTES:
1. INSTALL COMBINATION AIR/VACUUM RELIEF VALVE ASSEMBLIES (APCO 140C SERIES, CRISPIN UL SERIES, OR APPROVED EQUIVALENT) AT ALL HIGH POINTS OF THE CULINARY WATER SYSTEM.
2. INSTALL FIRE HYDRANT (PREFERRED) OR WASH-OUT VALVE AT LOW POINTS AND END-OF-LINE OF CULINARY WATER MAINS TO ACT AS BLOW-OFF.



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24x36 - 1"=60'

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REGISTERED PROFESSIONAL ENGINEER
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No. 323869
9/15/05
STATE OF UTAH

APPROVED
10/17/05

NOTE: SEE SHEET UP-04 FOR TYPICAL R.O.W. CROSS SECTIONS

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PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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THE VILLAGE AT RIVERWALK
UTILITY PLAN

PROJECT NO.: 04122
SHEET NO. UP-01
FILE NAME: UP-01
SCALE: AS SHOWN

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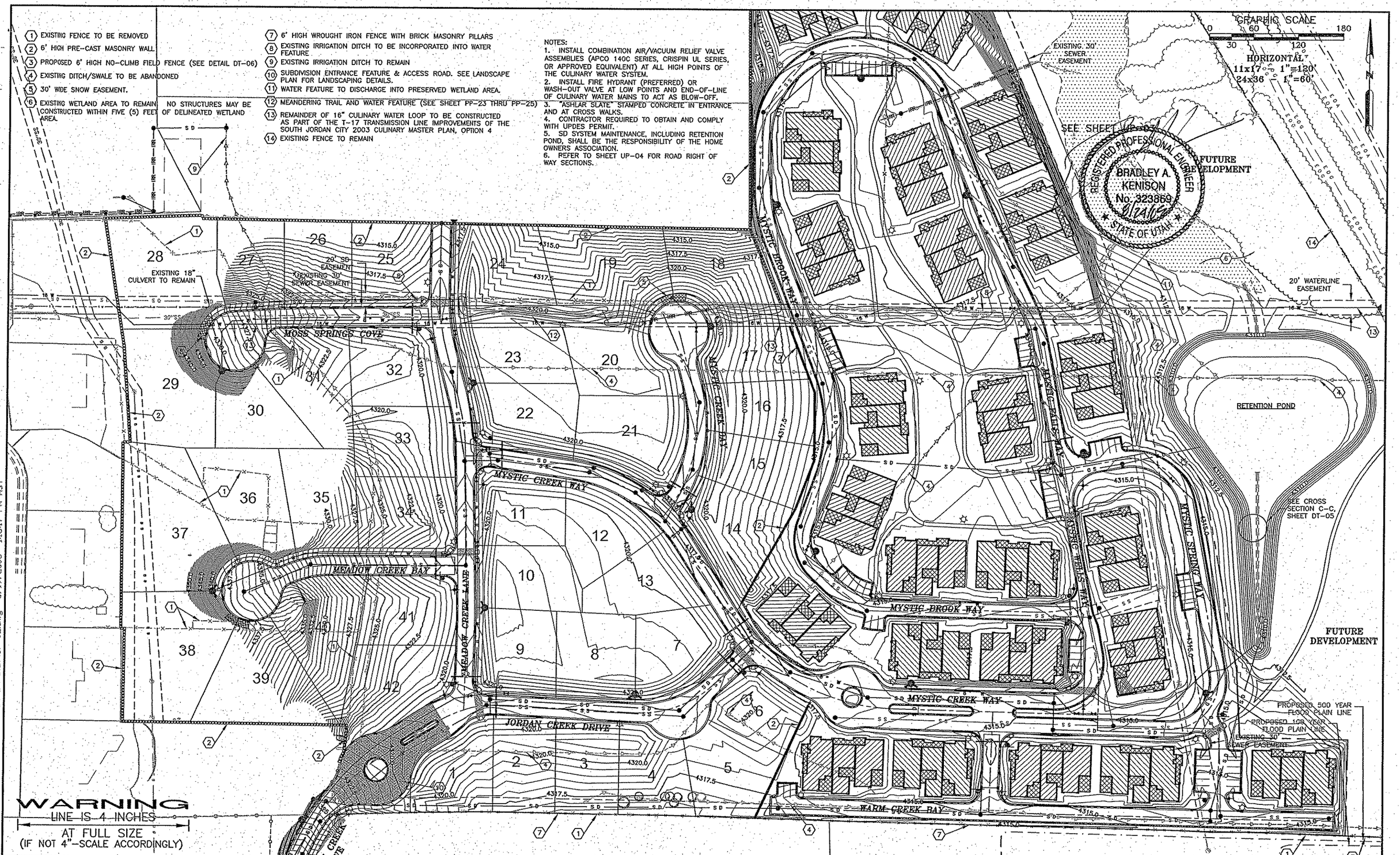
1. EXISTING FENCE TO BE REMOVED
2. 6' HIGH PRE-CAST MASONRY WALL
3. PROPOSED 6' HIGH NO-CLIMB FIELD FENCE (SEE DETAIL DT-06)
4. EXISTING DITCH/SWALE TO BE ABANDONED
5. 30' WIDE SNOW EASEMENT.
6. EXISTING WETLAND AREA TO REMAIN. NO STRUCTURES MAY BE CONSTRUCTED WITHIN FIVE (5) FEET OF DELINEATED WETLAND AREA.
7. 6' HIGH WROUGHT IRON FENCE WITH BRICK MASONRY PILLARS
8. EXISTING IRRIGATION DITCH TO BE INCORPORATED INTO WATER FEATURE
9. EXISTING IRRIGATION DITCH TO REMAIN
10. SUBDIVISION ENTRANCE FEATURE & ACCESS ROAD. SEE LANDSCAPE PLAN FOR LANDSCAPING DETAILS.
11. WATER FEATURE TO DISCHARGE INTO PRESERVED WETLAND AREA.
12. MEANDERING TRAIL AND WATER FEATURE (SEE SHEET PP-23 THRU PP-25)
13. REMAINDER OF 16" CULINARY WATER LOOP TO BE CONSTRUCTED AS PART OF THE T-17 TRANSMISSION LINE IMPROVEMENTS OF THE SOUTH JORDAN CITY 2003 CULINARY MASTER PLAN, OPTION 4
14. EXISTING FENCE TO REMAIN

NOTES:
1. INSTALL COMBINATION AIR/VACUUM RELIEF VALVE ASSEMBLIES (APCO 140C SERIES, CRISPIN UL SERIES, OR APPROVED EQUIVALENT) AT ALL HIGH POINTS OF THE CULINARY WATER SYSTEM.
2. INSTALL FIRE HYDRANT (PREFERRED) OR WASH-OUT VALVE AT LOW POINTS AND END-OF-LINE OF CULINARY WATER MAINS TO ACT AS BLOW-OFF.
3. "ASHLAR SLATE" STAMPED CONCRETE IN ENTRANCE AND AT CROSS WALKS.
4. CONTRACTOR REQUIRED TO OBTAIN AND COMPLY WITH UPDES PERMIT.
5. SD SYSTEM MAINTENANCE, INCLUDING RETENTION POND, SHALL BE THE RESPONSIBILITY OF THE HOME OWNERS ASSOCIATION.
6. REFER TO SHEET UP-04 FOR ROAD RIGHT OF WAY SECTIONS.



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THE VILLAGE AT RIVERWALK

UTILITY PLAN

PROJECT NO.: 04122
SHEET NO. UP-02
FILE NAME: UP-02
SCALE: AS SHOWN

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STORM WATER POLLUTION PREVENTION PLAN AND EROSION CONTROL PLAN NOTES:

CONTROLLING SEDIMENT TRANSPORT AND PREVENTING AND/OR CORRECTING PROBLEMS ASSOCIATED WITH EROSION AND RUNOFF PROCESSES WHICH COULD OCCUR BOTH DURING AND AFTER PROJECT CONSTRUCTION WILL BE CLOSELY MONITORED. PERIODIC MAINTENANCE AND INSPECTION OF SEDIMENT CONTROL DEVICES WILL BE SCHEDULED. PARTICULAR ATTENTION SHALL BE GIVEN TO EXISTING DRAINAGE PATTERNS WHICH RUN THROUGH DISTURBED AREAS AND OVER EXTREME SLOPES. THESE PATTERNS WILL BE IDENTIFIED TO ISOLATE PROBLEM AREAS WHERE WATER WILL CONCENTRATE. PROVISIONS SHALL BE MADE TO CHANNEL RUNOFF AWAY FROM NEW OR EXISTING IMPROVEMENTS TO PREVENT UNDERMINING AND GENERAL SITE EROSION. THESE PROVISIONS SHALL BE STABILIZED AND SHALL REMAIN IN PLACE UNTIL THE PERMANENT STORM DRAINAGE FACILITIES ARE INSTALLED AND FUNCTIONAL.

EROSION CONTROL – AN SWP3 HAS BEEN PREPARED IN ACCORDANCE WITH THE UTAH DISCHARGE ELIMINATION SYSTEM (UPDES) PERMIT FOR CONSTRUCTION, OUTLINING HOW EROSION AND SILTATION WILL BE CONTROLLED. A COPY OF THE PLAN MUST BE ON SITE AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE PLAN AND INSTALLING AND MAINTAINING THE EROSION CONTROL FACILITIES. SHOULD SILT LEAVE THE SITE OR EROSION OCCUR, IT IS THE CONTRACTOR'S RESPONSIBILITY TO TAKE CORRECTIVE ACTION AND REPAIR ANY DAMAGE CAUSED BY THE SILT OR EROSION IMMEDIATELY.

BEFORE CONSTRUCTION BEGINS, THE LIMITS OF DISTURBANCE BOUNDARY SHALL BE FLAGGED ON SITE AND APPROVED BY THE PROJECT ENGINEER. UNDER NO CIRCUMSTANCES SHALL SITE DISTURBANCE OCCUR OUTSIDE THE DESIGNATED AREAS AT ANY TIME DURING CONSTRUCTION.

EXCAVATION AND EMBANKMENT OPERATIONS SHALL PROCEED IN SUCH A MANNER SO THAT FINISHING OF SLOPES, INCLUDING REVEGETATION, SHALL BE ACCOMPLISHED AS SOON AS POSSIBLE AFTER ROUGH GRADING. ALL SLOPES 2:1 OR FLATTER SHALL BE SCARIFIED WITH HEAVY EQUIPMENT, LEAVING TRACKS PERPENDICULAR TO THE SLOPE.

CUT SLOPES SHALL BE 1:1 MAXIMUM AND FILL SLOPES 2:1 MAXIMUM UNLESS ROCK IS ENCOUNTERED. CUT SLOPES IN ROCK MAY BE STEEPENED, DEPENDING UPON GEOTECHNICAL CONSIDERATIONS. THE TOPS OF ALL CUT SLOPES IN SOIL SHALL BE ROUNDED FOR A HORIZONTAL DISTANCE OF THREE FEET BEYOND THE CATCH POINT. SLOPE ROUNDING SHALL OCCUR AS THE SLOPE IS BEING BROUGHT DOWN. THE OVERALL SHAPE, HEIGHT AND GRADE OF ANY CUT AND/OR FILL SLOPE SHALL BE DEVELOPED IN CONCERT WITH THE EXISTING NATURAL CONTOURS, SCALE AND VEGETATION OF NATURAL TERRAIN.

STABILIZATION PRACTICES MAY INCLUDE, BUT NOT BE LIMITED TO, TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, GEOTEXTILES, SOD STABILIZATION, VEGETATIVE BUFFER STRIPS, PROTECTION OF TREES, PRESERVATION OF NATURAL VEGETATION, AND OTHER APPROPRIATE MEASURES. USE OF IMPERVIOUS SURFACES FOR STABILIZATION SHALL BE AVOIDED. EXCEPT AS PROVIDED BELOW, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS POSSIBLE IN DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 15 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED.

(A) WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 15TH DAY AFTER CONSTRUCTION ACTIVITY PERMANENTLY CEASES IS PRECLUDED BY DEEP SNOW OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INIATED AS SOON AS PRACTICABLE.

(B) WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH DISTURBING WILL RESUME WITHIN 15 WORKING DAYS, TEMPORARY STABILIZATION MEASURES NEED NOT BE INITIATED ON THAT PORTION OF THE SITE.

SPECIFICALLY OUTLINED DISTURBED AREAS, BOTH ON AND OFF-SITE SHALL BE REVEGETATED. THESE AREAS SHALL INCLUDE, BUT NOT BE LIMITED TO, ALL UNSURFACED AREAS WITHIN THE FLAGGED LIMITS OF DISTURBANCE, STAGING AND STORAGE AREAS, MATERIAL WASTE AREAS, UNDERGROUND UTILITY CONSTRUCTION AREAS, BENCHED AREAS, INCLUDING RETAINING WALL BENCHES, AND TEMPORARY OR EXISTING ACCESS ROADS USED FOR CONSTRUCTION ACTIVITIES. CUT AND FILL SLOPES OVER 3:1 REQUIRE THE PLACEMENT OF EROSION CONTROL/REVEGETATION MATTING. SLOPES LESS THAN 3:1 MAY BE SPRAYED WITH TACKIFIER. ROCK CUTS STEEPER THAN 1:1 WILL NOT BE REVEGETATED.

SEDIMENT TRAPS MUST OUTLET ONTO STABILIZED (PREFERABLY UNDISTURBED) GROUND, OR LEFT TO PERCOLATE INTO THE GROUND.

CONTROLLED OUTLETS SHALL DIRECT COLLECTED RUNOFF THROUGH SILT FENCES OR STRAW BALES.

TYPICAL FUGITIVE DUST SHALL BE CONTROLLED BY WATERING AND/OR CHEMICAL STABILIZATION, PROVIDING VEGETATIVE OR SYNTHETIC COVER AND WIND BREAKS CONSISTENT WITH UTAH STATE DIVISION OF AIR QUALITY STANDARDS.

REVEGETATION NOTES:

1. RECOMMENDED SEEDING MIXTURES, RATES AND CULTURAL PRACTICES MUST BE DONE ON A SITE SPECIFIC BASIS WHICH ACCOUNTS FOR THE FOLLOWING: SOIL PROPERTIES, CLIMATIC FACTORS, TOPOGRAPHIC POSITION, CULTURAL PLANS, AND FEASIBILITY.
2. VEGETATIVE PLANTING SHALL BE DONE WHERE DEEMED NECESSARY TO HASTEN THE RETURN OF PREEXISTING SITE CHARACTERISTICS AND IN THE FOLLOWING SITUATIONS:
   A. ANY FINISHED SLOPE WHICH WILL REMAIN UNDISTURBED FOR AT LEAST 10 YEARS.
   B. ALL TYPES OF LANDSCAPING.
3. ALL DISTURBED OPEN SPACE AREAS, AND CUT AND FILL AREAS, SHALL RECEIVE AN ACCEPTABLE SEED MIX. APPLICATION PROCEDURE TO MATCH PRE-EXISTING CONDITIONS.
4. SEED MIX SHALL BE APPLIED AT A RATE SO THAT GERMINATION AND SUBSEQUENT COVERAGE REACHES 80 PERCENT IN A REPRESENTATIVE 10' x 10' AREA. IF COVERAGE DOES NOT REACH 80 PERCENT, RESEEDING MUST OCCUR.
5. APPROPRIATE FERTILIZER SHALL BE APPLIED TO ALL SLOPES RECEIVING SEED. APPLICATION RATES OF THE FERTILIZER SHALL BE STRICTLY ADHERED TO.

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STORM WATER MANAGEMENT PLAN

1. Maintain catch basin and stormwater inlets on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, and restore the catch basins' sediment trapping capacity. A catch basin is distinguished from a stormwater inlet by having at its base a sediment sump designed to catch and retain sediments below the overflow point. This information sheet focuses on the cleaning of accumulated sediments from catch basins.
2. Proper maintenance and siltation removal is required on both a routine and corrective basis to promote effective stormwater pollutant removal efficiencies for wet/dry detention pond and infiltrative devices.
3. Prevent or reduce the discharge of pollutants to stormwater from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, and maintaining the stormwater collection system.
4. Employee training, like equipment maintenance, is a method by which to implement BMPs. Employee training should be used in conjunction with all other BMPs as part of the facility's SWPPP.
5. Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.
6. Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals.
7. Implement measures to detect, correct, and enforce against illegal dumping of pollutants on streets, into the storm drain system, and into creeks. Substances illegally dumped on streets, into the storm drain system, and into creeks includes paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes can cause storm water and receiving water quality problems as well as clog the storm drain system.

GENERAL NOTES:

1. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING BLUE STAKES 48 HOURS PRIOR TO EXCAVATING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR FLAGGING, CAUTION SIGNS AND PUBLIC SAFETY ON ALL ADJACENT STREETS, CONSTRUCTION SITE, AND CONSTRUCTION CROSSINGS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR PUBLIC SAFETY AND OSHA/MSHA SAFETY STANDARDS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CARE OF ALL CONSTRUCTION STAKES.
6. CONTRACTOR SHALL STRIP, STOCKPILE, PROTECT, AND SAVE ALL TOPSOIL.
7. CONTRACTOR SHALL BE RESPONSIBLE TO RESEED ALL DISTURBED AREAS WITH APPROVED SEED MIX.
8. BACKFILL SHALL BE COMPACTED TO 95% MODIFIED PROCTOR – ASTM D1557
CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EROSION CONTROL AND FUGITIVE DUST MEASURES.
9. CONTRACTOR SHALL INSTALL SILT FENCE BELOW ALL DISTURBED AREAS AS OUTLINED ON THIS SHEET.
10. CONTRACTOR SHALL SLOPE ALL EXCAVATIONS TO AN ANGLE OF REPOSE OF MATERIAL BEING EXCAVATED OR USE BRACING OR SHORING. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH OSHA/MSHA REGULATIONS AND GUIDELINES.

(1) INSTALL SILT FENCE (SEE DETAIL THIS SHEET)
(2) INSTALL CATCHBASIN PROTECTION (SEE DETAIL THIS SHEET)
(3) INSTALL STABILIZED CONSTRUCTION ENTRANCE (SEE DETAIL THIS SHEET)

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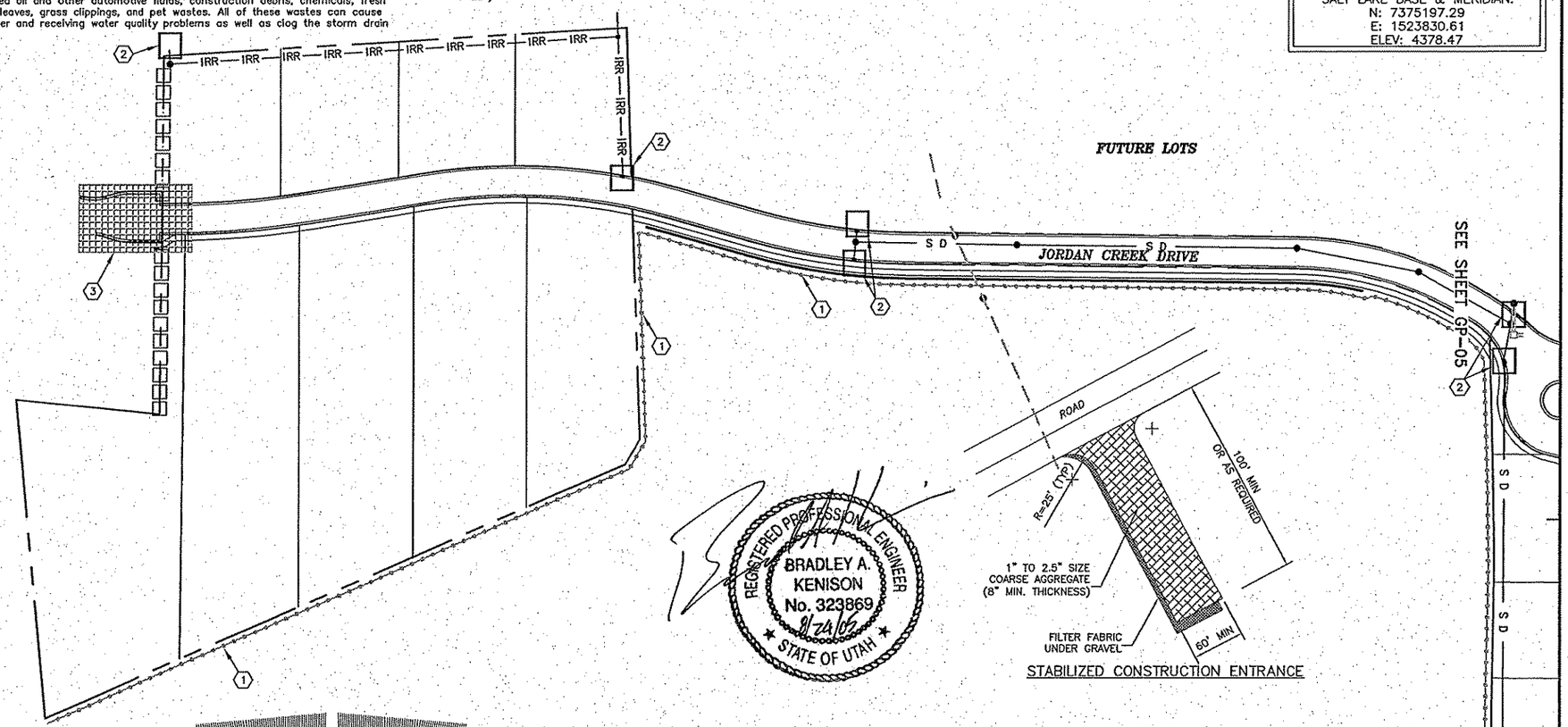
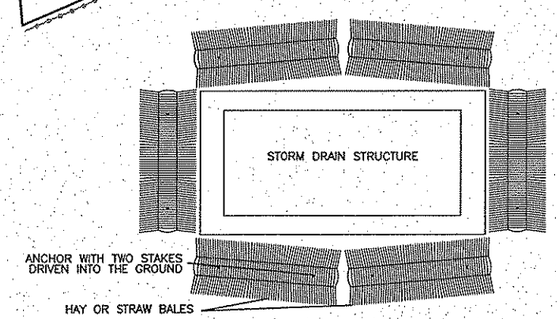
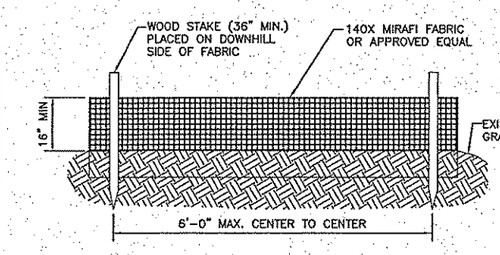


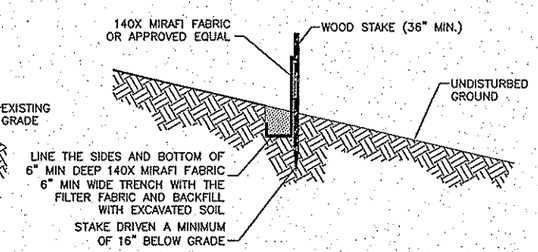
STABILIZED CONSTRUCTION ENTRANCE



STRAW BALE CATCHBASIN PROTECTION



SILT FENCE FRONT VIEW



SILT FENCE SIDE VIEW

NO	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED RWA 7/8/05 DATE (PROJECT ENGINEER)
APPROVED BAK 7/8/05 DATE (PROJECT MANAGER)

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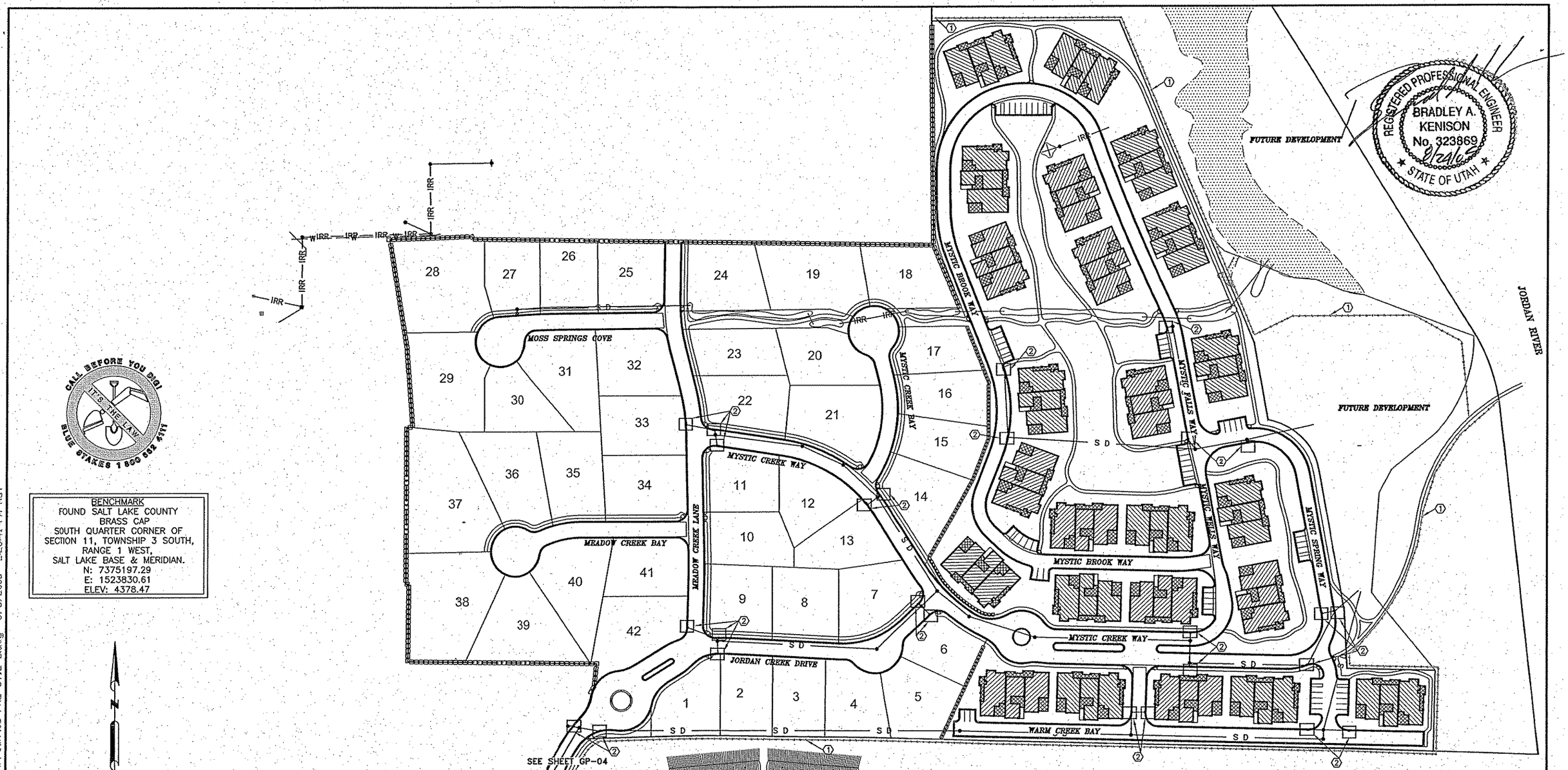
THE VILLAGE AT RIVERWALK

STORM WATER POLLUTION PREVENTION PLAN

PROJECT NO.: 04122
SHEET NO. GP-05
FILE NAME: GP-05
SCALE: AS SHOWN

Q:\2004\04122 - Riverwalk Subdivision\CAD\Sheets\Prelim\06-PRE-UTIL.dwg 5/3/2005 2:26:41 PM MST



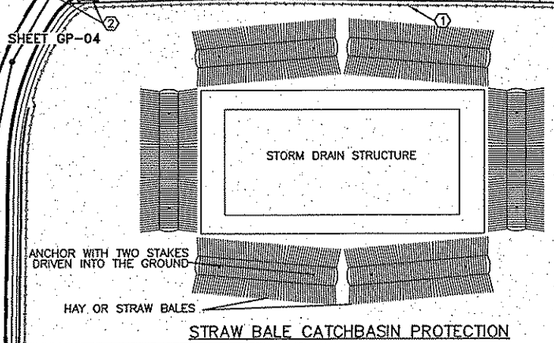
BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

GRAPHIC SCALE
0 80 240
40 160
HORIZONTAL
11x17 – 1"=160'
24x36 – 1"=80'

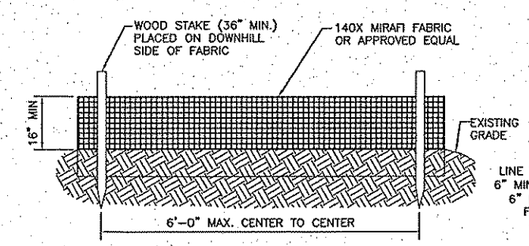
WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"–SCALE ACCORDINGLY)

① INSTALL SILT FENCE (SEE DETAIL THIS SHEET)
② INSTALL CATCHBASIN PROTECTION (SEE DETAIL THIS SHEET)

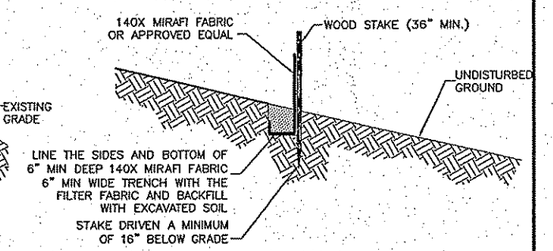
SEE SHEET GP–05 FOR THE FOLLOWING NOTES:
1. STORM WATER POLLUTION PREVENTION PLAN
2. EROSION CONTROL PLAN
3. STORM WATER MANAGEMENT PLAN
4. REVEGETATION NOTES
5. GENERAL NOTES



STRAW BALE CATCHBASIN PROTECTION



SILT FENCE FRONT VIEW



SILT FENCE SIDE VIEW

NO	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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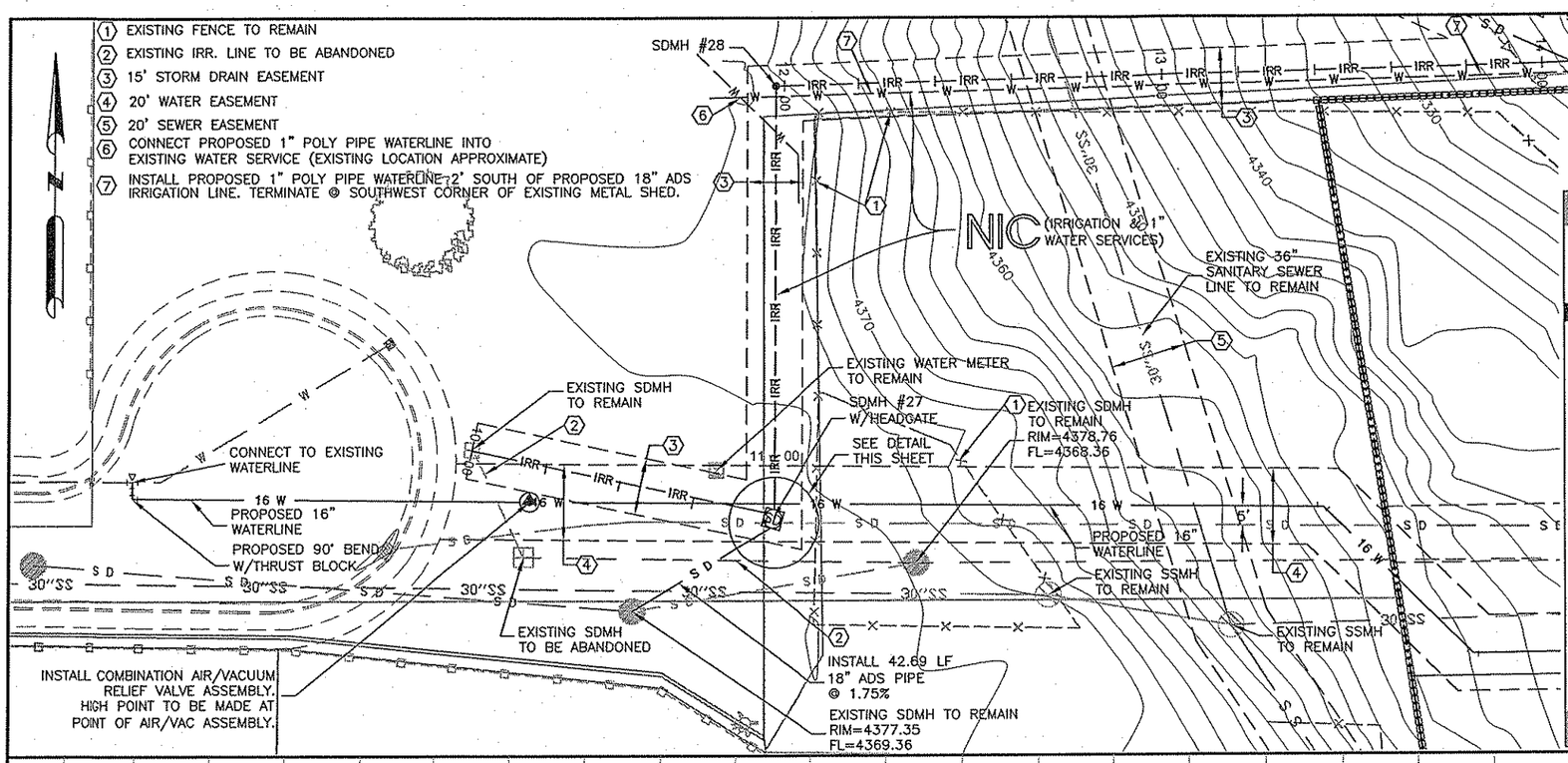
THE VILLAGE AT RIVERWALK

STORM WATER POLLUTION PREVENTION PLAN

PROJECT NO.: 04122
SHEET NO. GP–06
FILE NAME: GP–06
SCALE: AS SHOWN

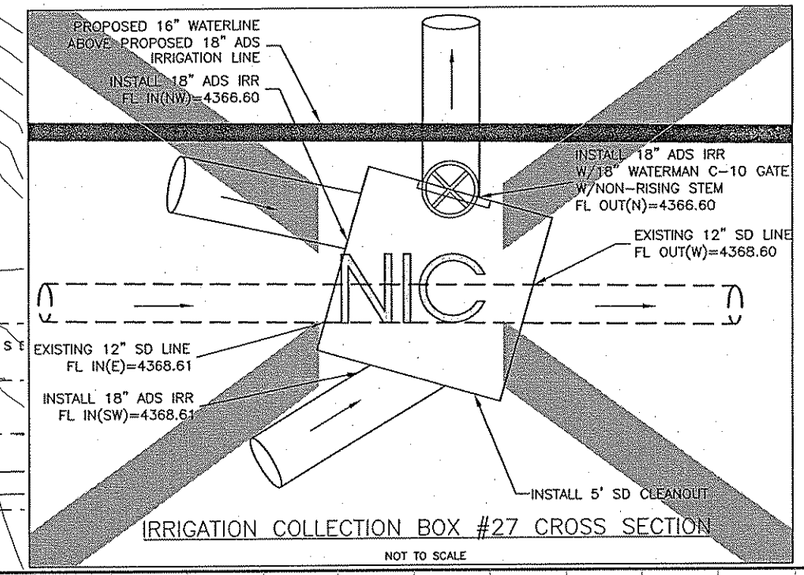
Q:\2004\04122 – Riverwalk Subdivision\CAD\Sheets\Prelim\06-PRE-UTIL B.dwg 5/3/2005 2:26:41 PM MST

1. EXISTING FENCE TO REMAIN
2. EXISTING IRR. LINE TO BE ABANDONED
3. 15' STORM DRAIN EASEMENT
4. 20' WATER EASEMENT
5. 20' SEWER EASEMENT
6. CONNECT PROPOSED 1" POLY PIPE WATERLINE INTO EXISTING WATER SERVICE (EXISTING LOCATION APPROXIMATE)
7. INSTALL PROPOSED 1" POLY PIPE WATERLINE 12' SOUTH OF PROPOSED 18" ADS IRRIGATION LINE. TERMINATE @ SOUTHWEST CORNER OF EXISTING METAL SHED.

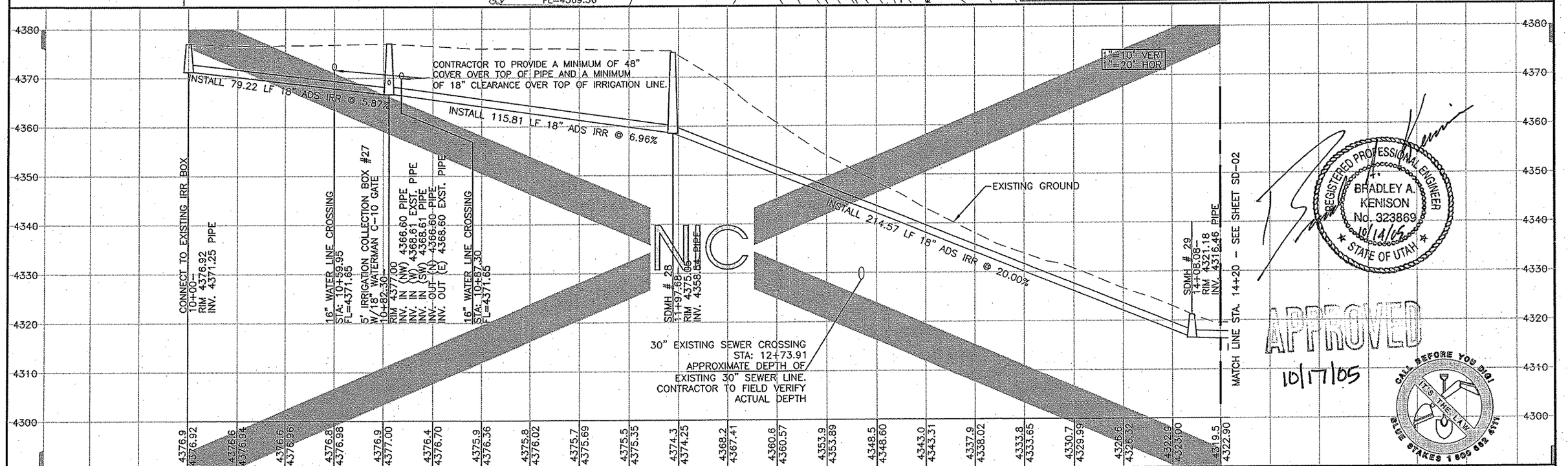


GRAPHIC SCALE
0 20' 60'
10' 40'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"–SCALE ACCORDINGLY)



IRRIGATION COLLECTION BOX #27 CROSS SECTION
NOT TO SCALE



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

APPROVED
10/17/05

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IT'S THE LAW
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NO.	REVISIONS	BY	DATE

DRAWN	TT	7/8/05 DATE
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APPROVED	BAK PROJECT MANAGER	7/8/05 DATE

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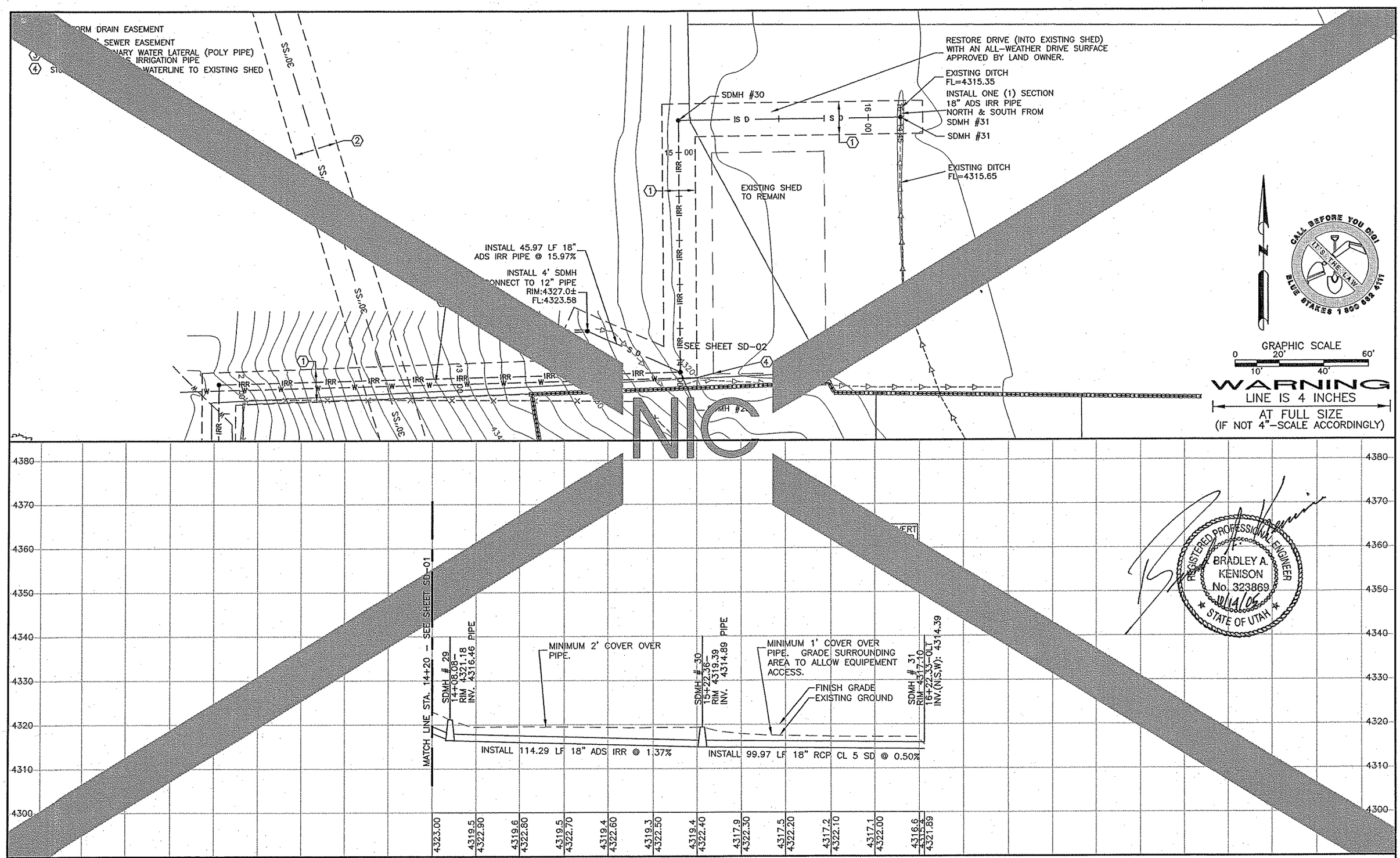
THE VILLAGE AT RIVERWALK

OFFSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-01
FILE NAME: SD-01
SCALE: AS SHOWN



NO	REVISIONS	BY	DATE

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PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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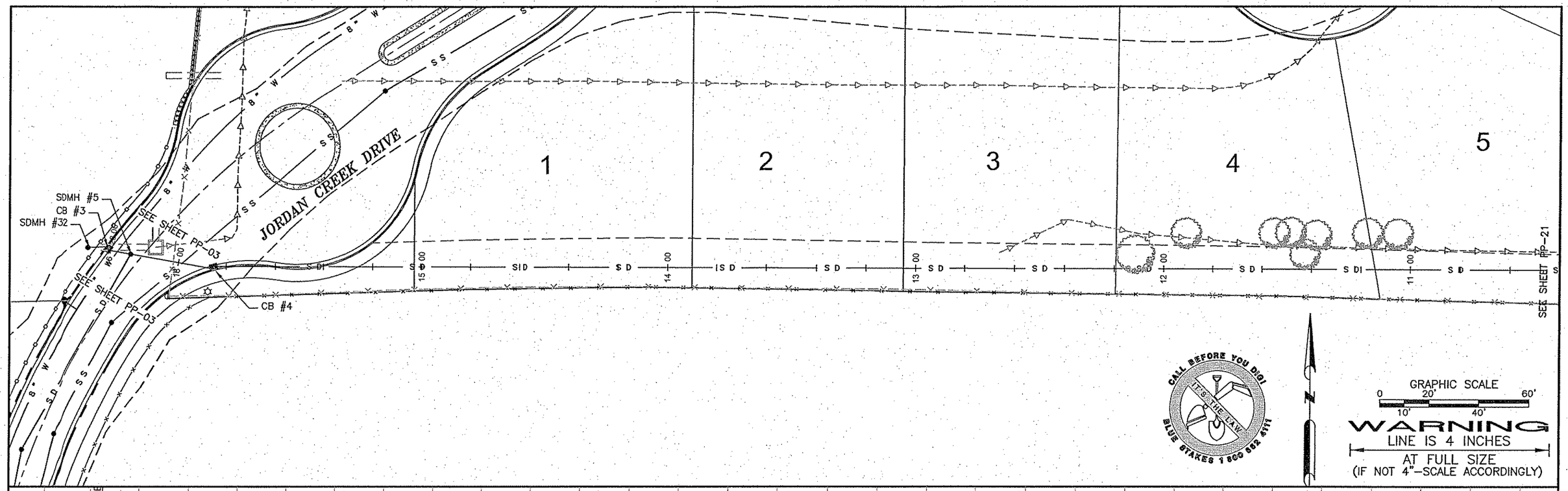
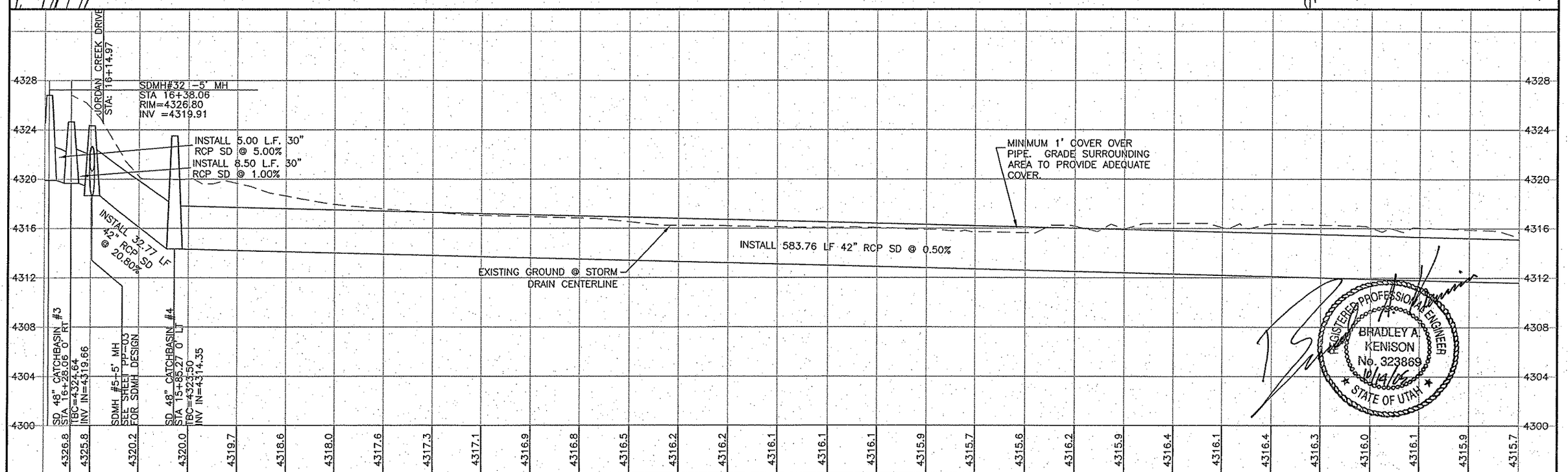
THE VILLAGE AT RIVERWALK

OFFSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-02
FILE NAME: SD-02
SCALE: AS SHOWN





NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE

CHECKED RWA 7/8/05
PROJECT ENGINEER DATE

APPROVED BAK 7/8/05
PROJECT MANAGER DATE

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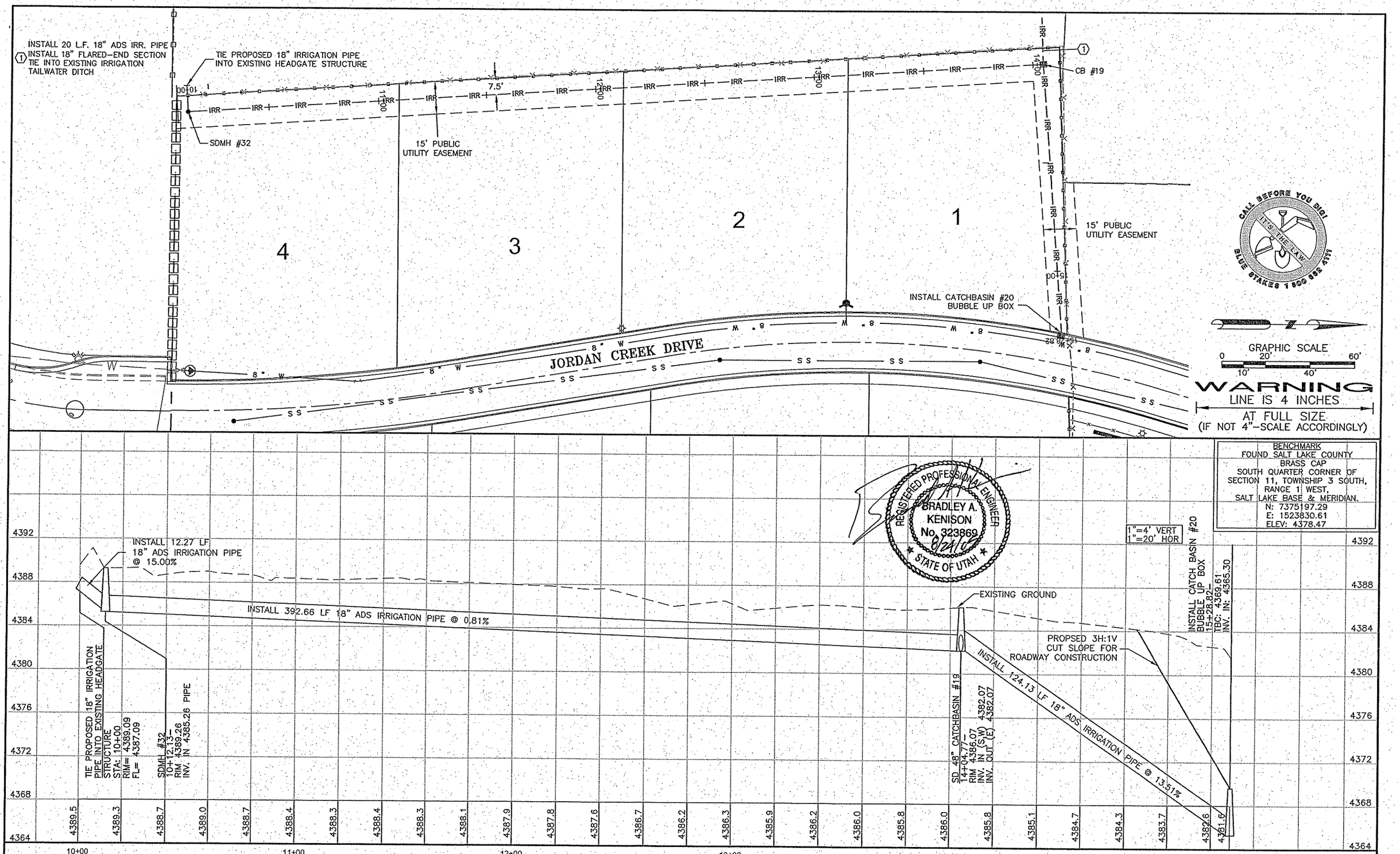
THE VILLAGE AT RIVERWALK

SOUTH STORM DRAIN SHEET

PROJECT NO.: 04122
SHEET NO. SD-03
FILE NAME: SD-03
SCALE: AS SHOWN



NO	REVISIONS	BY	DATE

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CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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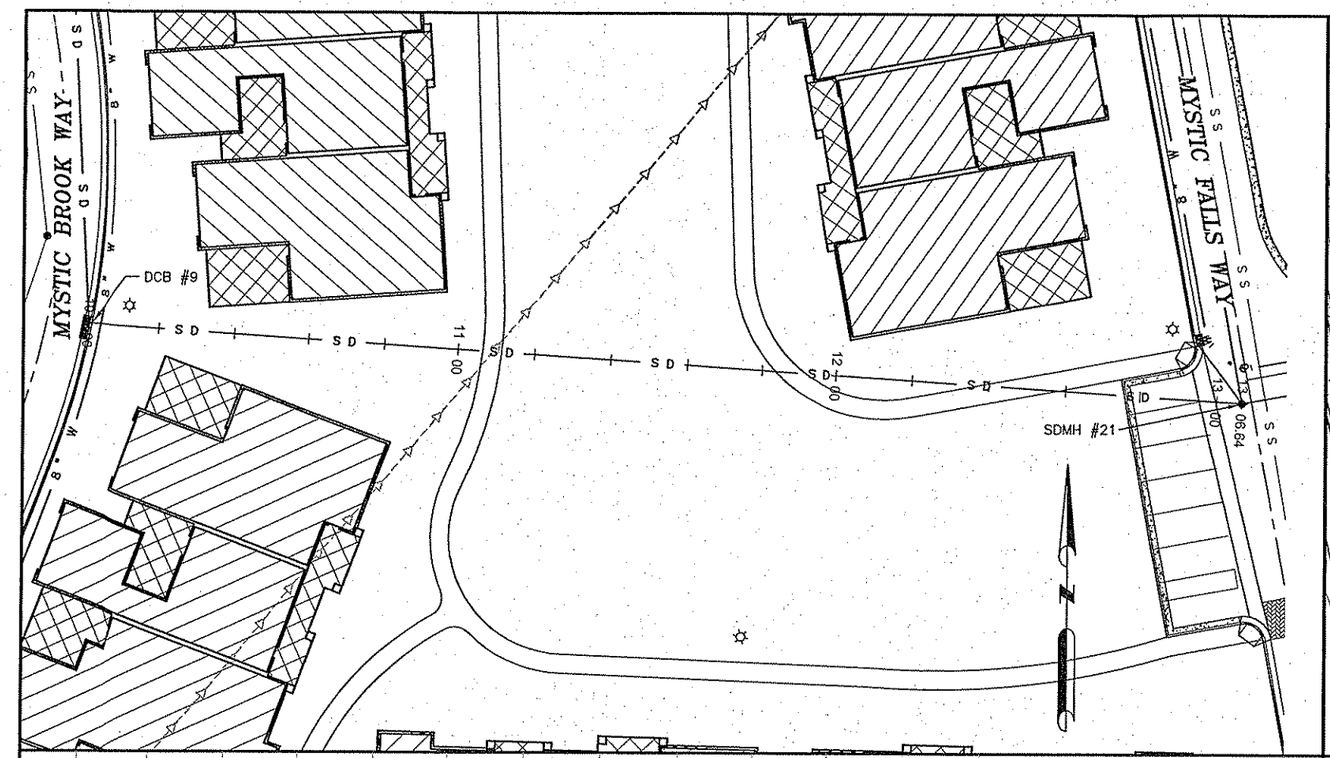
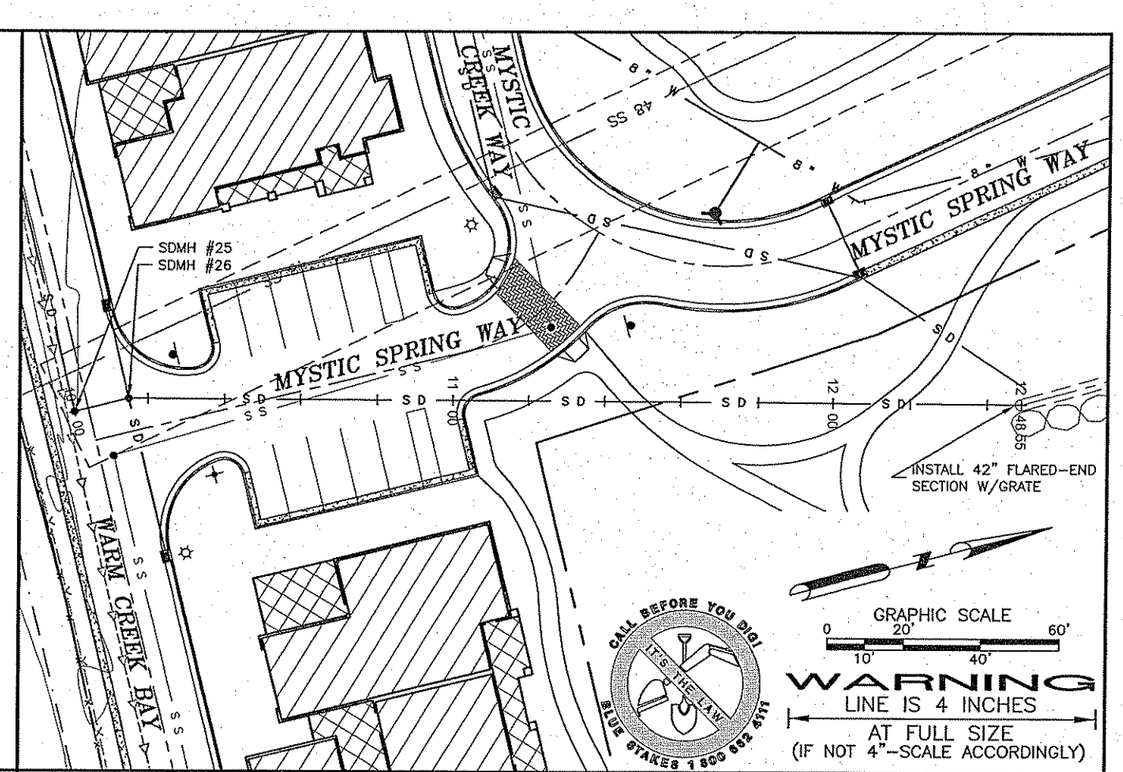
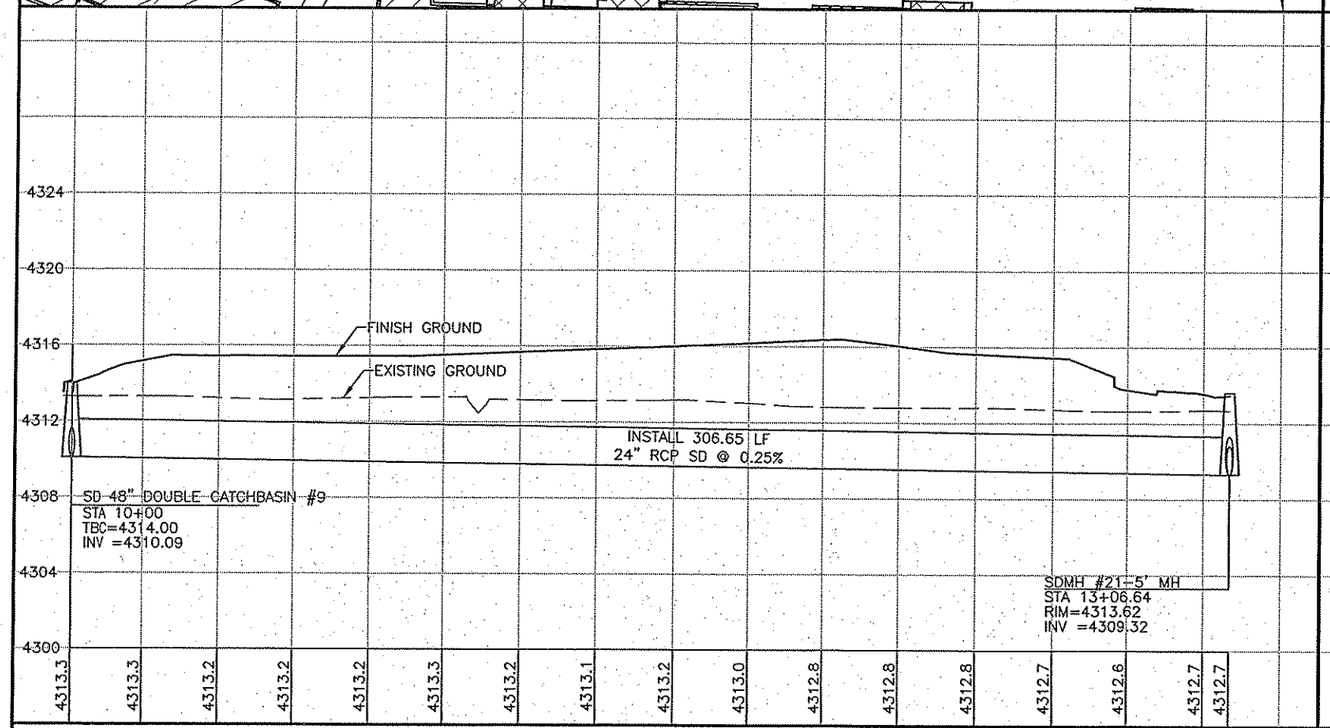
THE VILLAGE AT RIVERWALK

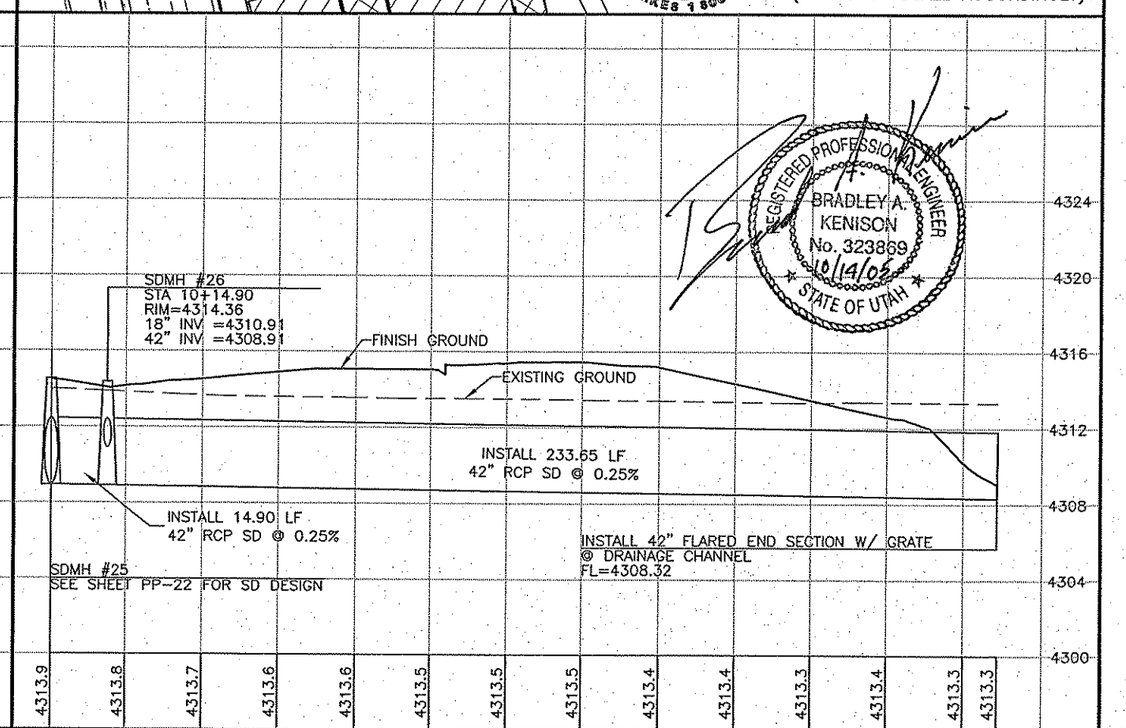
OFFSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-04
FILE NAME: SD-04
SCALE: AS SHOWN









REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN GSB	DATE 7/8/05	
CHECKED RWA (PROJECT ENGINEER)	DATE 7/8/05	
APPROVED BAK (PROJECT MANAGER)	DATE 7/8/05	

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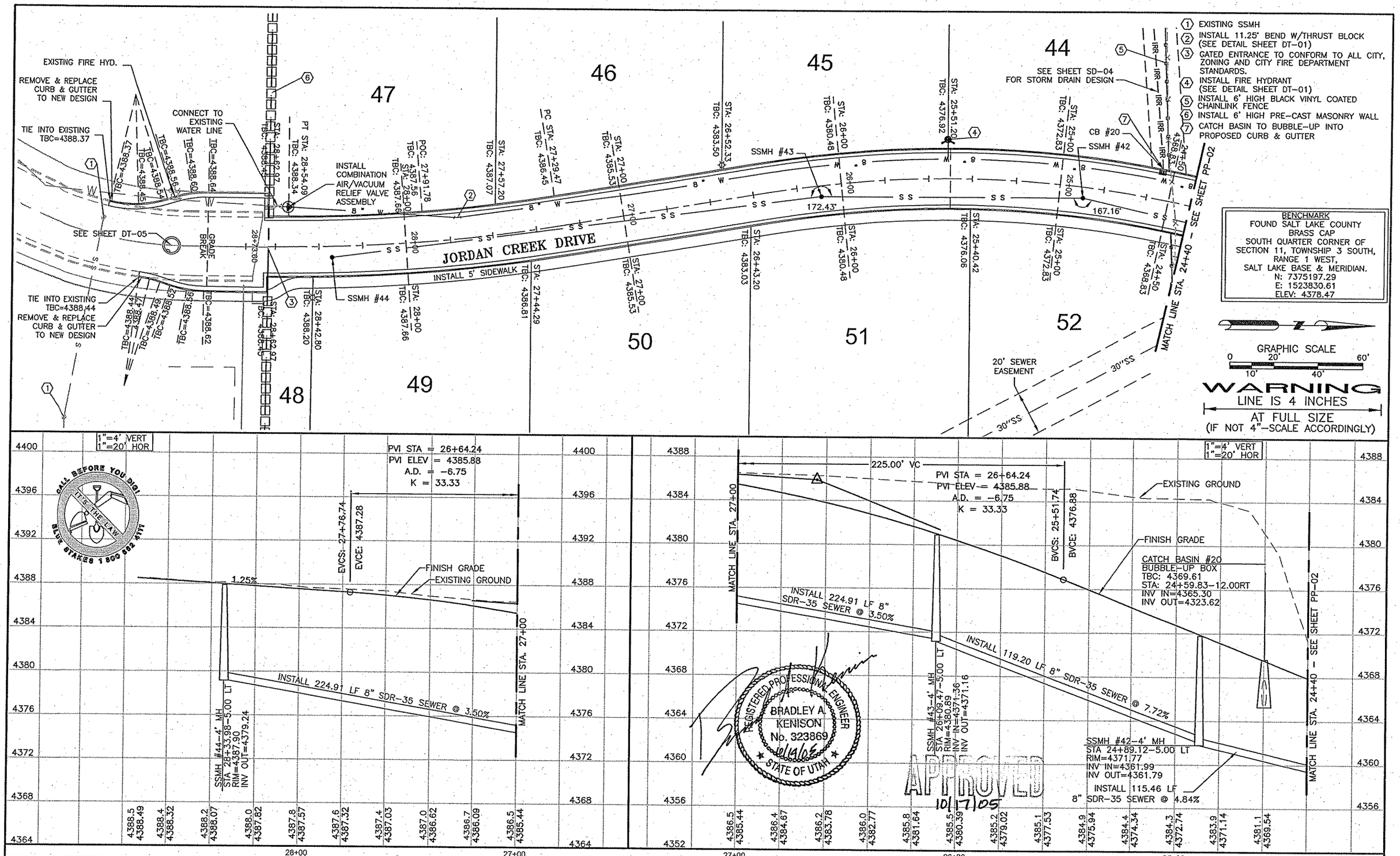
ONSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-05
FILE NAME: SD-05
SCALE: AS SHOWN



NO.	REVISIONS	BY	DATE

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CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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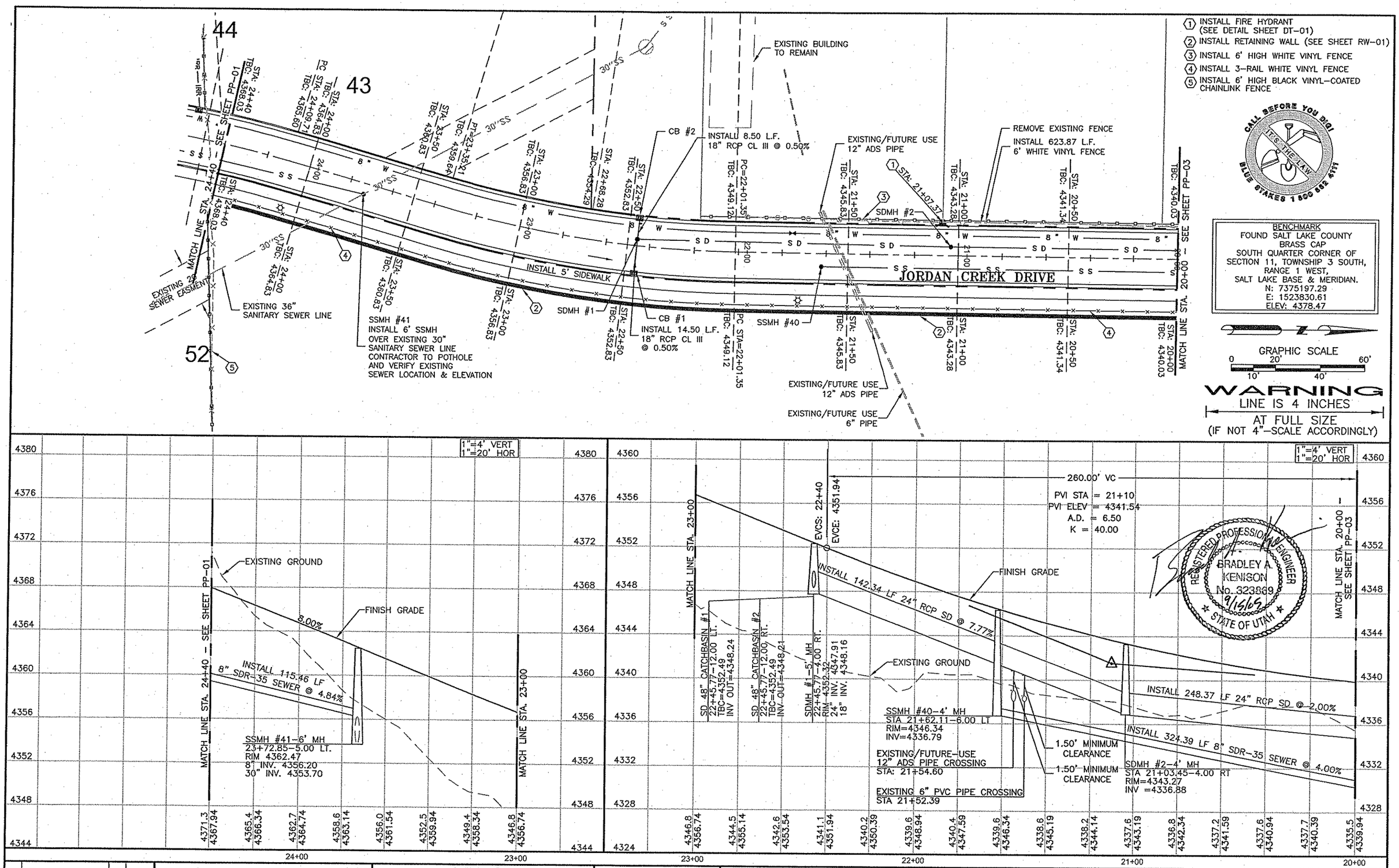
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-01
FILE NAME: PP-01
SCALE: AS SHOWN



NO	REVISIONS	BY	DATE

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PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
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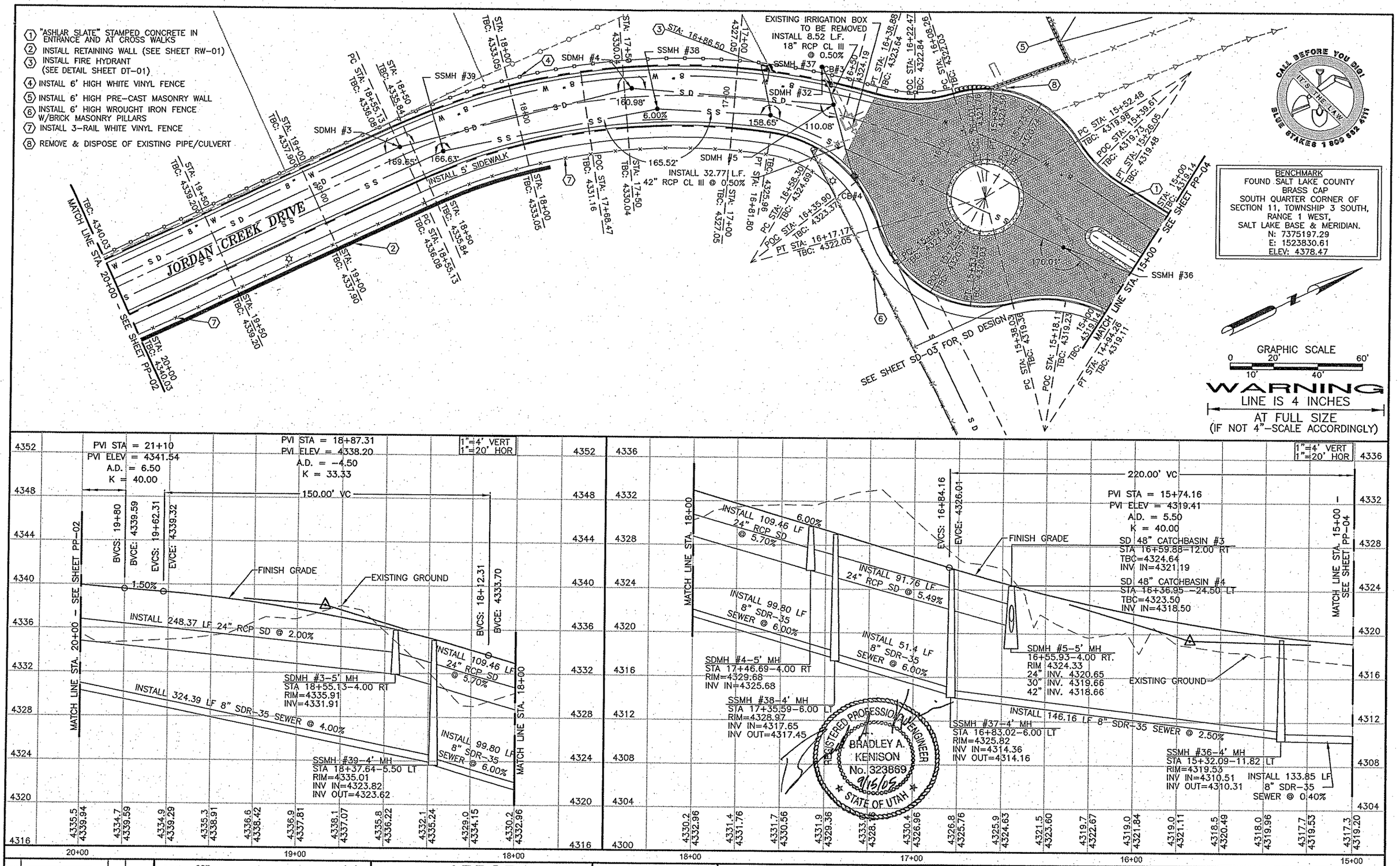
PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-02
FILE NAME: PP-02
SCALE: AS SHOWN



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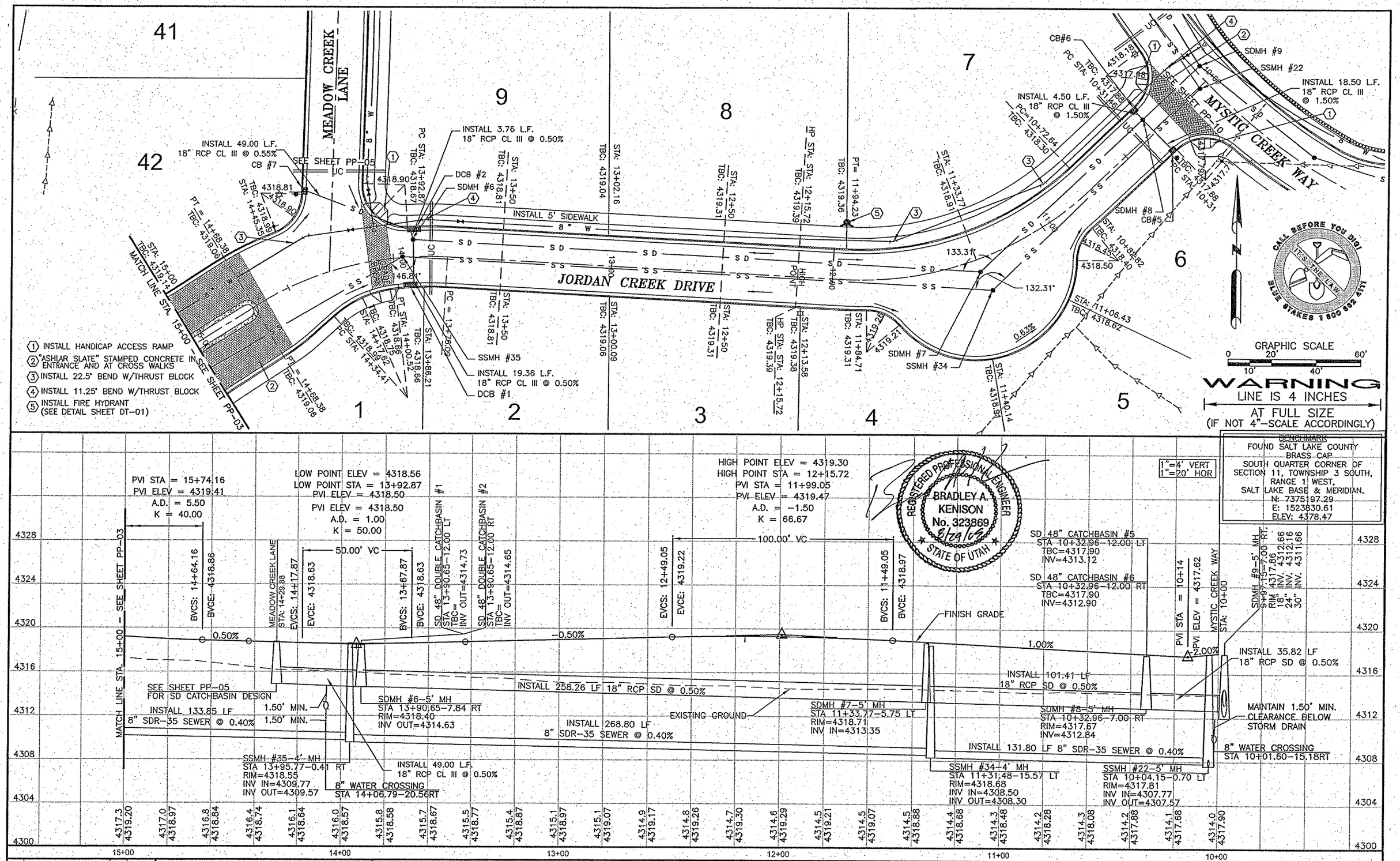
PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-03
FILE NAME: PP-03 SCALE: AS SHOWN



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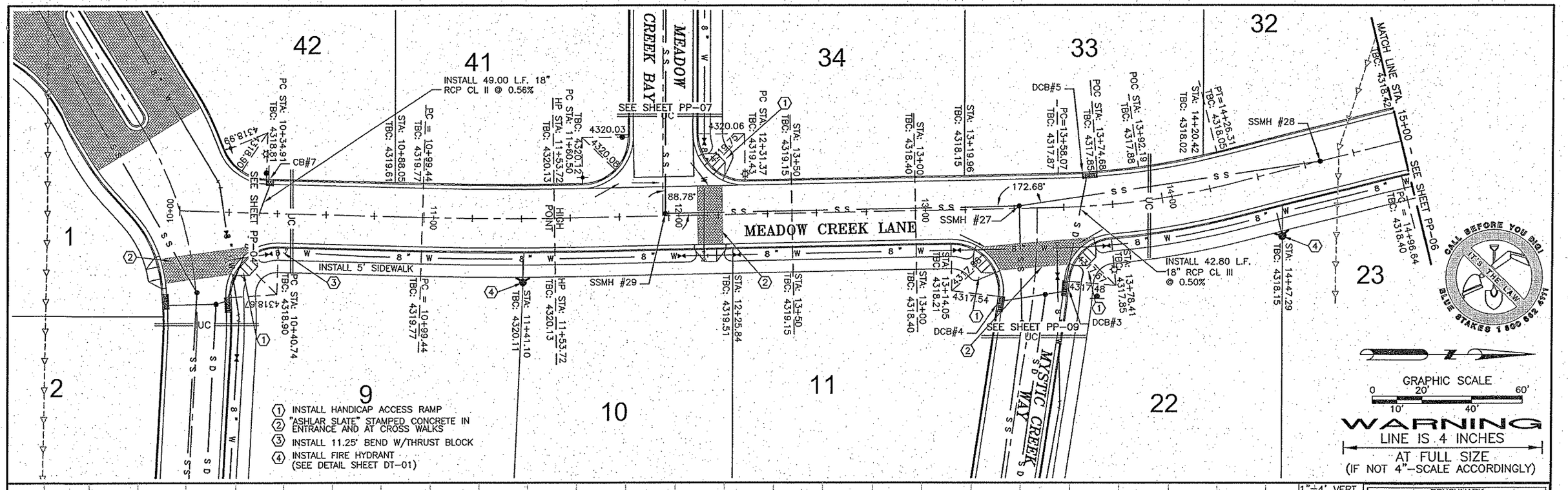
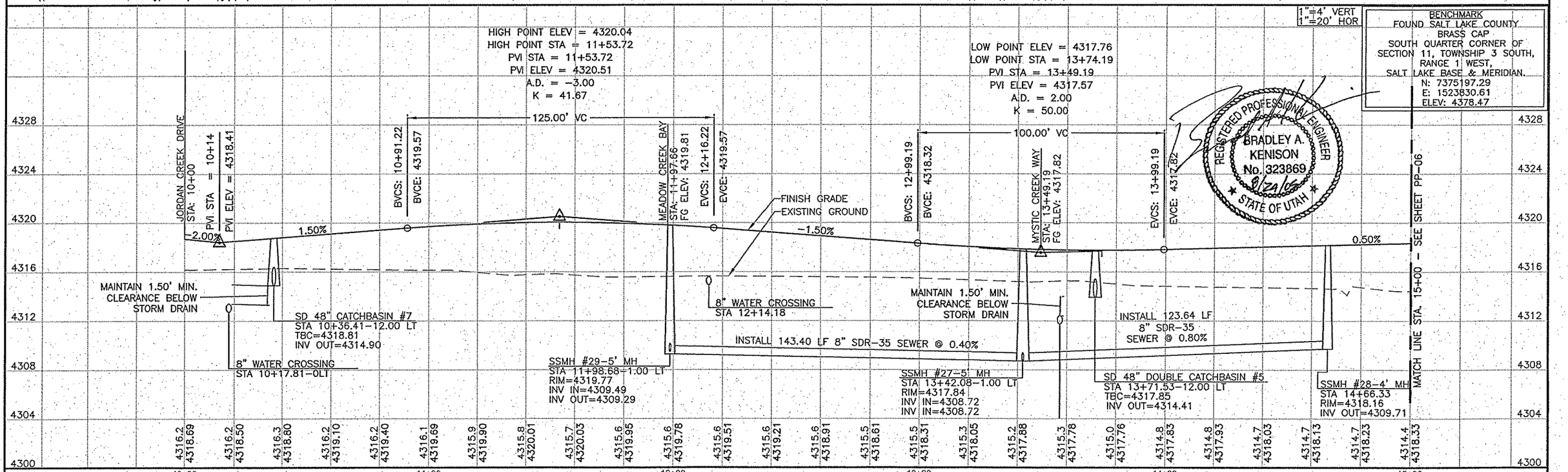
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-04
FILE NAME: PP-04
SCALE: AS SHOWN





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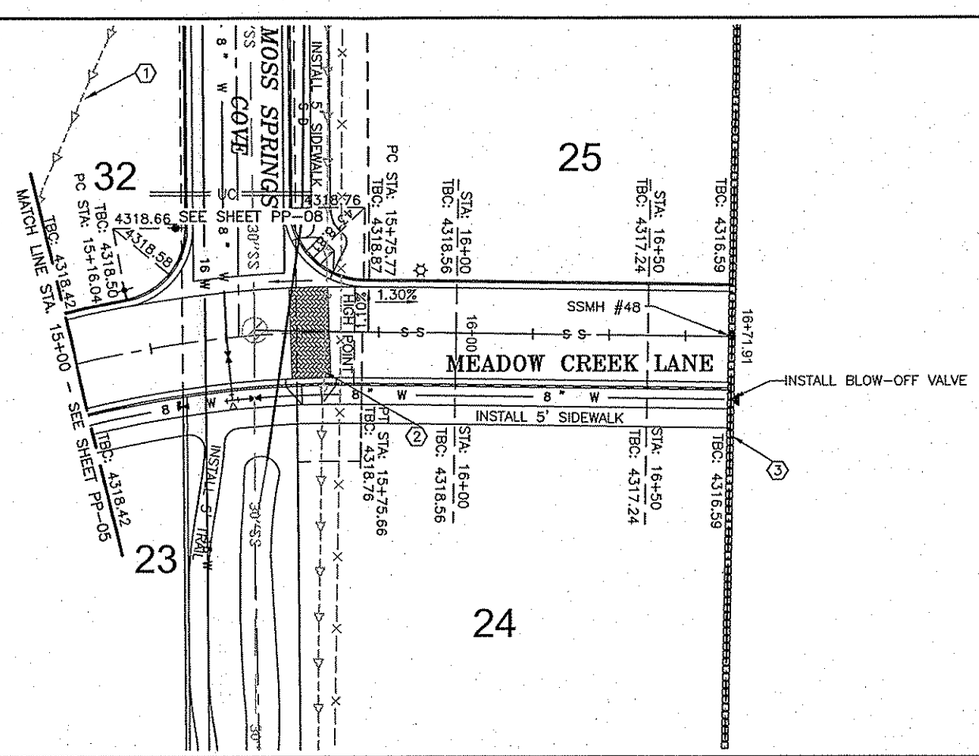
PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-05
FILE NAME: PP-05
SCALE: AS SHOWN



① EXISTING IRRIGATION DITCH TO BE PIPED
② "ASHLAR SLATE" STAMPED CONCRETE IN ENTRANCE AND AT CROSS WALKS
③ 6' HIGH PRE-CAST MASONRY WALL

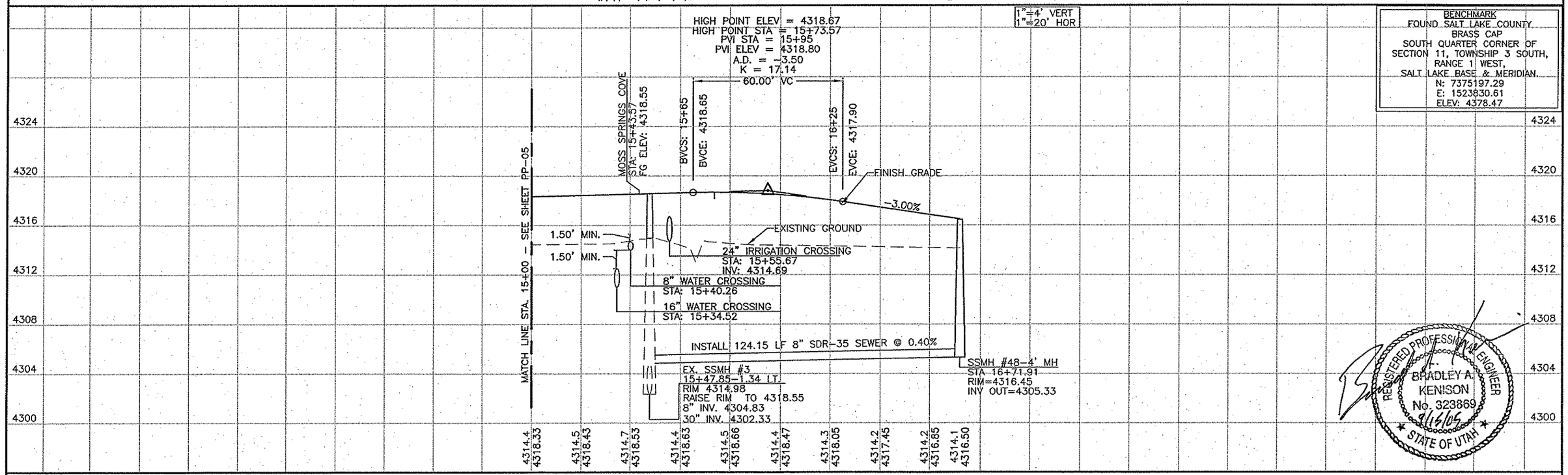
CALL BEFORE YOU DIG! IT'S THE LAW BLUE STAKES 1 800 662 4111

GRAPHIC SCALE
0 10' 20' 40' 60'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

1"=4' VERT
1"=20' HOR

BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
9/15/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

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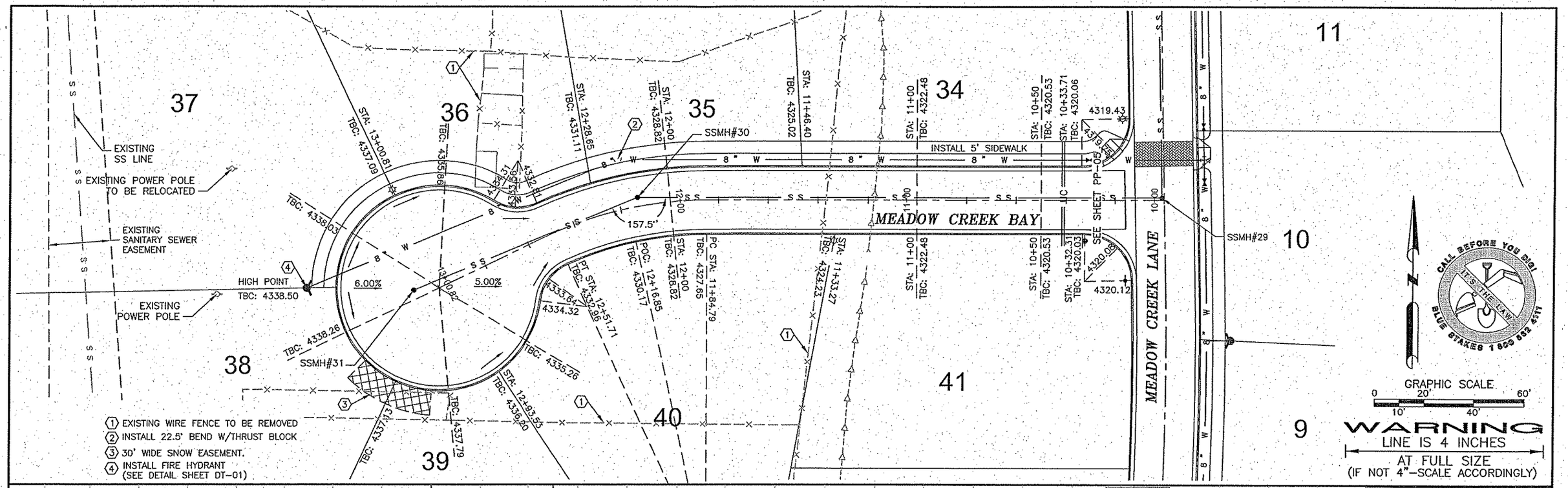
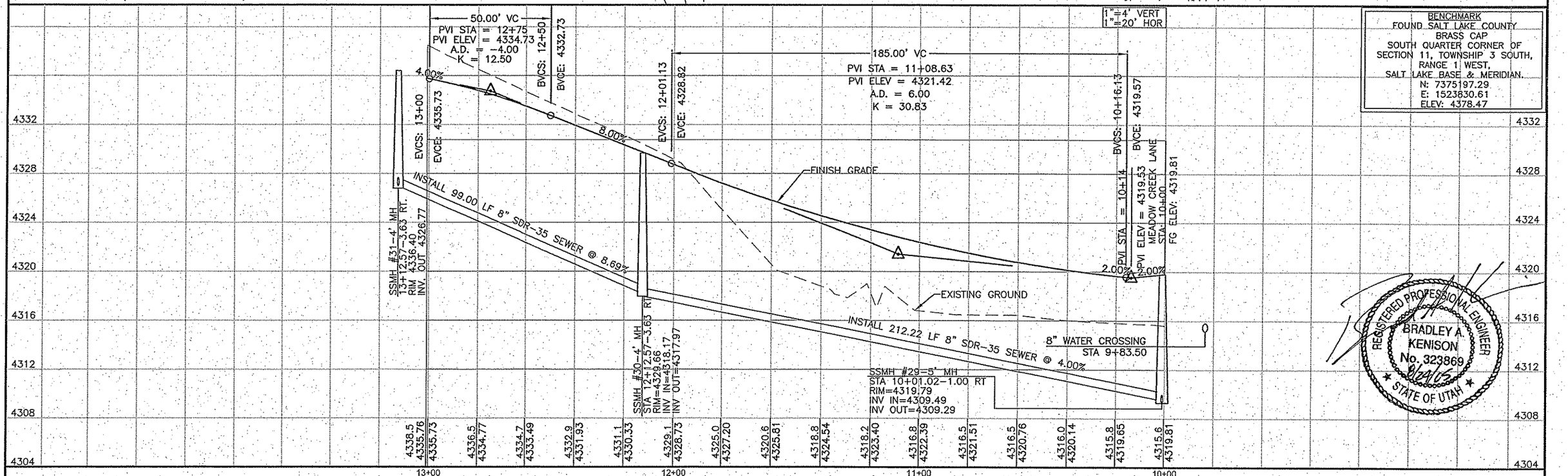
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-06
FILE NAME: PP-06
SCALE: AS SHOWN





BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
PLANS
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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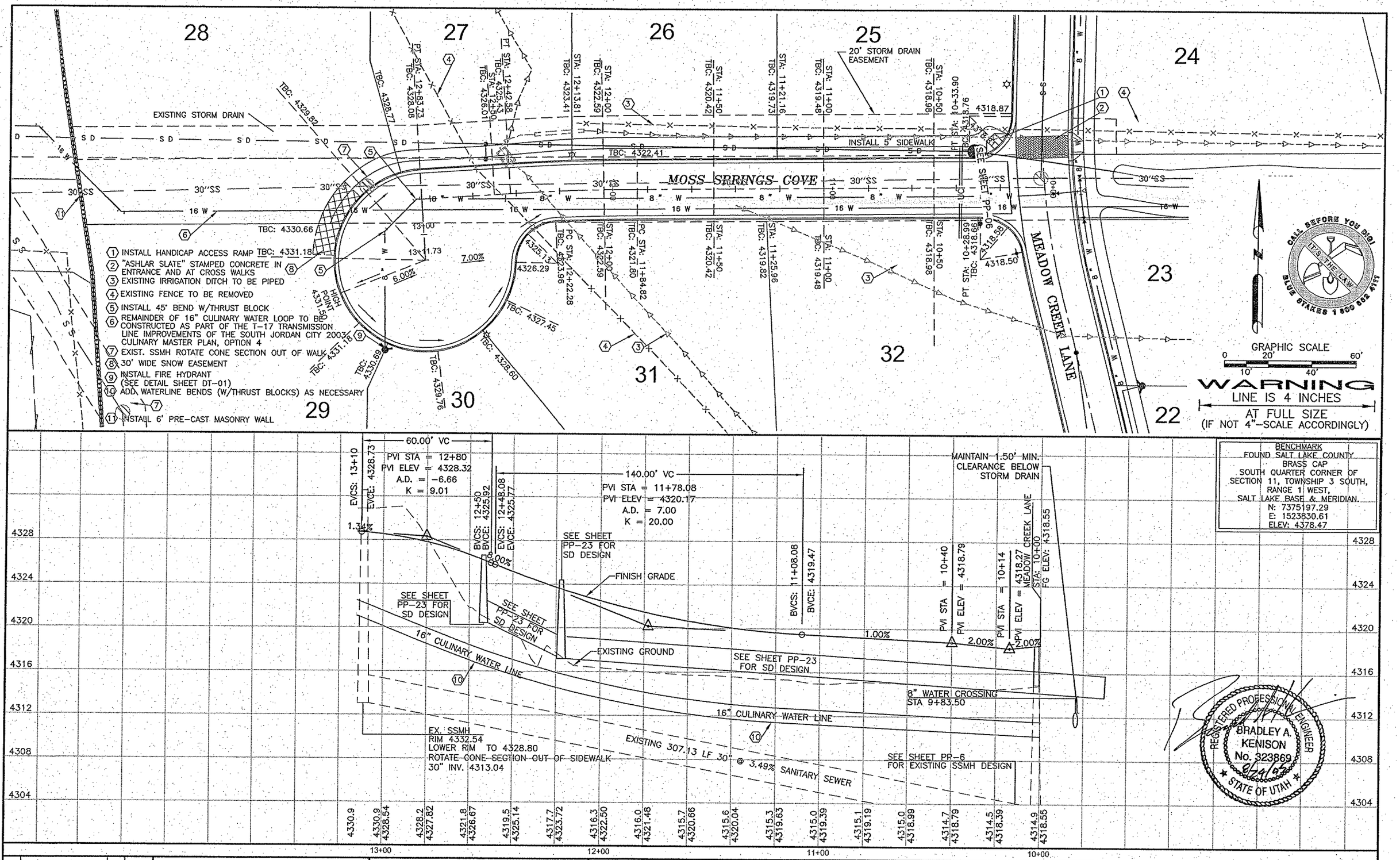
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-07
FILE NAME: PP-07
SCALE: AS SHOWN



BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523630.61
ELEV: 4378.47

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
07/08/05
STATE OF UTAH

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PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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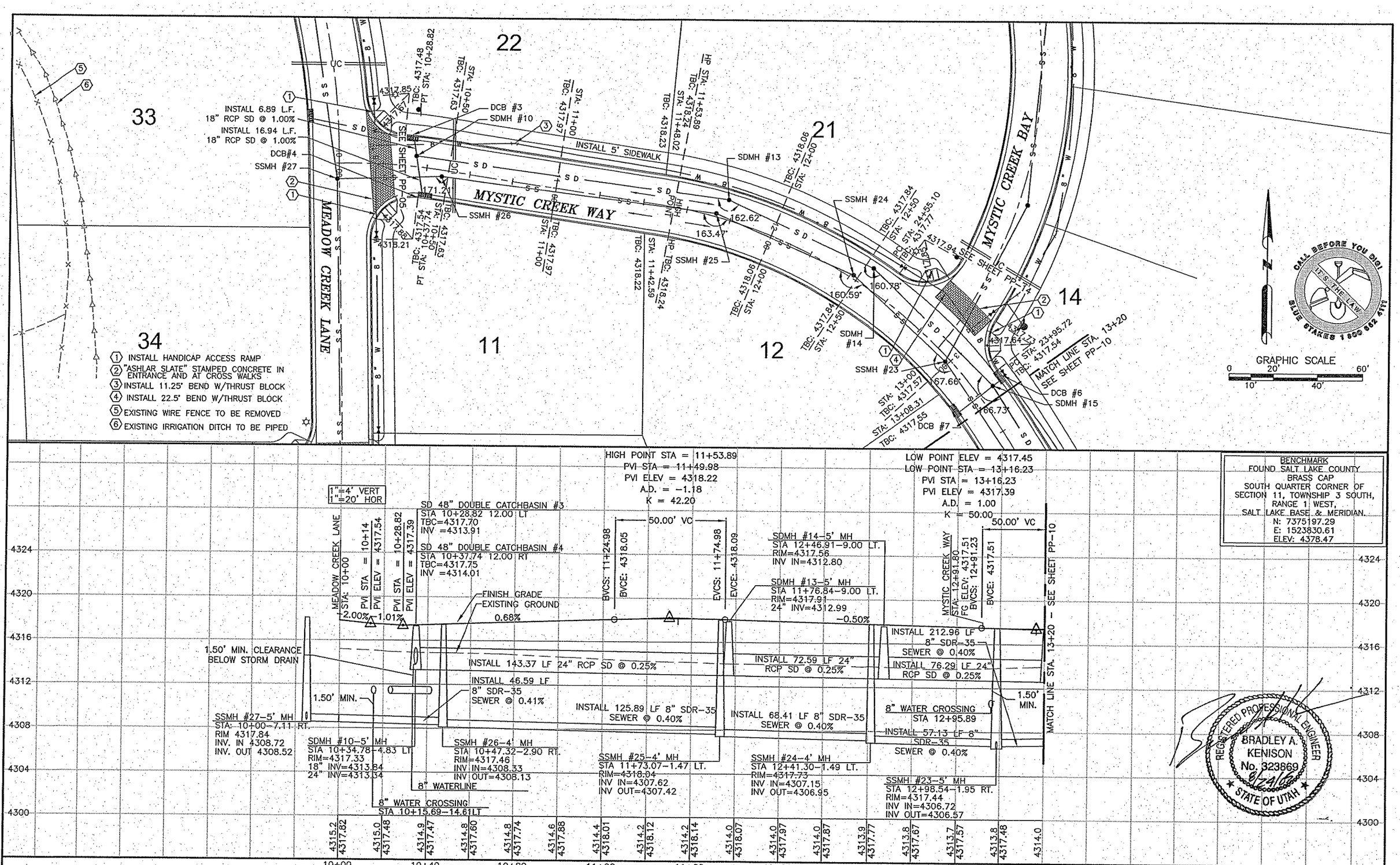
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-08
FILE NAME: PP-08
SCALE: AS SHOWN



NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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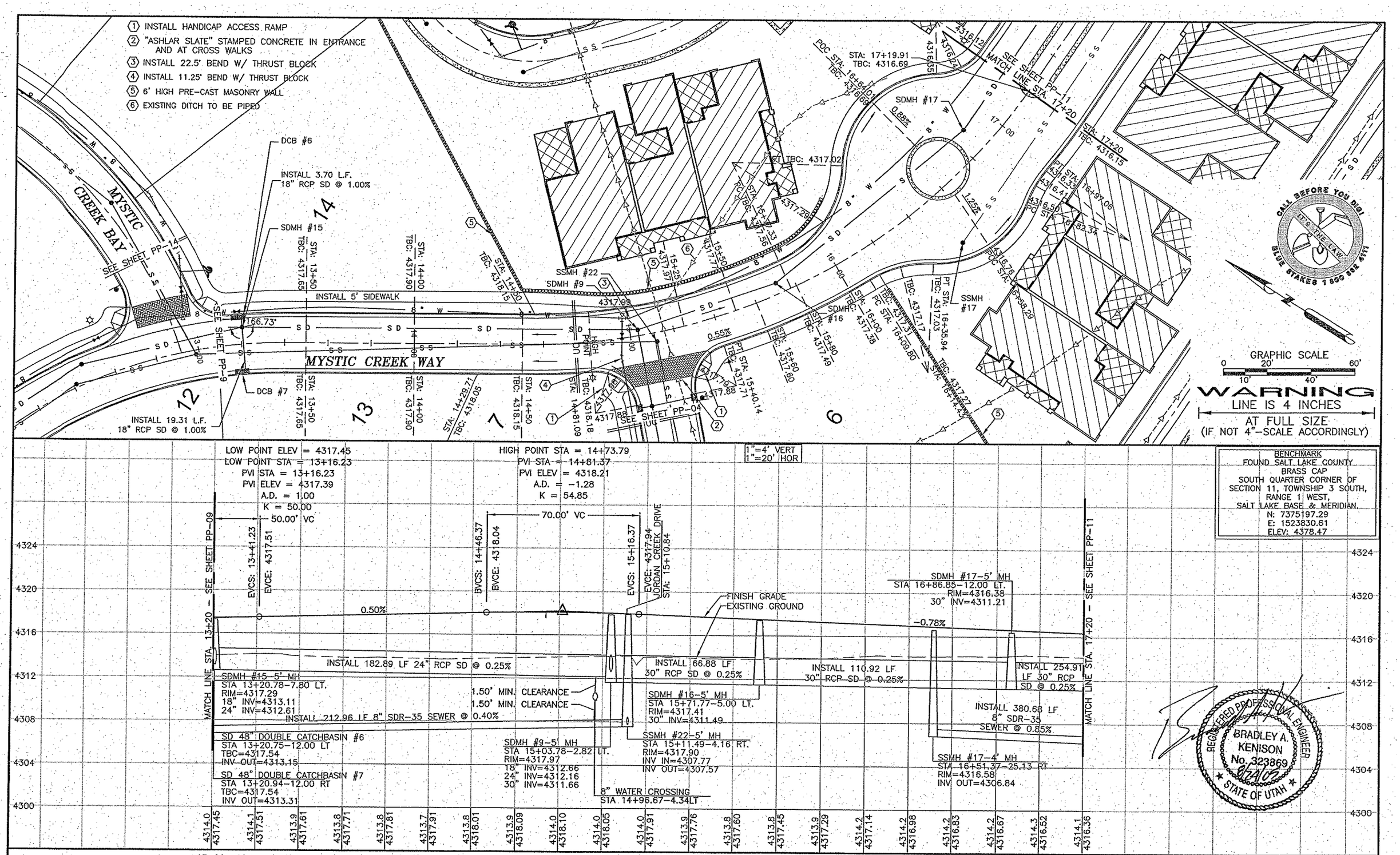
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-09
FILE NAME: PP-09
SCALE: AS SHOWN



NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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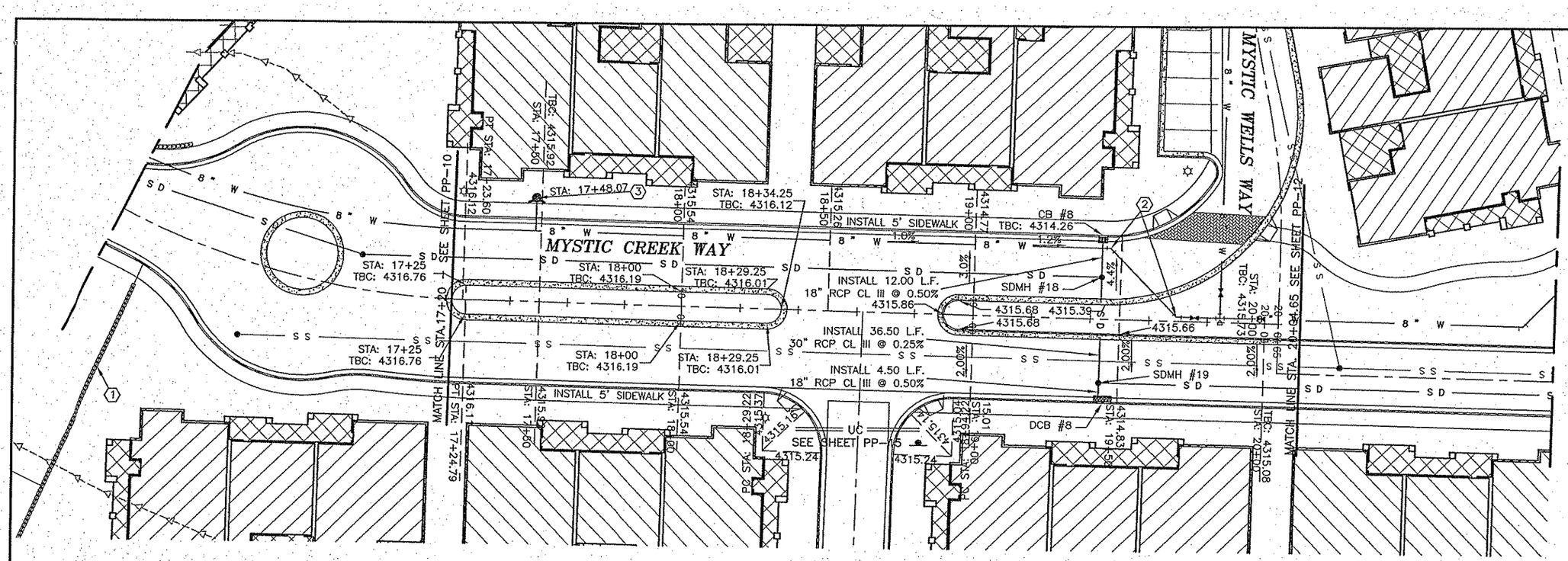
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-10
FILE NAME: PP-10
SCALE: AS SHOWN



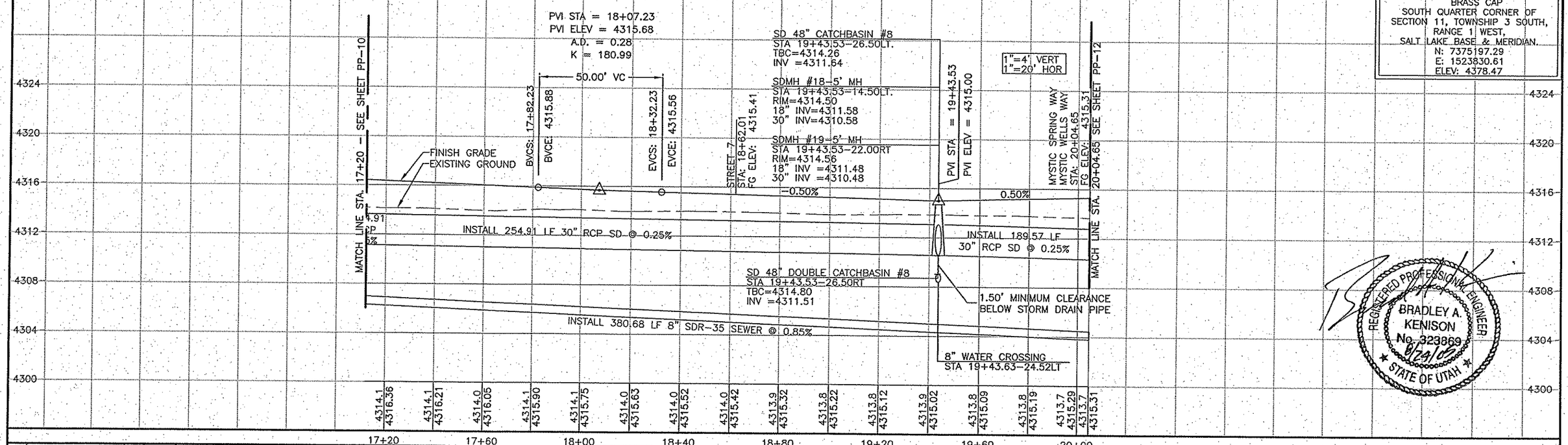
1. 6' HIGH PRE-CAST MASONRY WALL
2. INSTALL 45° BEND W/THRUST BLOCK
3. INSTALL FIRE HYDRANT (SEE DETAIL SHEET DT-01)

CALL BEFORE YOU DIG! IT'S THE LAW BLUE STAKES 1 800 662 4111

GRAPHIC SCALE
0 10' 20' 40' 60'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/24/05
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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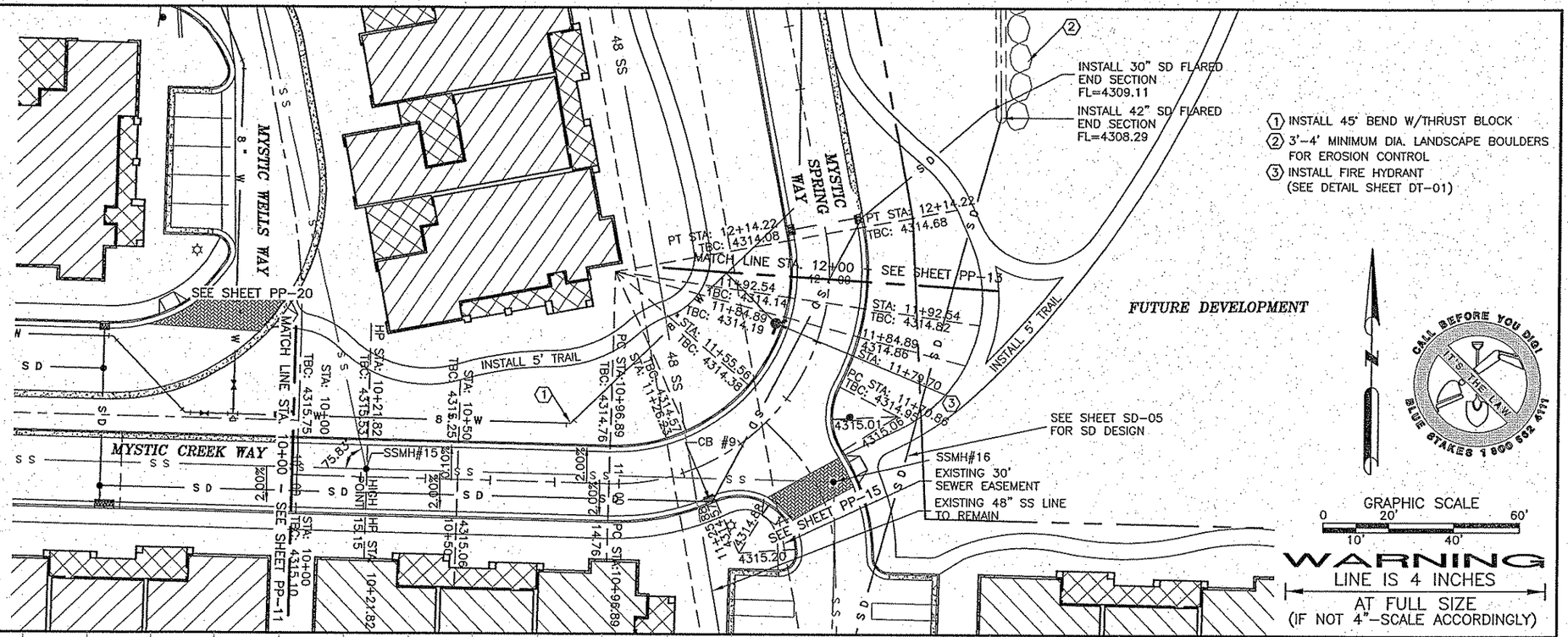
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-11
FILE NAME: PP-11
SCALE: AS SHOWN



1. INSTALL 45° BEND W/THRUST BLOCK
2. 3'-4' MINIMUM DIA. LANDSCAPE BOULDERS FOR EROSION CONTROL
3. INSTALL FIRE HYDRANT (SEE DETAIL SHEET DT-01)

BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

1"=4' VERT
1"=20' HOR

HIGH POINT ELEV = 4315.02
HIGH POINT STA = 10+21.82
PVI STA = 10+25
PVI ELEV = 4315.09
A.D. = -1.15
K = 43.65
50.00' VC

LOW POINT ELEV = 4313.94
LOW POINT STA = 12+17.40
PVI STA = 12+14.22
PVI ELEV = 4313.87
A.D. = 1.15
K = 43.65
50.00' VC

MYSTIC WELLS WAY STA: 10+00 FG ELEV: 4314.97 BVCS: 10+00 BVCE: 4314.97 EVCS: 10+50 EVCE: 4314.93

MYSTIC SPRING WAY STA: 11+50.26 FG ELEV: 4314.29 BVCS: 11+89.22 BVCE: 4314.03

SSMH #16-4' MH
STA 11+51.58- 27.95 RT
RIM=4314.70
INV OUT=4305.06

FINISH GRADE
EXISTING GROUND

-0.65%

8" WATER CROSSING
STA 10+17.58-18.51LT

INSTALL 189.57 LF 30" RCP SD @ 0.25%

INSTALL 99.67 LF 30" RCP SD @ 0.25%

SD 48" CATCHBASIN #9
STA 11+25.01 10.00 RT
TBC=4314.58
INV =4310.01

INSTALL 380.68 LF 8" SDR-35 SEWER @ 0.85%

INSTALL 144.52 LF 8" SDR-35 SEWER @ 1.00%

SSMH #15-5' MH
STA 10+21.62-2.50 LT
RIM=4315.05
INV IN=4303.62
INV OUT=4303.42

EXISTING 48" SEWER LINE
STA 11+22.79
INV. = 4298.16

4324 4320 4316 4312 4308 4304 4300

4313.8 4314.97 | 4313.7 4315.02 | 4313.6 4314.99 | 4313.5 4314.87 | 4313.6 4314.74 | 4313.5 4314.61 | 4313.5 4314.48 | 4313.5 4314.35 | 4313.5 4314.22 | 4313.4 4314.09 | 4313.4 4313.98

10+00 10+40 10+80 11+20 11+60 12+00

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/04/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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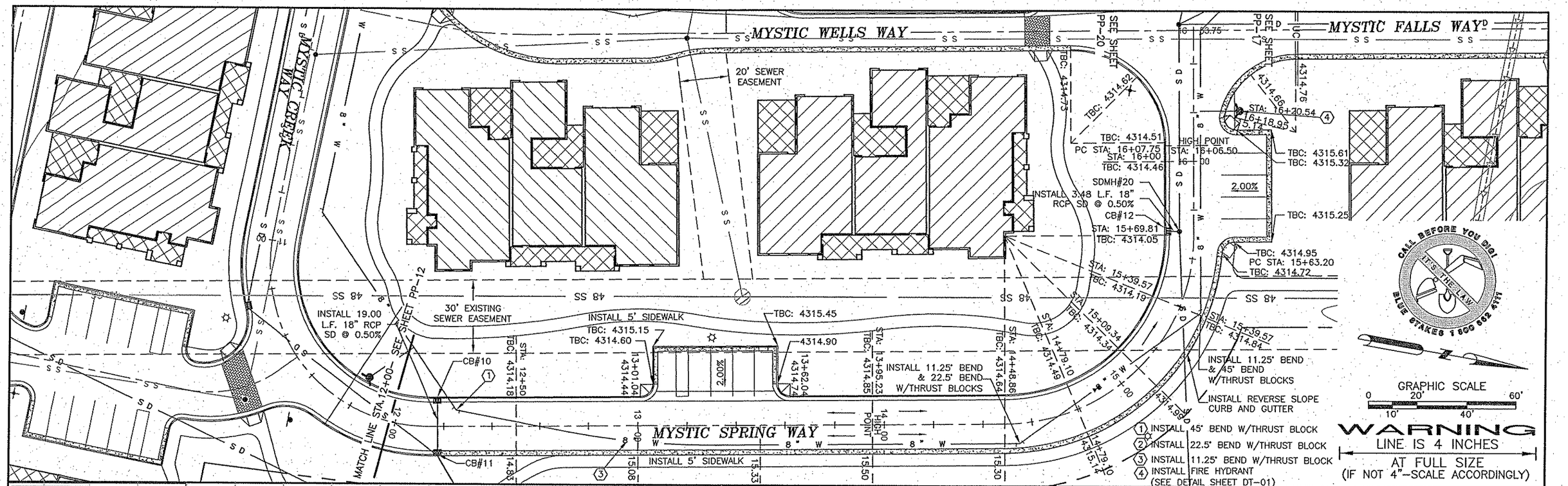
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-12
FILE NAME: PP-12
SCALE: AS SHOWN



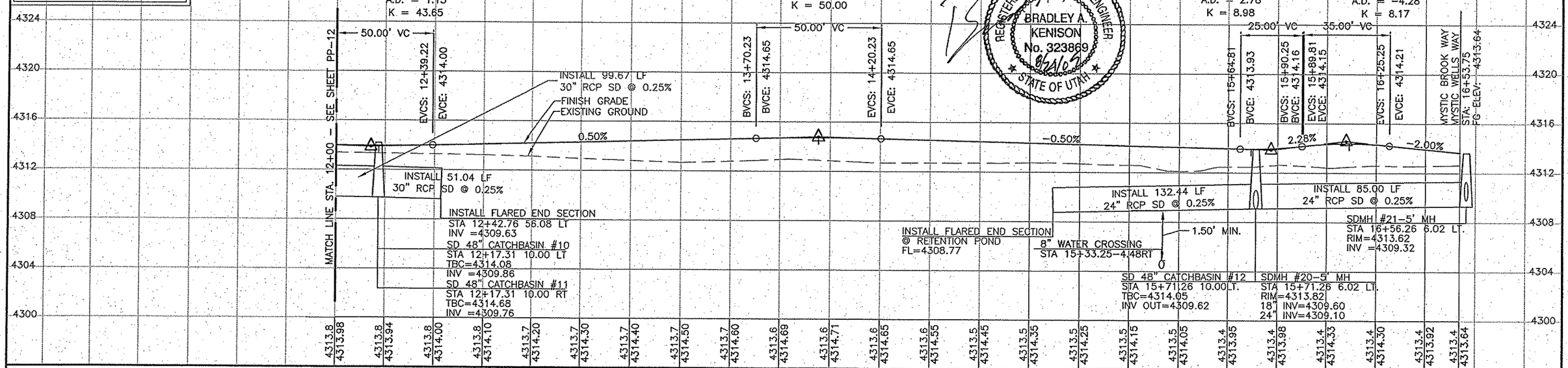
BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP
SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

LOW POINT ELEV = 4313.94
LOW POINT STA = 12+17.40
PVI STA = 12+14.22
PVI ELEV = 4313.87
A.D. = 1.15
K = 43.65

HIGH POINT ELEV = 4314.72
HIGH POINT STA = 13+95.23
PVI STA = 13+95.23
PVI ELEV = 4314.78
A.D. = -1.00
K = 50.00

LOW POINT ELEV = 4313.92
LOW POINT STA = 15+69.30
PVI STA = 15+77.31
PVI ELEV = 4313.87
A.D. = 2.78
K = 8.98

HIGH POINT ELEV = 4314.38
HIGH POINT STA = 16+08.91
PVI STA = 16+07.75
PVI ELEV = 4314.56
A.D. = -4.28
K = 8.17



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/24/07
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
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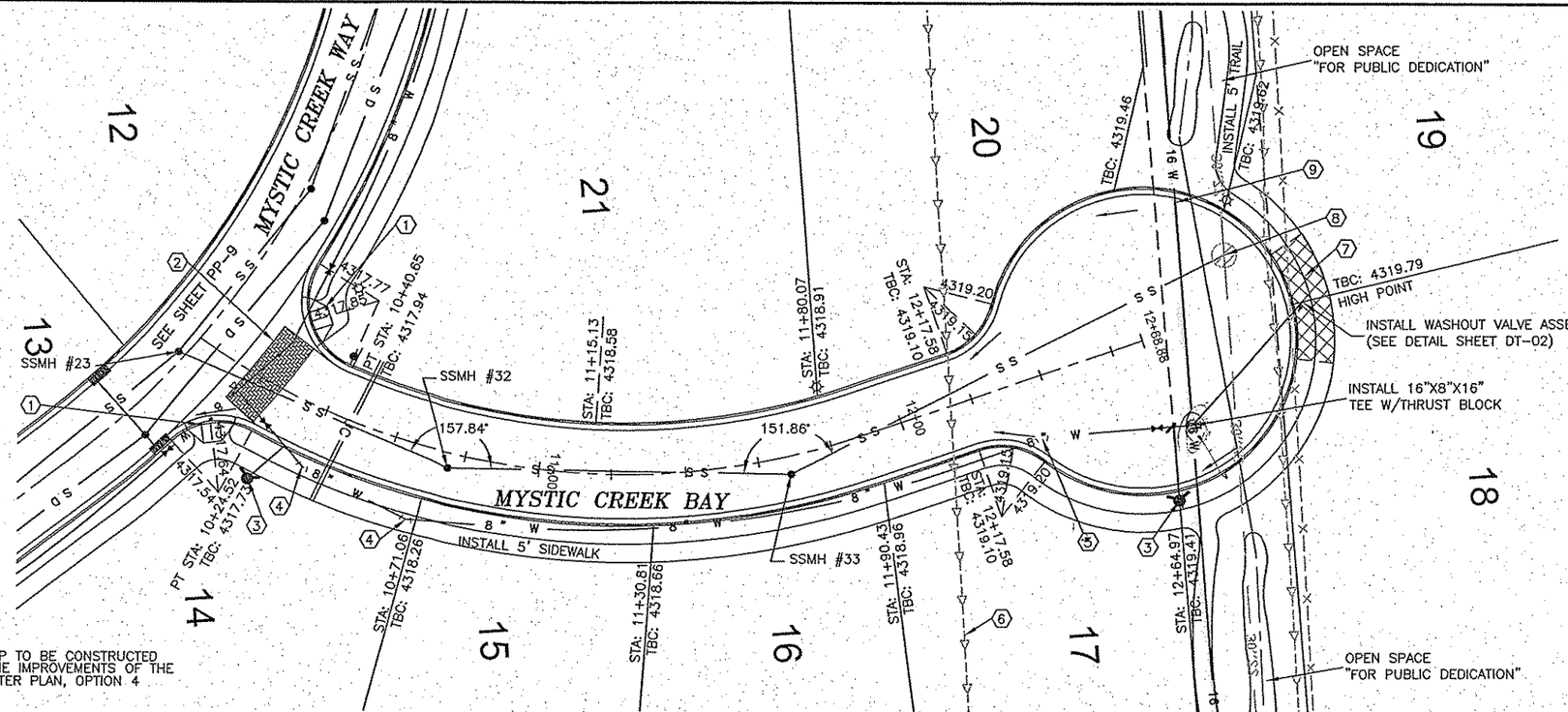
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-13
FILE NAME: PP-13
SCALE: AS SHOWN



1. INSTALL HANDICAP ACCESS RAMP
2. "ASHLAR SLATE" STAMPED CONCRETE IN ENTRANCE AND AT CROSS WALKS
3. INSTALL FIRE HYDRANT (SEE DETAIL SHEET DT-01)
4. INSTALL 22.5° BEND W/THRUST BLOCK
5. INSTALL 11.25° BEND W/THRUST BLOCK
6. EXISTING IRRIGATION DITCH TO BE PIPED
7. 30' WIDE SNOW EASEMENT.
8. EXISTING SSMH
9. REMAINDER OF 16" CULINARY WATER LOOP TO BE CONSTRUCTED AS PART OF THE T-17 TRANSMISSION LINE IMPROVEMENTS OF THE SOUTH JORDAN CITY 2003 CULINARY MASTER PLAN, OPTION 4

CALL BEFORE YOU DIG! IT'S THE LAW. BLUE STAKES 1 800 662 4111

GRAPHIC SCALE
0 10' 20' 40' 60'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
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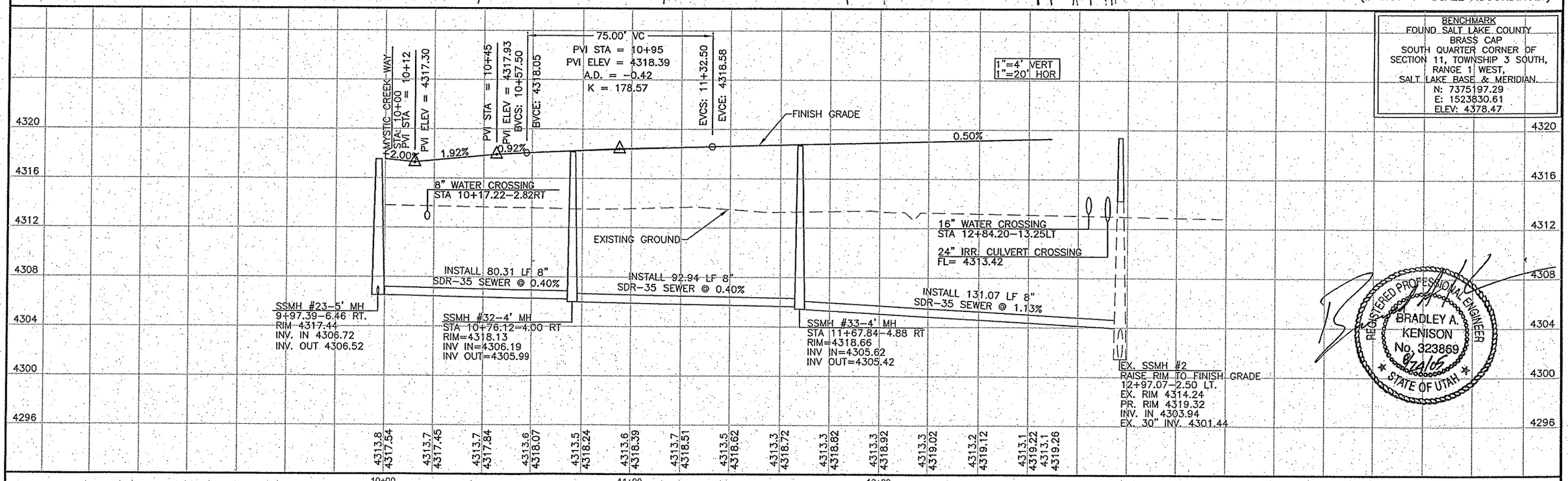
ELEV: 4378.47



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/2/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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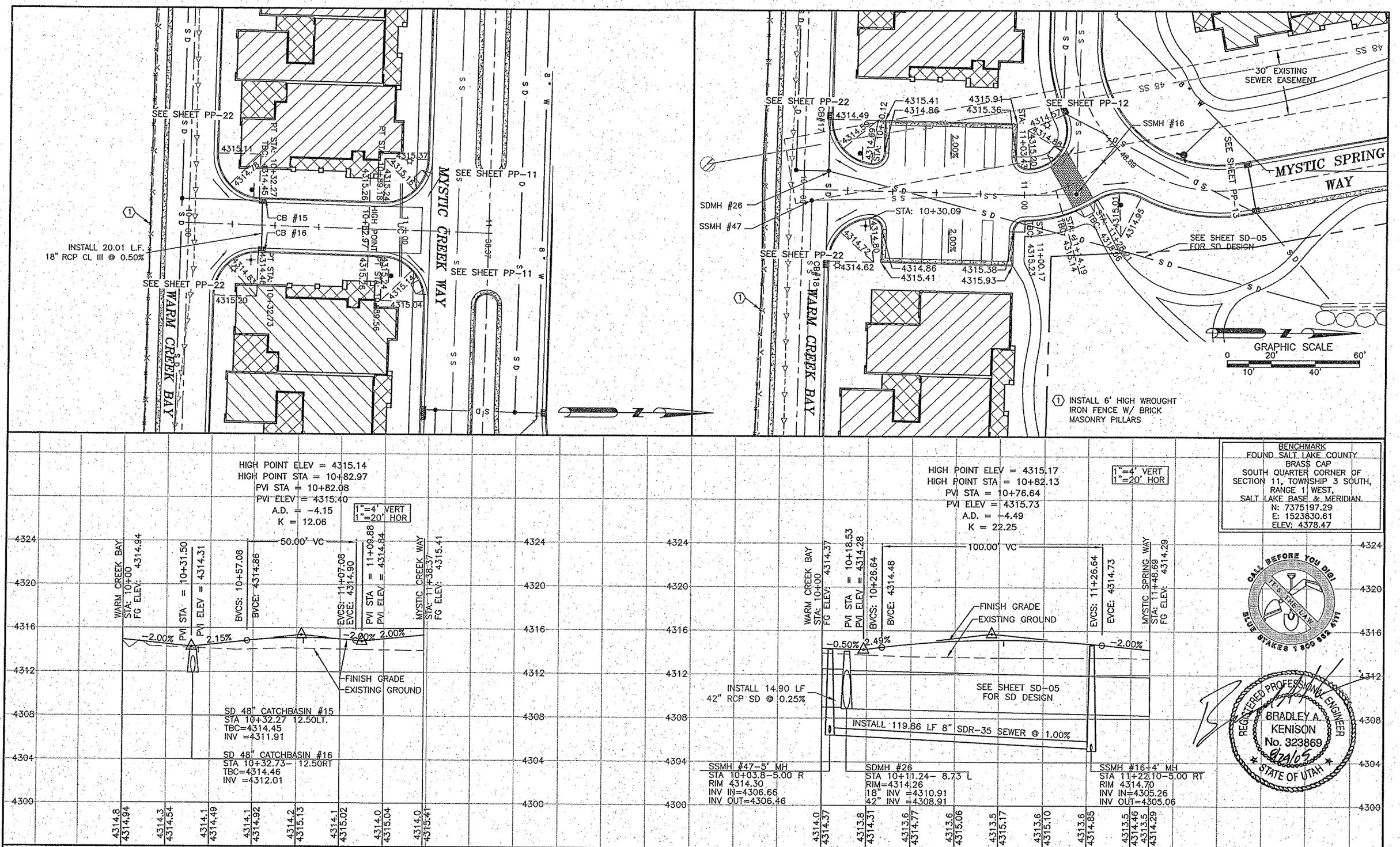
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-14
FILE NAME: PP-14
SCALE: AS SHOWN



NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE

CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER

APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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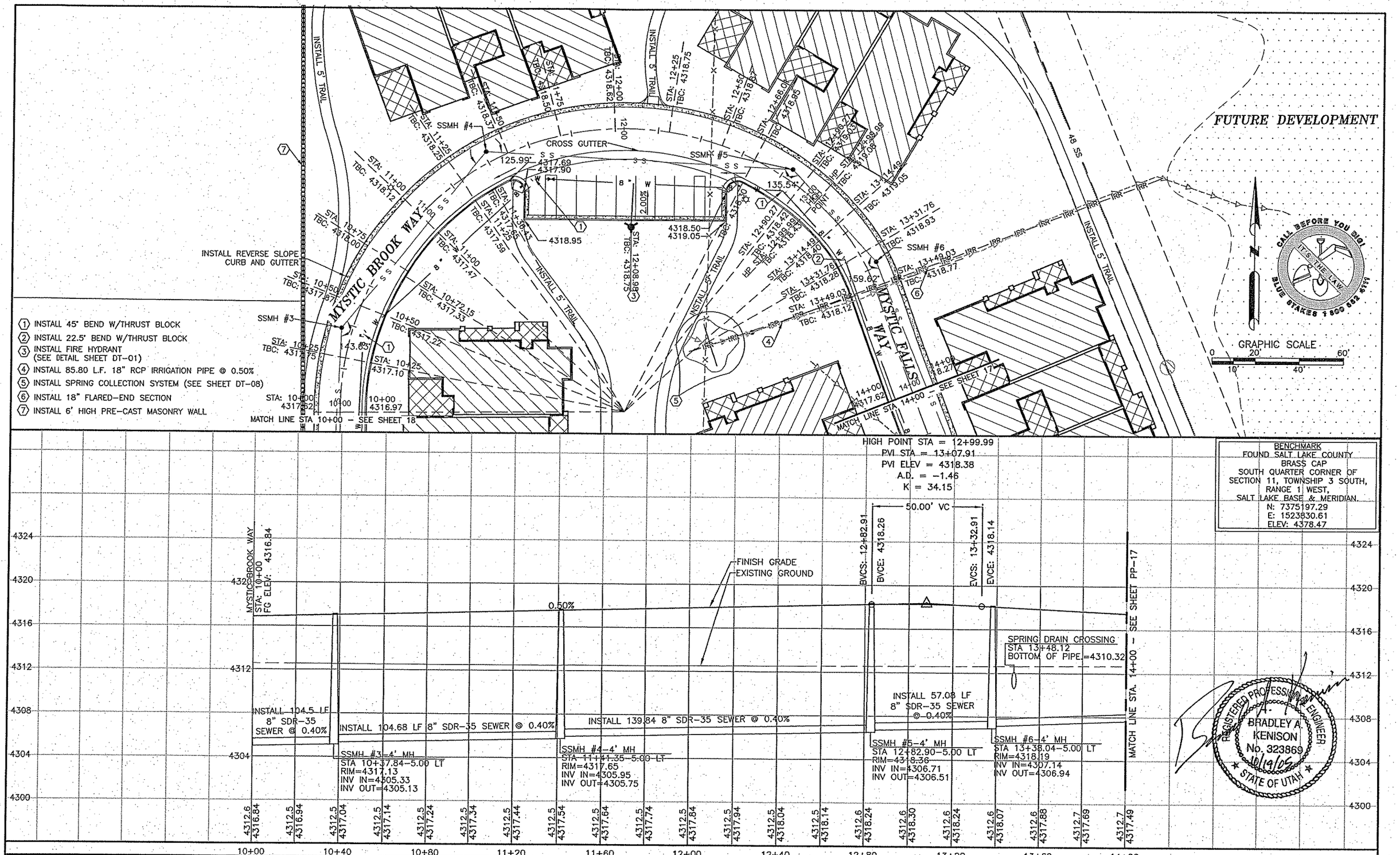
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-15
FILE NAME: PP-15
SCALE: AS SHOWN



NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-16
FILE NAME: PP-16
SCALE: AS SHOWN

NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE

CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER

APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

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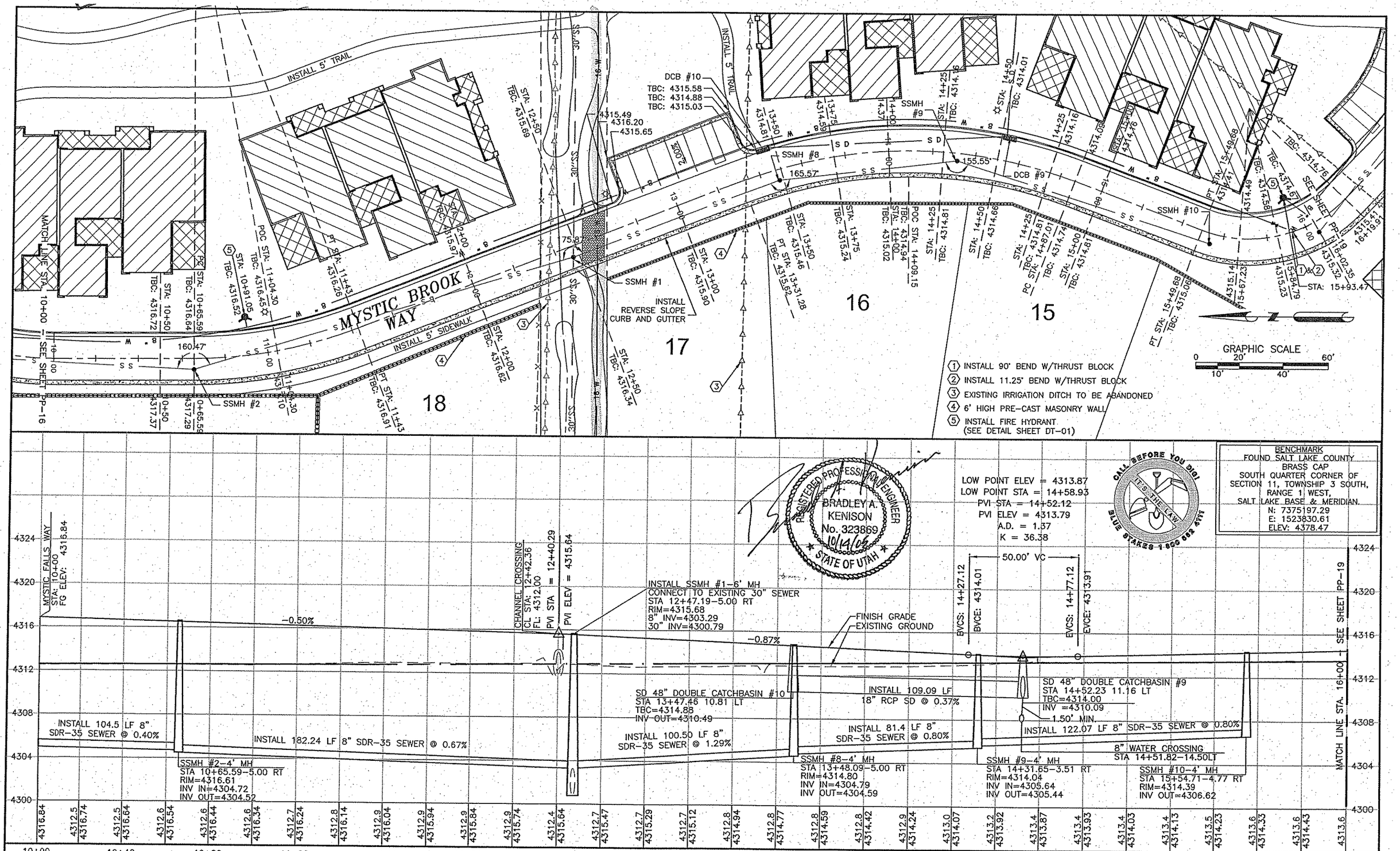
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-17
FILE NAME: PP-17
SCALE: AS SHOWN



NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 PROJECT ENGINEER DATE
APPROVED BAK 7/8/05 PROJECT MANAGER DATE

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45 WEST 10000 SOUTH, SUITE 301
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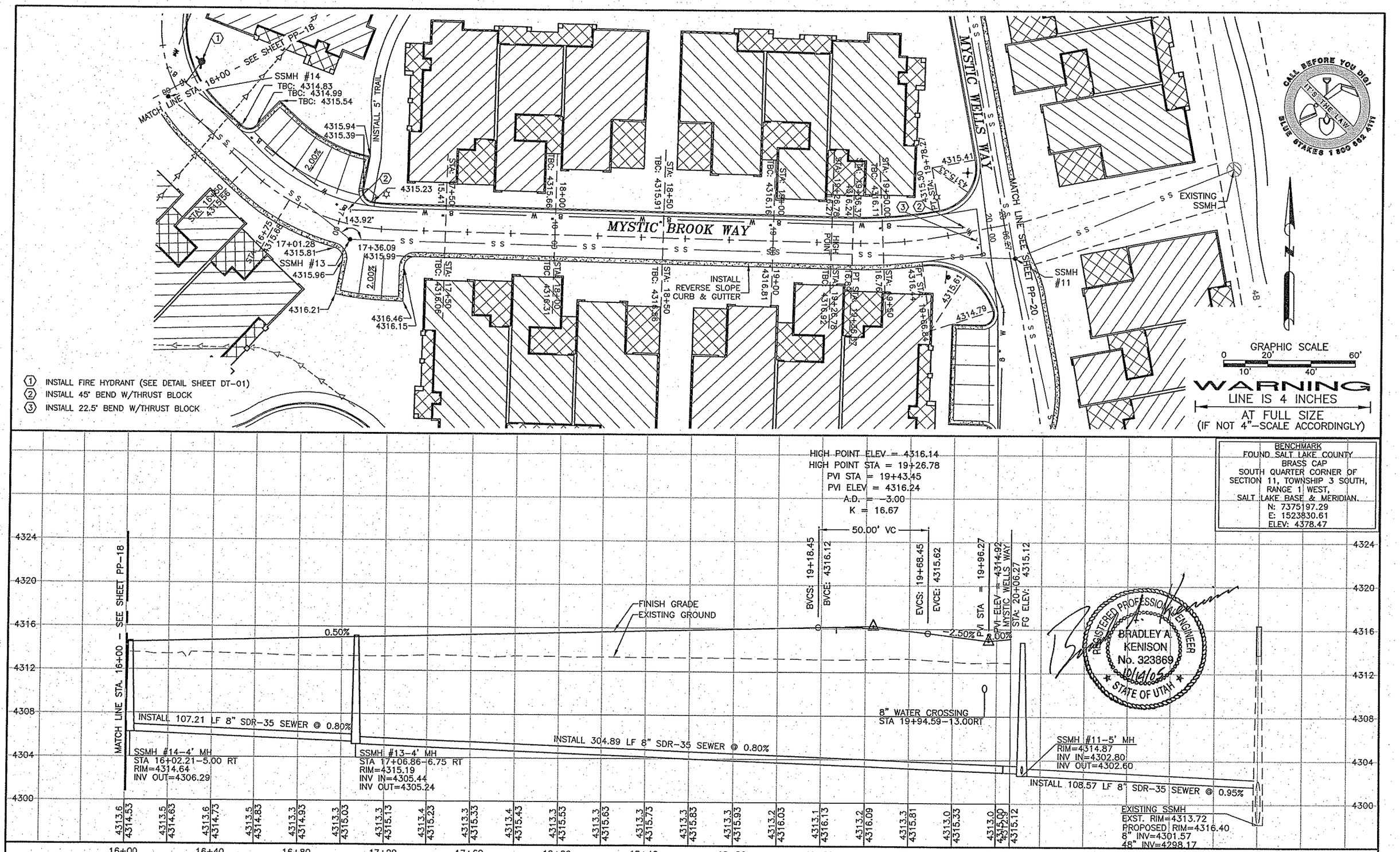
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-18
FILE NAME: PP-18 SCALE: AS SHOWN



BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

NO.	REVISIONS	BY	DATE

DRAWN GSB	7/8/05 DATE	
CHECKED RWA PROJECT ENGINEER	7/8/05 DATE	
APPROVED BAK PROJECT MANAGER	7/8/05 DATE	

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THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-19
FILE NAME: PP-19
SCALE: AS SHOWN

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 PROJECT ENGINEER DATE
APPROVED BAK 7/8/05 PROJECT MANAGER DATE

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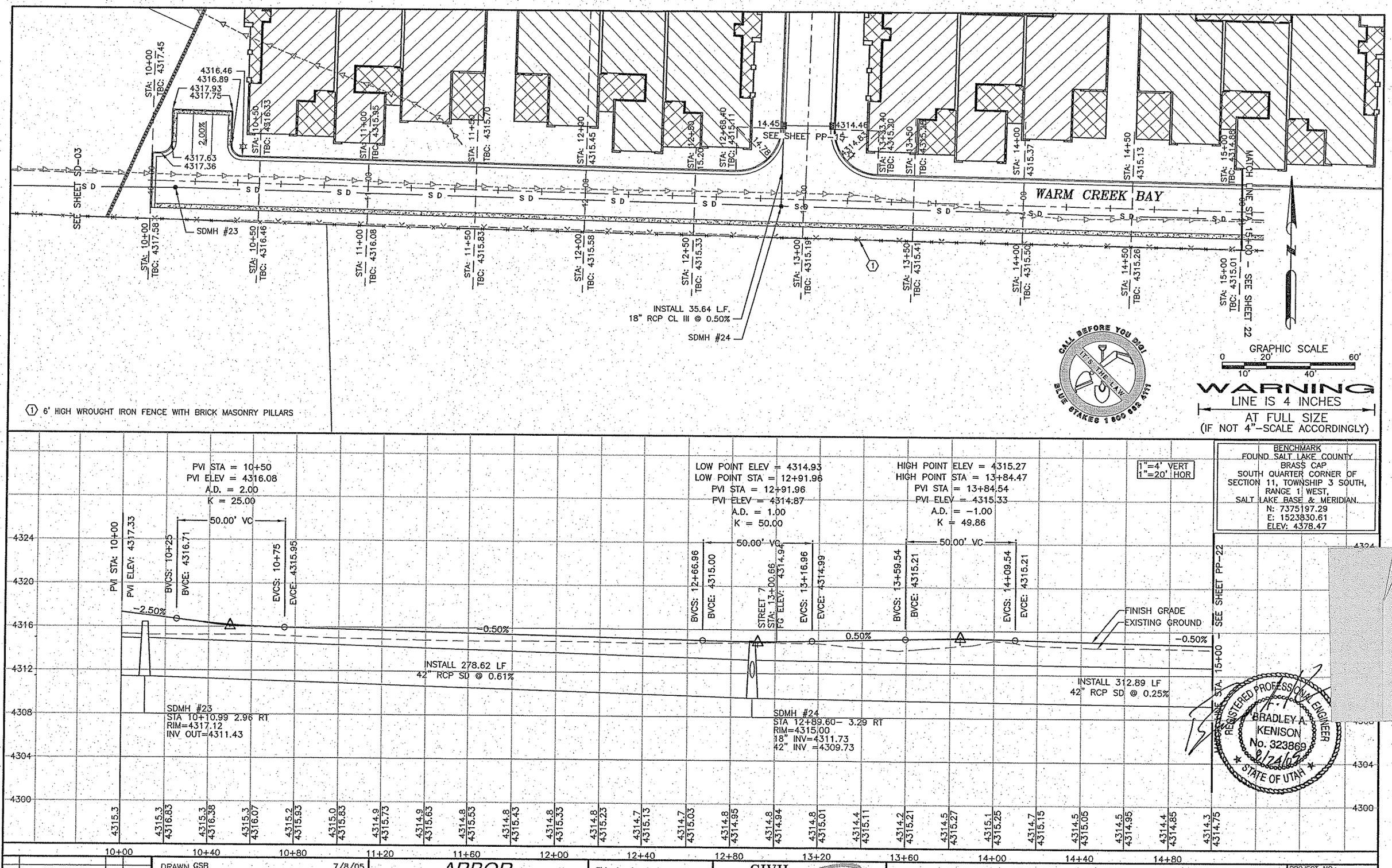
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-20
FILE NAME: PP-20
SCALE: AS SHOWN



NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE

CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER

APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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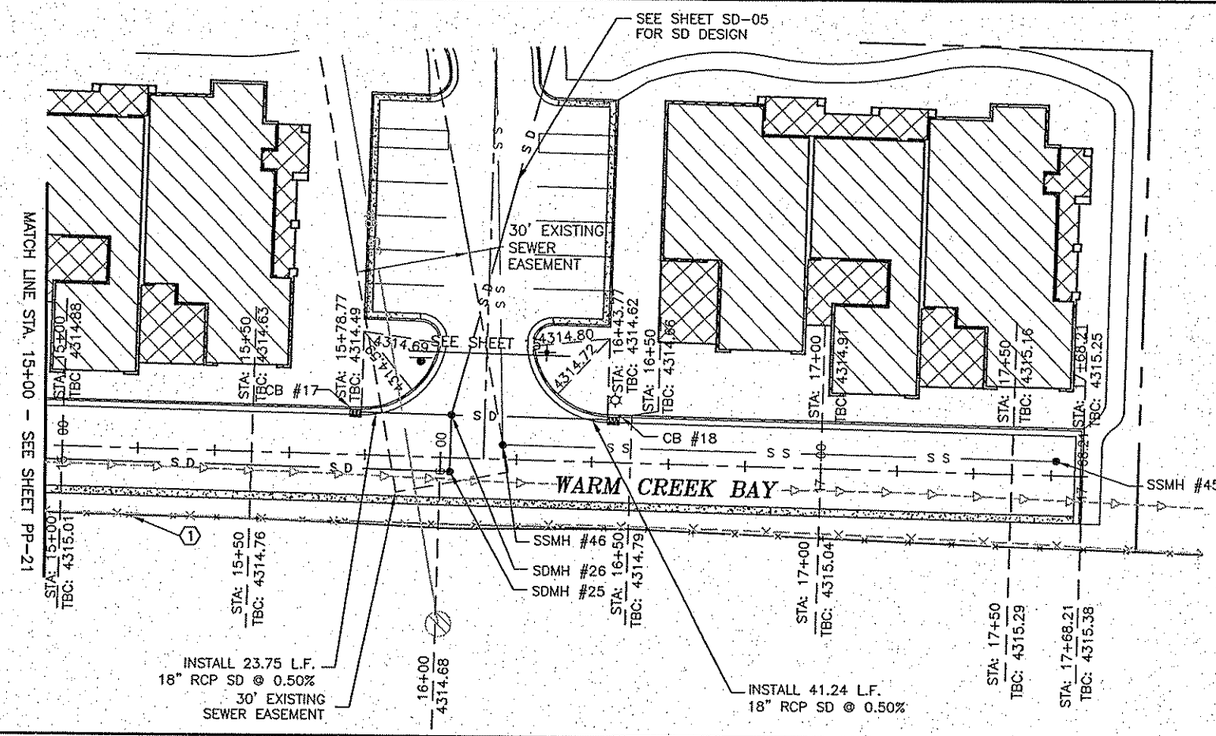
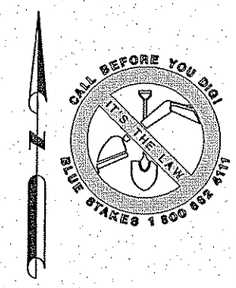
THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-21
FILE NAME: PP-21
SCALE: AS SHOWN

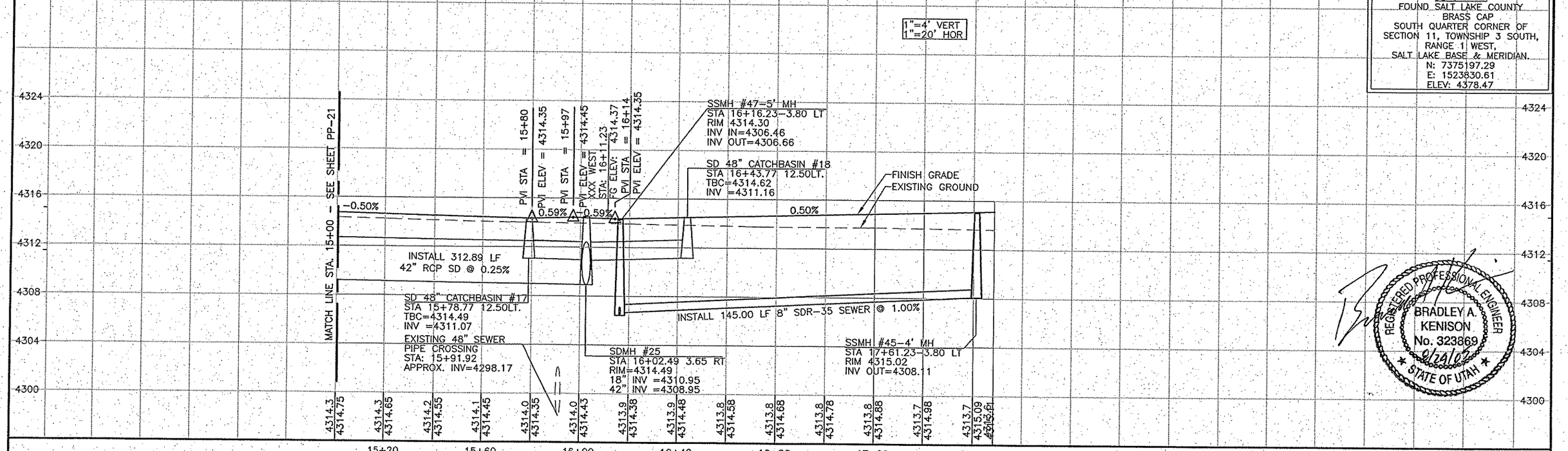




GRAPHIC SCALE
0 10' 20' 40' 60'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
6/24/05
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN GSB	7/8/05 DATE	
CHECKED RWA PROJECT ENGINEER	7/8/05 DATE	
APPROVED BAK PROJECT MANAGER	7/8/05 DATE	

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COMMERCIAL/RESIDENTIAL
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SANDY, UTAH 84070
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THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-22
FILE NAME: PP-22
SCALE: AS SHOWN

NOTES:
1. PROVIDE ADS END SECTION ON BOTH SIDES OF EACH CULVERT.
2. PLACE RIP-RAP ON CULVERT ENDS FOR AESTHETICS AND TO MAINTAIN SLOPES.

SEE DETAIL SHEET DT-07

INSTALL 6.96 LF 24" RCP SD @ 0.97%

SDMH #12
SDMH #11
SDMH #31

MOSS SPRINGS COVE

MEADOW CREEK LANE

MEANDERING ROCK-LINED WATER FEATURE

SEE SHEET PP-24

INSTALL 30 mil PVC LINER (IMPERMEABLE MEMBRANE) AS PER MANUFACTURERS RECOMMENDATIONS.

WATER FEATURE SIDE SLOPES VARY (1H:1V MAX)
FINISH GROUND
2' MIN.
1' MIN.
8" COBBLE RIPRAP, 16" DEEP

MEANDERING ROCK LINED WATER FEATURE
– NTS –

CALL BEFORE YOU DIG! IT'S THE LAW! BLUE STAKES 1 800 662 4111

GRAPHIC SCALE
0 10' 20' 40' 60'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

1"=4' VERT
1"=20' HOR

FINISH GRADE
EXISTING GROUND

MEADOW CREEK LANE
CL STA: 12+64
FG=4318.61

FINISHED WATER FEATURE FLOW ELEVATION

INSTALL 222.40 LF 24" RCP SD @ 0.88%

INSTALL 64.8 LF 24" RCP SD @ 0.26%

-0.50%

INSTALL 6.96 LF 24" RCP SD @ 1.00%

INSTALL 24" FLARED END SECTION
STA 13+17.98
INV=4314.63

MATCH LINE STA. 14+40 – SEE SHEET PP-24

SDMH #11
STA 10+23.82
RIM=4326.20
INV IN=4317.80 (TO BE VERIFIED BY CONTRACTOR PRIOR TO BEGINNING WORK)
INV OUT=4317.57

SDMH #12
STA 10+30.78
RIM=4326.40
INV IN (S,W)=4317.50
INV OUT (E)=4316.75

SDMH #31
STA 12+53.18
RIM=4326.40
INV 4314.80

4320 4316 4312 4308 4304 4300

4318.9 4317.9 4316.58 4316.2 4316.14 4315.5 4315.70 4315.0 4315.27 4314.5 4314.83 4314.5 4314.68 4314.1 4314.47 4314.0 4314.22

11+00 12+00 13+00 14+00

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN GSB	7/8/05 DATE	
CHECKED RWA PROJECT ENGINEER	7/8/05 DATE	
APPROVED BAK PROJECT MANAGER	7/8/05 DATE	

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SANDY, UTAH 84070
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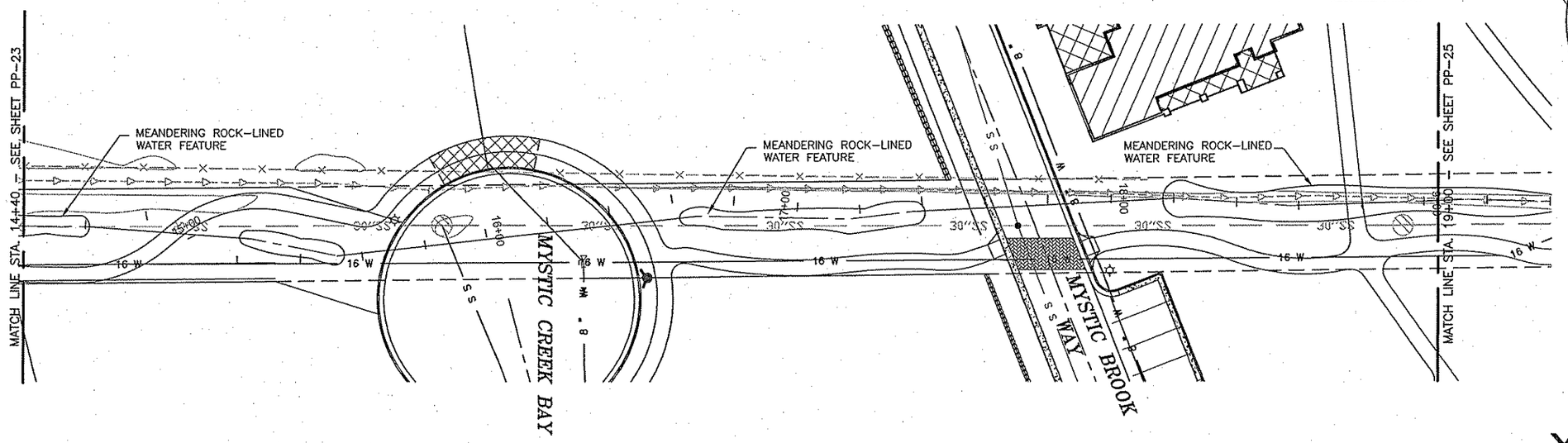
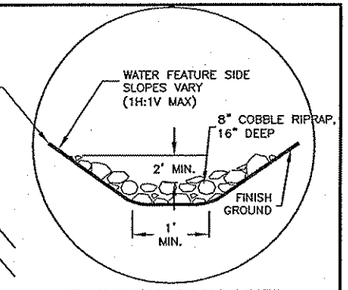
THE VILLAGE AT RIVERWALK

WATER PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-23
FILE NAME: PP-23
SCALE: AS SHOWN

NOTES:
1. PROVIDE ADS END SECTION ON BOTH SIDES OF EACH CULVERT.
2. PLACE RIP-RAP ON CULVERT ENDS FOR AESTHETICS AND TO MAINTAIN SLOPES.





MEANDERING ROCK LINED WATER FEATURE
– NTS –

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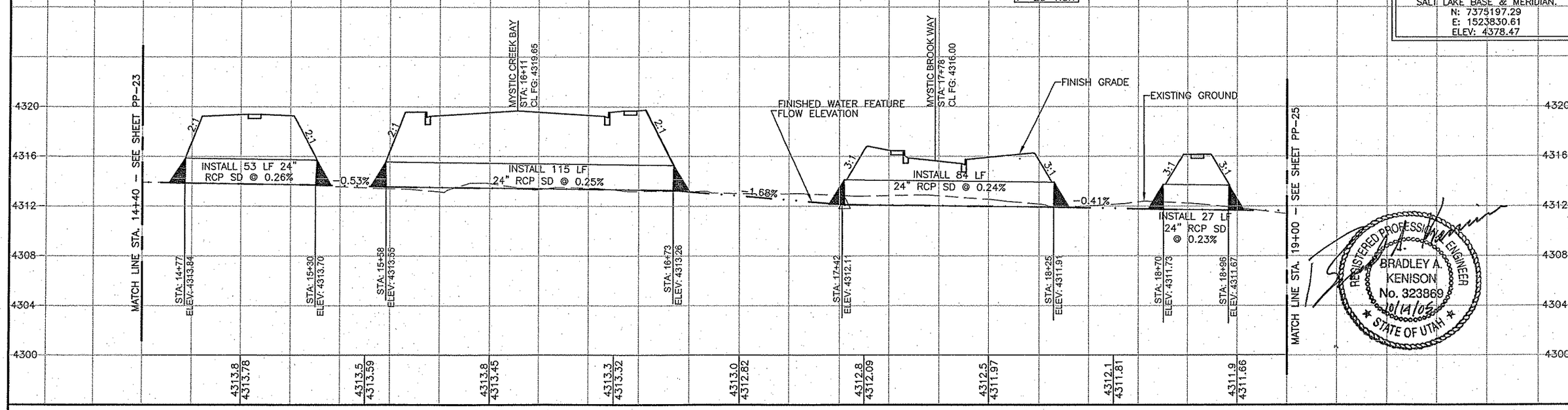
GRAPHIC SCALE
0 10' 20' 40' 60'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"–SCALE ACCORDINGLY)

BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP
SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

1"=4' VERT
1"=20' HOR



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
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SANDY, UTAH 84070
801-561-8594

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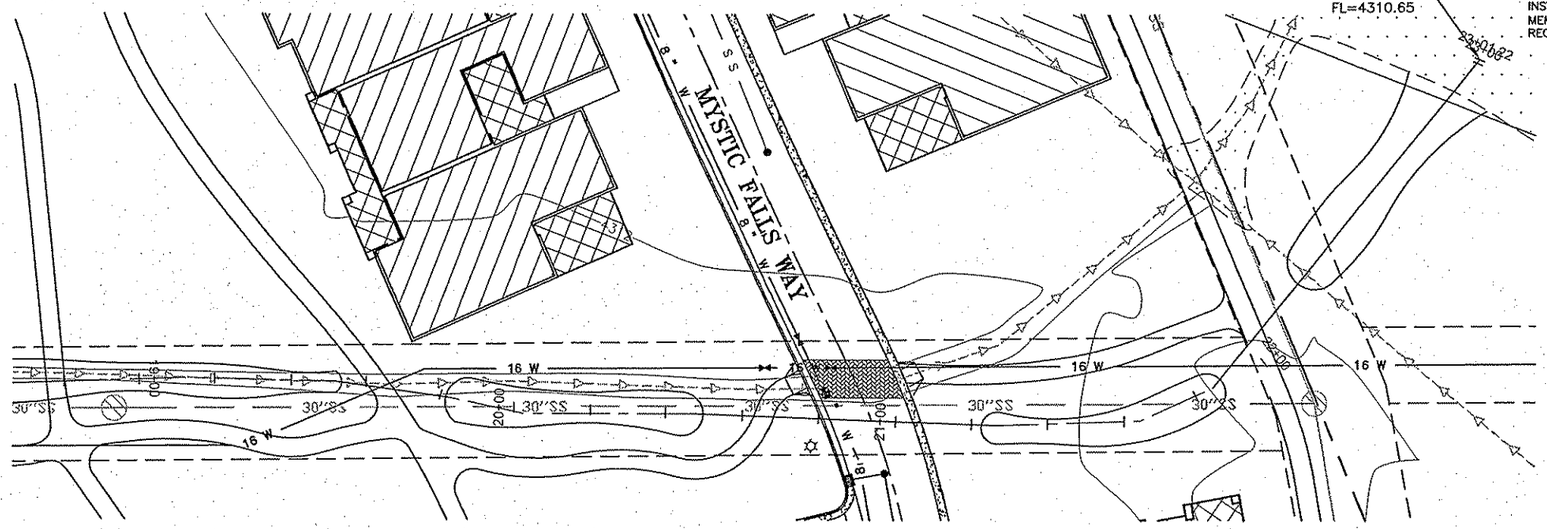
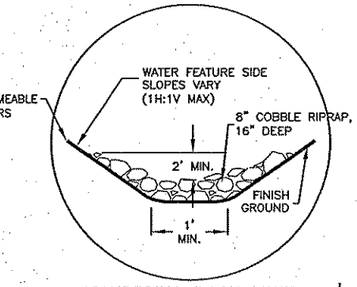
THE VILLAGE AT RIVERWALK

WATER PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-24
FILE NAME: PP-24
SCALE: AS SHOWN

NOTES: PROVIDE ADS END SECTION ON BOTH SIDES OF EACH CULVERT.
PLACE RIP-RAP ON CULVERT ENDS FOR AESTHETICS AND TO MAINTAIN SLOPES.





MEANDERING ROCK LINED WATER FEATURE
– NTS –

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GRAPHIC SCALE
0 20' 60'
10' 40'

WARNING
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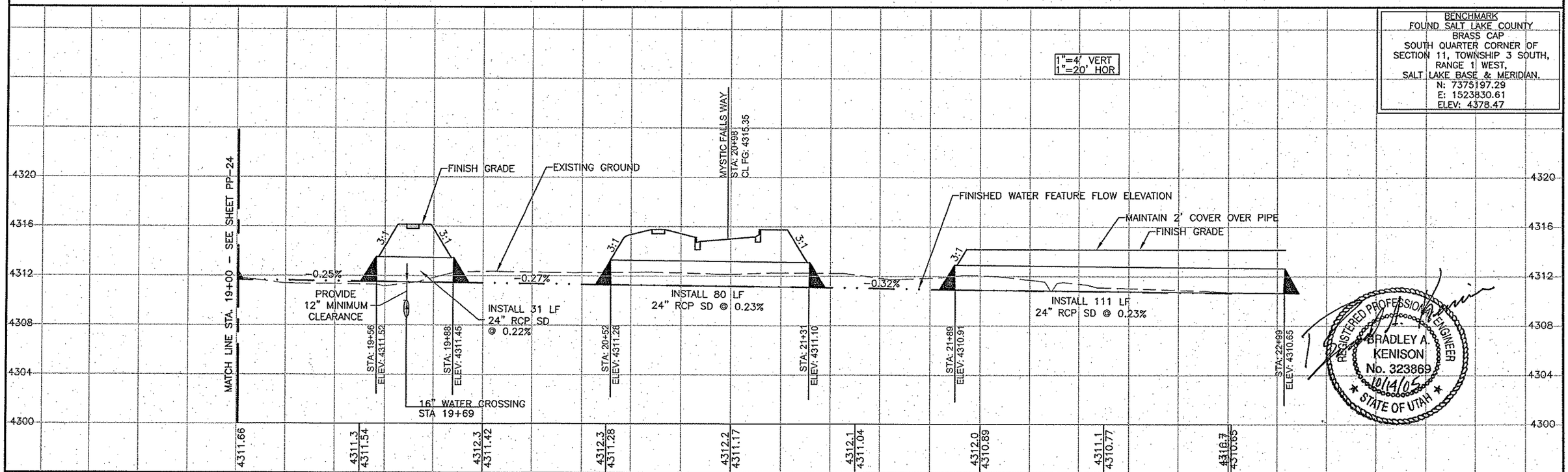
AT FULL SIZE
(IF NOT 4"–SCALE ACCORDINGLY)

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

1"=4' VERT
1"=20' HOR



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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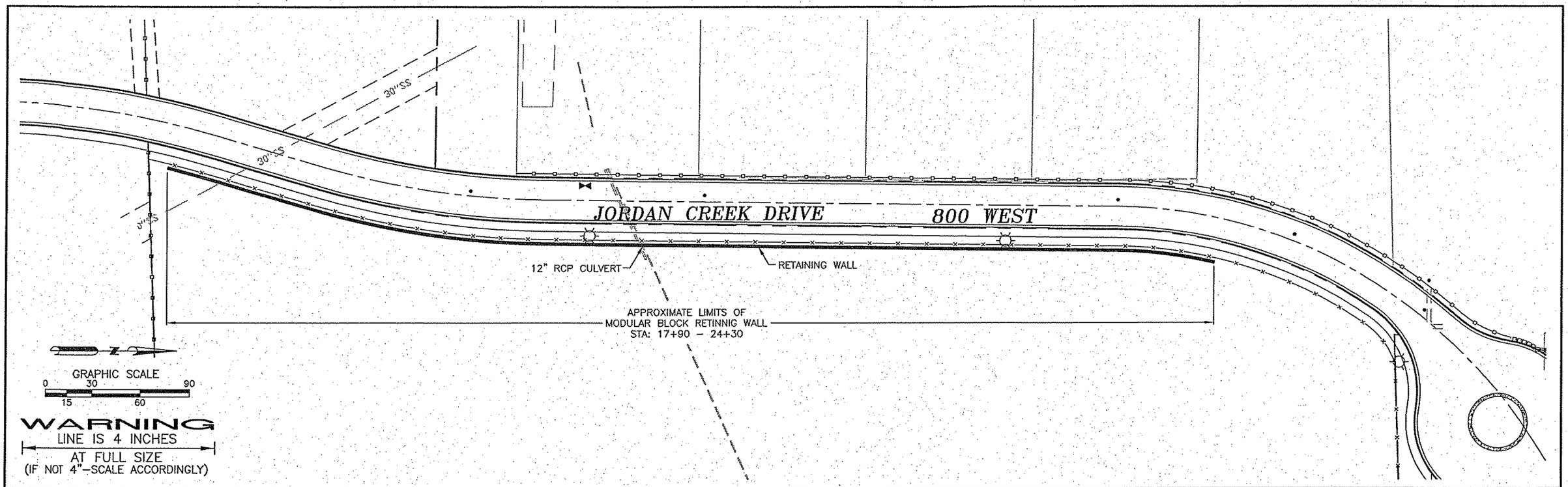
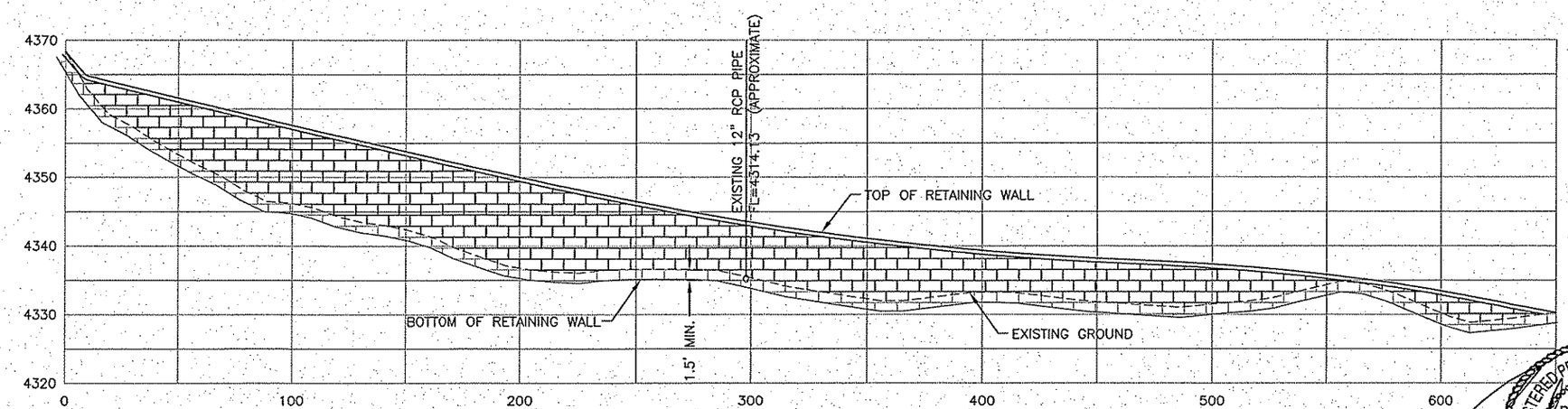
THE VILLAGE AT RIVERWALK

WATER PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-25
FILE NAME: PP-25
SCALE: AS SHOWN





NOTE:

1. BOTTOM OF RETAINING WALL MAY STEP IN 8 OR 16 INCH INCREMENTS AND MUST REMAIN A MINIMUM OF 1.5 FEET BELOW THE EXISTING GROUND.

APPROVED
10/17/05

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

CALL BEFORE YOU DIG!
IT'S THE LAW
BLUE STAKES 1 800 662 4111

HORIZONTAL
11x17 – 1"=60'
24x36 – 1"=30'
VERTICAL
11x17 – 1"=20'
24x36 – 1"=10'

NO.	REVISIONS	BY	DATE

DRAWN TT	7/8/05 DATE	
CHECKED BAK PROJECT ENGINEER	7/8/05 DATE	
APPROVED BMC PROJECT MANAGER	7/8/05 DATE	

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SANDY, UTAH 84070
801-561-8594

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THE VILLAGE AT RIVERWALK

RETAINING WALL PLAN & PROFILE

PROJECT NO.: 04122
SHEET NO. RW-01
FILE NAME: RW-01 SCALE: AS SHOWN

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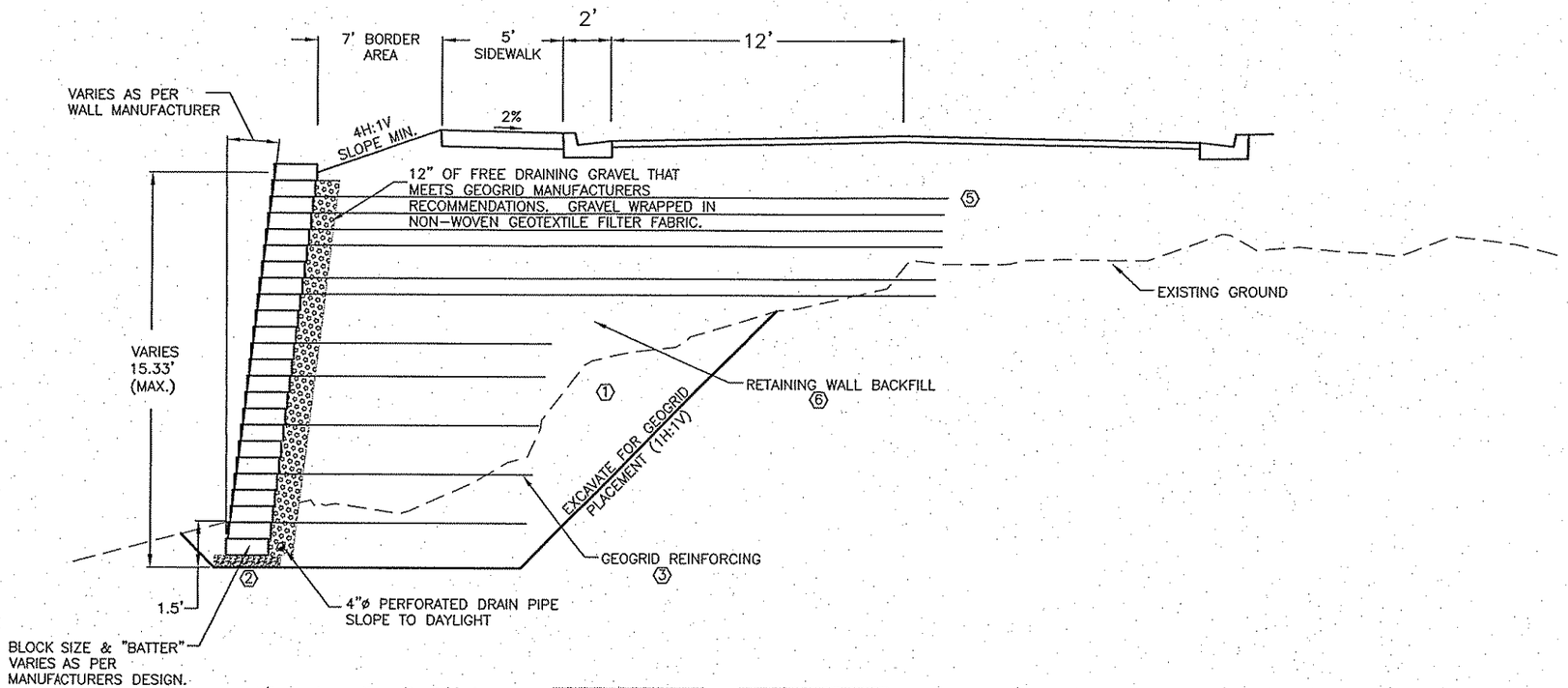


NOTES

1. EXCAVATE EXISTING GRADE AS REQUIRED FOR CONSTRUCTION OF LEVELING PAD AND PLACEMENT OF GEOGRID.
2. CONSTRUCT LEVELING PAD 6"MIN THICKNESS
3. GEOGRID REINFORCING SHALL CONSIST OF TENSAR UX1400SB OR EQUIVALENT INSTALLED WITH MACHINE (ROLL) DIRECTION PERPENDICULAR TO WALL FACE:

HEIGHT (ft)	COURSE	LENGTH (ft)*
1.33	3	10.5
3.33	6	10.5
5.33	9	10.5
7.33	12	10.5
8.67	14	10.5
10.67	17	26
11.33	18	26
12.67	20	26
13.33	21	26
14.00	22	26
14.67	23	26

*SEE NOTE 5

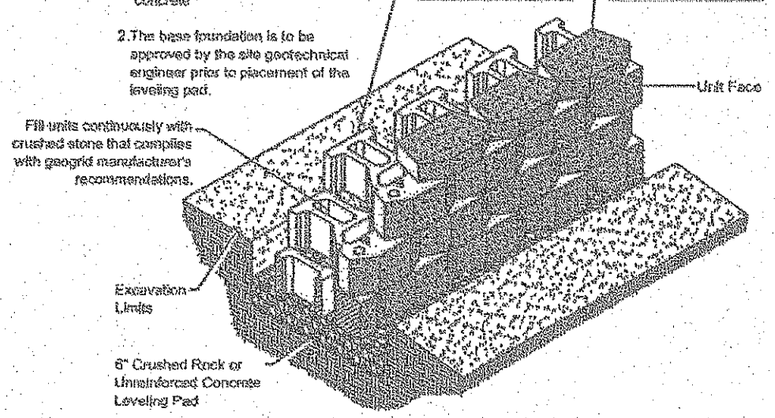
5. 26 FT. REINFORCMENT LAYER TO BE PLACED BELOW TOP COURSE FOR ALL WALL HEIGHTS GREATER THAN 10 FEET.
6. SELECT OR SEMI-SELECT BACKFILL AS DESCRIBED IN REPORT TEXT.

Base Leveling Pad Notes:

1. The leveling pad is to be constructed of crushed stone or 2,000 psi± unreinforced concrete
2. The base foundation is to be approved by the site geotechnical engineer prior to placement of the leveling pad.

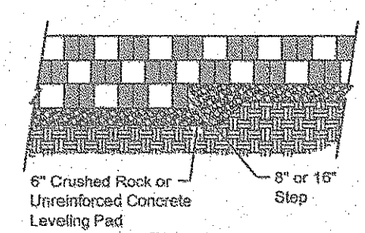
Standard Unit	
Width:	18"
*Depth:	21 1/2"
Height:	8"
*Weight:	115 lbs

Cap Unit	
Width:	18"
*Depth:	10 1/2"
Height:	4"
*Weight:	45 lbs

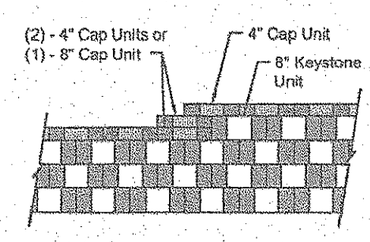


Standard Unit/Base Pad Isometric Section View

* Dimensions & Weight May Vary by Region



Elevation



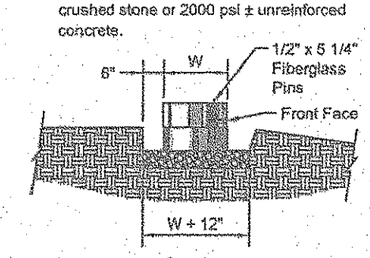
Note:

1. Secure all cap units with Keystone Kapseal or equal.

Top of Wall Steps

Note:

1. The leveling pad is to be constructed of crushed stone or 2000 psi ± unreinforced concrete.



Section

Leveling Pad Detail

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/13/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED BAK 7/8/05 DATE (PROJECT ENGINEER)
APPROVED BMC 7/8/05 DATE (PROJECT MANAGER)

ARBOR COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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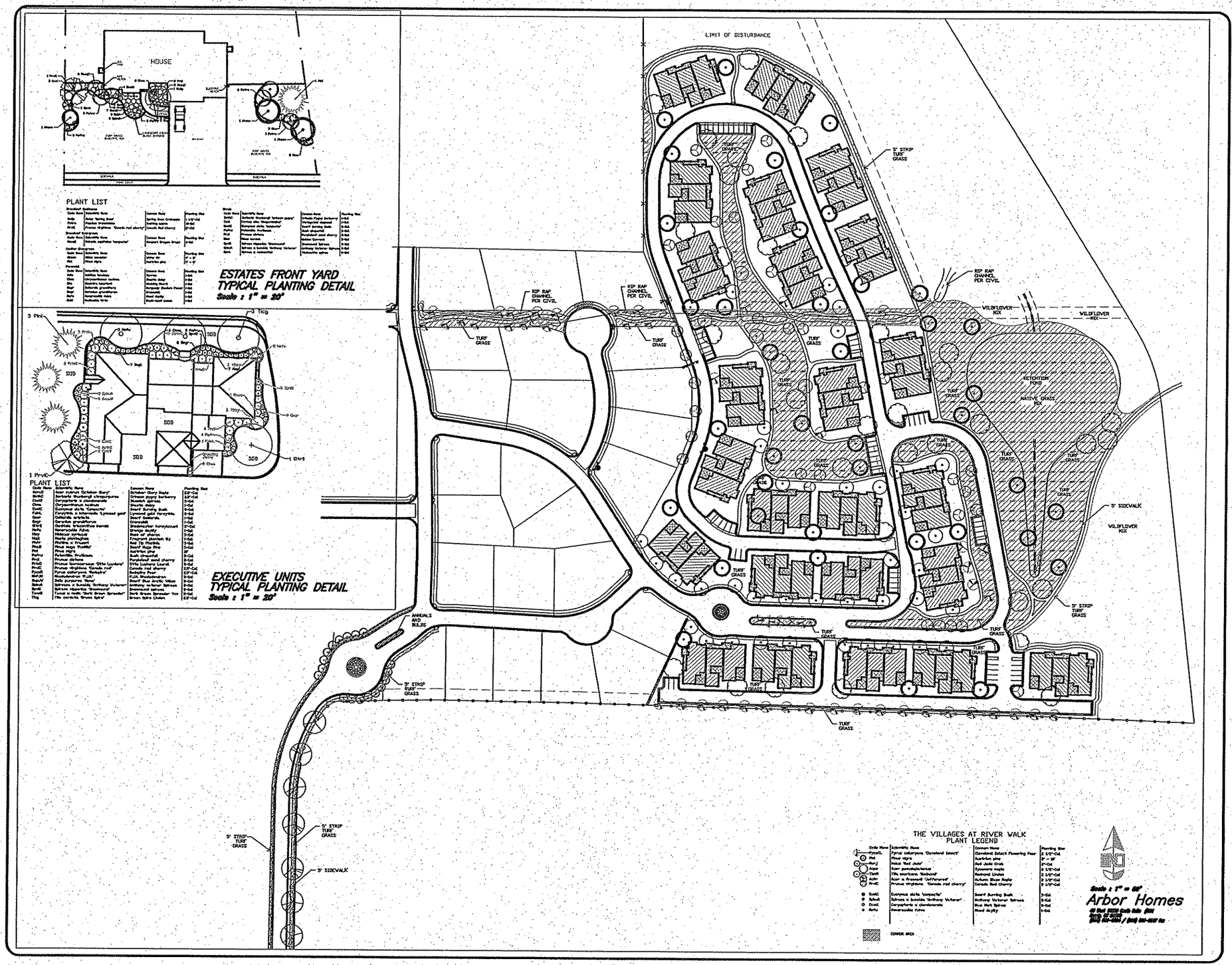
THE VILLAGE AT RIVERWALK

RETAINING WALL DETAILS

PROJECT NO.: 04122
SHEET NO. RW-02
FILE NAME: RW-02
SCALE: AS SHOWN

Q:\2004\04122 - Riverwalk Subdivision\CAD\Sheets\Final\RW-02.dwg 10/13/2005 8:08:18 PM MST



SELLEY LANDSCAPE DESIGN
13636 ARISTRY LANE
HERRIMAN, UTAH
84065
(801) 446-9550

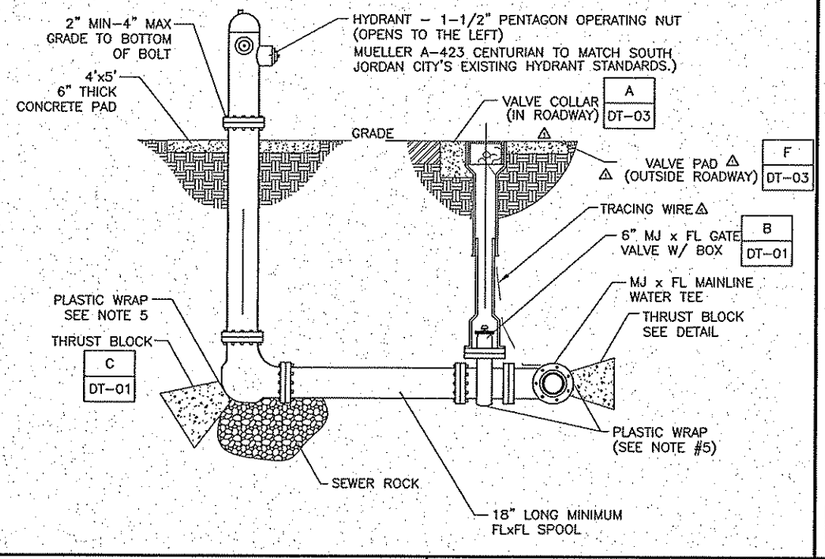
THE VILLAGES AT RIVERWALK
SOUTH JORDAN, UTAH

LANDSCAPE PLANTING PLAN

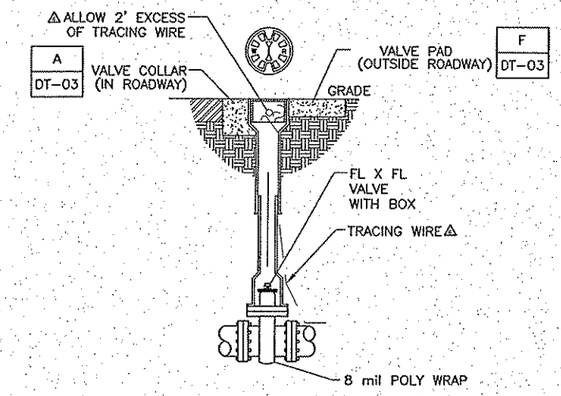
DATE: 6-20-05
DRAWN BY: JS
CHECKED BY: JS
JOB NO: 200505

SHEET NO:
L2.1

1. INSPECTION: PRIOR TO BACKFILLING, SECURE INSPECTION OF INSTALLATION BY ENGINEER.
2. BACKFILL: INSTALL AND COMPACT ALL BACKFILL MATERIAL PER SPECIFICATIONS.
3. HYDRANT: DRY BARREL PER AWWA C502.
   A. PROVIDE AT LEAST 1 CUBIC YARD OF SEWER ROCK AROUND DRAIN HOLE AT BASE OF HYDRANT. PLACE TAR PAPER OR PLASTIC OVER SEWER ROCK TO PREVENT SILTING.
   B. PAINT FIRE HYDRANT RED PER SOUTH JORDAN CITY'S REQUIREMENTS.
   C. APPLY POLY-FM GREASE TO ALL BURIED METAL SURFACES. WRAP WITH 8 mil THICK POLYETHYLENE SHEET AND TAPE WRAP.
   D. NOTIFY FIRE DEPARTMENT AS SOON AS HYDRANT IS PLACED IN SERVICE.
4. THRUST BLOCKS: REQUIRED FOR ALL CONNECTIONS INCLUDING FLANGED OR WELDED PIPE SYSTEMS.
5. PLASTIC WRAP: PRIOR TO POURING CONCRETE, APPLY POLY-FM GREASE AND WRAP PIPE SYSTEM AND FITTINGS WITH 8 mil THICK PLASTIC SHEET TO PREVENT BONDING OF CONCRETE TO PIPE SYSTEM AND FITTINGS.
6. PLACE FOUR (4) PROTECTIVE BOLLARDS AROUND HYDRANT AS DIRECTED BY BY SOUTH JORDAN CITY. SEE DETAIL 'B' SHEET DT-03



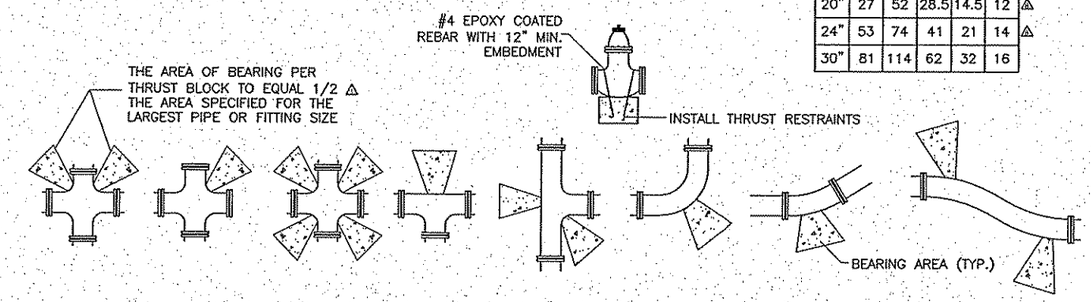
A FIRE HYDRANT WITH VALVE
N.T.S.



B VALVE DETAIL
N.T.S.

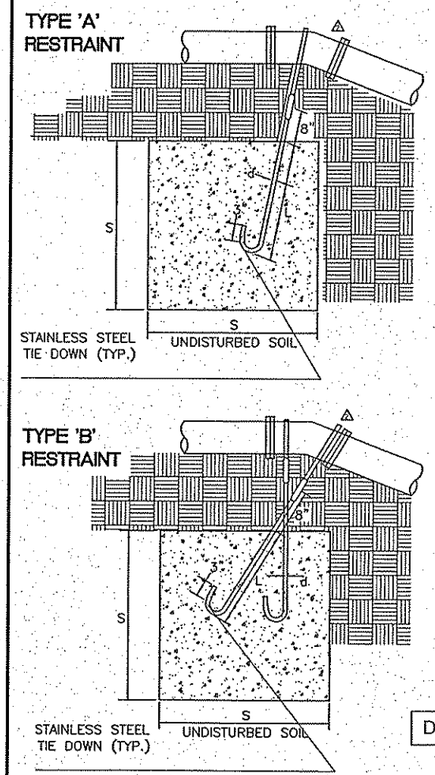
1. INSPECTION: PRIOR TO BACKFILLING AROUND THRUST BLOCK, SECURE INSPECTIONS OF INSTALLATION BY ENGINEER.
2. BACKFILL: INSTALL AND COMPACT ALL BACKFILL MATERIAL PER SPECIFICATIONS.
3. CONCRETE: CLASS 2,000 MINIMUM. POUR CONCRETE AGAINST UNDISTURBED SOIL.
4. PIPE JOINTS: DO NOT COVER WITH CONCRETE. LEAVE COMPLETELY ACCESSIBLE.
5. GREASE: APPLY POLY-FM GREASE TO ALL BURIED METAL SURFACES. WRAP WITH 8 MIL THICK POLYETHYLENE SHEET AND TAPE WRAP.
6. SPECIAL CONSTRUCTION REQUIREMENTS:
   A. THRUST DESIGN FOR PIPE SIZES OR CONFIGURATIONS NOT SHOWN REQUIRE SPECIAL DESIGN.
   B. BEARING AREAS, VOLUMES, AND SPECIAL THRUST BLOCKING DETAILS SHOWN ON DRAWINGS TAKE PRECEDENCE OVER THIS PLAN.
   C. REINFORCING STEEL BARS TO BE EPOXY COATED AT LEAST 15 MILS THICK. MINIMUM STRESS YIELD STRENGTH OF TIE DOWN BARS IS 70,000 PSI.
   D. LOCKING RESTRAINT DEVICES MAY BE USED IN CONJUNCTION WITH CONCRETE THRUST BLOCKING (AT OPTION OF ENGINEER).
   E. RESTRAINT SIZING IS BASED UPON A MAXIMUM OPERATING PRESSURE OF 150 PSI AND A TEST PRESSURE OF 200 PSI, AND A MINIMUM SOIL BEARING STRESS OF 2,000 PSF. OPERATING PRESSURES IN EXCESS OF 150 PSI OR SOILS WITH LESS THAN 2,000 POUND BEARING STRENGTH WILL REQUIRE SPECIAL DESIGN.
   F. CONCRETE MUST BE ALLOWED TO CURE IN THRUST RESTRAINTS FOR 5 DAYS PRIOR TO PRESSURIZING WATER LINES OR HAVE ADDITIONAL APPROVED THRUST RESTRAINTS INSTALLED PRIOR TO PRESSURIZING THE WATER LINE.

MINIMUM BEARING AREA IN SQ. FT.					
SIZE OF PIPE	TEES, VALVES DEAD ENDS	90° BENDS	45° BENDS	22 1/2° BENDS	11 1/4° BENDS
4"	2	3	2	2	2
6"	4	5.5	3	1.5	1
8"	6.5	9.5	5	2.75	1.5
12"	14	20	11	5.5	3
14"	19	26.5	14.5	7.5	4
16"	24	34	18.5	9.5	6
20"	27	52	28.5	14.5	12 △
24"	53	74	41	21	14 △
30"	81	114	62	32	16



C DIRECT BEARING THRUST BLOCK/TIE DOWN RESTRAINTS
N.T.S.

△ 11-21-03 PSE REVIEW	CS	11/03
△ 12-12-03 REVIEW	CS	12/03
△ 1-04 REVIEW	CS	01/04
△ 2-04 REVIEW	CS	02/04
△ 3-04 REVIEW	CS	03/04
△ 3-18 REVIEW	CS	03/18



TYPE 'A' RESTRAINT
FOR 11 1/4°-22 1/2° VERTICAL BENDS

TABLE OF DIMENSIONS

PIPE SIZE NOMIN. DIAMETER - INCH	VB: VERTICAL BEND DEGREES	VB: △ NO. OF CU FT. OF CONC. BLOCKING	S: SIDE OF CUBE FEET	d: DIAMETER OF SHACK OR REBAR RODS-INCH	L: DEPTH OF RODS IN CONCRETE FT.
4"	11 1/4	8	2.0	5/8"	1.5
	22 1/2	15.6	2.5	5/8"	2.0
6"	11 1/4	15.6	2.5	5/8"	2.0
	22 1/2	34.3	3.25	5/8"	2.0
8"	11 1/4	27	3.0	5/8"	2.0
	22 1/2	64	4.0	5/8"	2.0
12"	11 1/4	64	4.0	3/4"	2.0
	22 1/2	125	5.0	3/4"	3.0
16"	11 1/4	107	4.25	7/8"	3.0
	22 1/2	216	6.0	7/8"	4.0
20"	11 1/4	138	5.17	1"	3.5
	22 1/2	334	6.94	1"	4.0
24"	11 1/4	240	6.22	1"	4.0
	22 1/2	476	7.61	1"	4.0
30"	11 1/4	369	7.17	1"	4.0
	22 1/2	733	9.02	1"	4.0

TYPE 'B' RESTRAINT
FOR 45° VERTICAL BENDS

TABLE OF DIMENSIONS

PIPE SIZE NOMIN. DIAMETER - INCH	VB: VERTICAL BEND DEGREES	VB: △ NO. OF CU C.Y. OF CONC. BLOCKING	S: SIDE OF CUBE FEET	d: DIAMETER OF SHACK OR REBAR RODS-INCH	L: DEPTH OF RODS IN CONCRETE FT.
4"	45°	1	3.0	5/8" / 5/8"	2.0
6"	45°	2.37	4.0	5/8" / 5/8"	2.5
8"	45°	3.97	4.75	5/8" / 5/8"	2.0
12"	45°	9.04	6.25	5/8" / 5/8"	4.0
16"	45°	17.24	7.75	3/4" / 3/4"	4.0
20"	45°	26.52	△ 8.95	3/4" / 3/4"	4.0
24"	45°	37.82	10.07	3/4" / 3/4"	4.0
30"	45°	58.26	11.63	3/4" / 3/4"	4.0

D TIE DOWN THRUST RESTRAINTS
N.T.S.

APPROVED
10/17/05

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/04/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED BAK 7/8/05 PROJECT ENGINEER DATE
APPROVED BMC 7/8/05 PROJECT MANAGER DATE

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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Lehi, UT 84043
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THE VILLAGE AT RIVERWALK

STANDARD WATER DETAIL

PROJECT NO.: 04122
SHEET NO. DT-01
FILE NAME: WDT-01
SCALE: AS SHOWN

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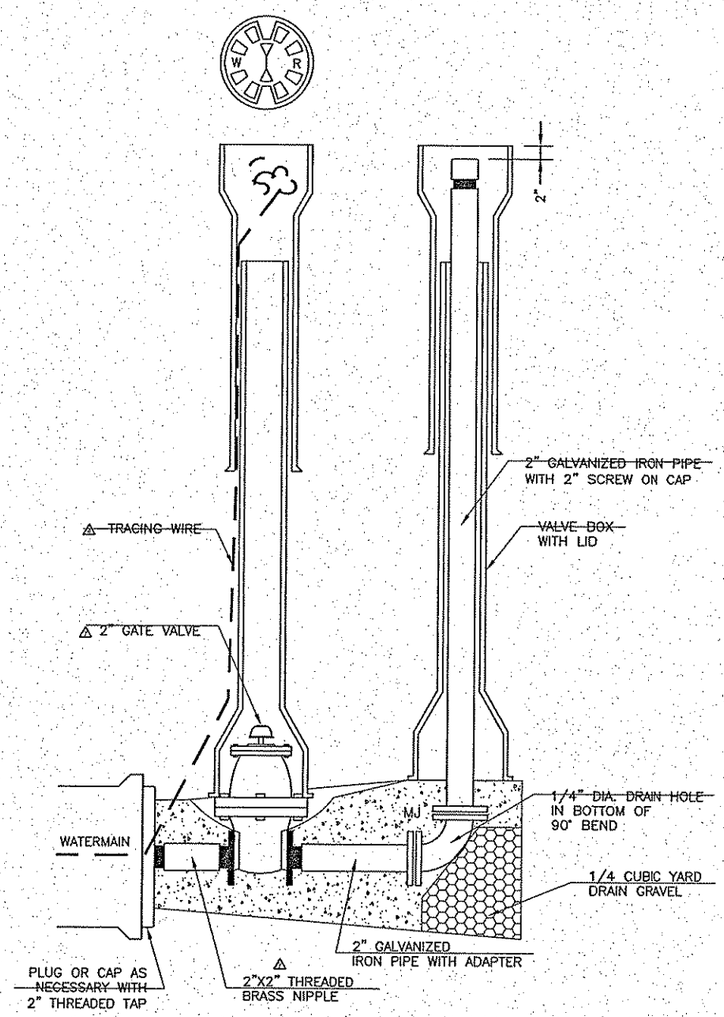
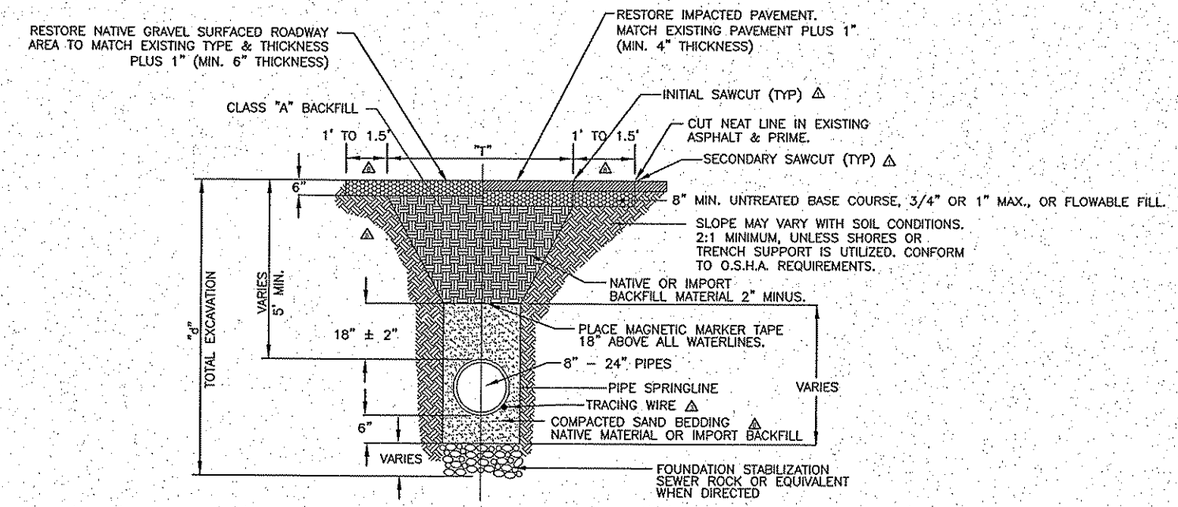


1. INSPECTION: PRIOR TO BACKFILLING AROUND THRUST BLOCK, SECURE INSPECTION OF INSTALLATION BY ENGINEER.
2. BACKFILL: INSTALL AND COMPACT ALL BACKFILL MATERIAL PER SPECIFICATIONS.
3. CONCRETE: CLASS 2,000 MINIMUM. POUR CONCRETE AGAINST UNDISTURBED SOIL.
4. TAPE: APPLY TAPE WRAP TO THE EXTERIOR OF ALL GALVANIZED PIPE PER AWWA C209
5. SPECIAL DESIGN: WATERMAINS 12" AND LARGER WILL REQUIRE SPECIAL WASHOUT ASSEMBLY DESIGN.
6. DRAINAGE: AFTER INSTALLATION OF WASHOUT VALVE ASSEMBLY, VERIFY THE WASHOUT VALVE RISER DRAINS TO GRAVEL.
7. WRAP ALL FOOTINGS PRIOR TO PLACEMENT OF THRUST BLOCKING

A WASHOUT VALVE ASSEMBLY
N.T.S.



B TYPICAL TRENCH DETAIL
N.T.S.

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/24/05
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED BAK 7/8/05 DATE
PROJECT ENGINEER
APPROVED BMC 7/8/05 DATE
PROJECT MANAGER

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THE VILLAGE AT RIVERWALK

STANDARD WATER DETAIL

PROJECT NO.: 04122
SHEET NO. DT-02
FILE NAME: WDT-02
SCALE: AS SHOWN

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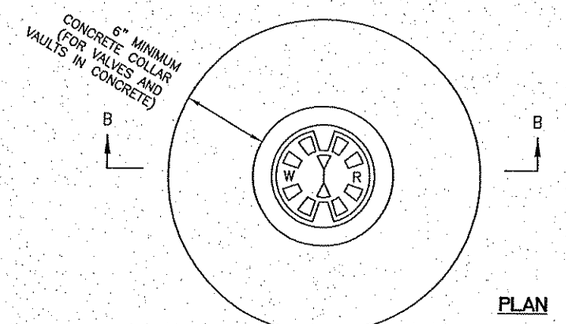
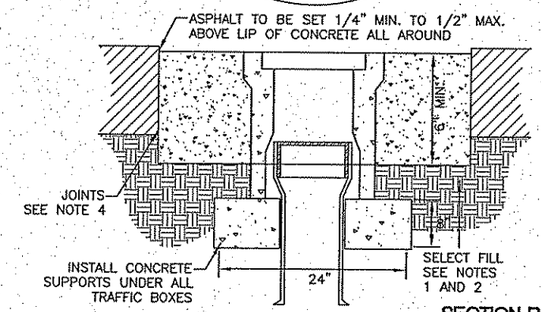


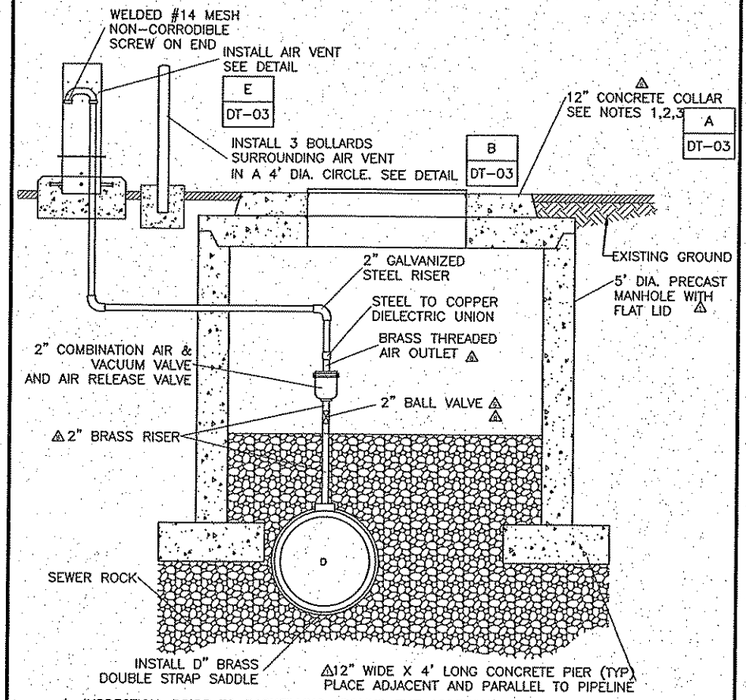
PLAN



SECTION B-B

1. BACKFILL: INSTALL AND COMPACT ALL BACKFILL MATERIAL PER SPECIFICATIONS 2. SELECT FILL: USE UNTREATED BASE COURSE GRADE 3/4" MAXIMUM PER SPECIFICATIONS. USE OF SEWER ROCK OR RECYCLED AGGREGATE REQUIRES ENGINEER'S WRITTEN APPROVAL.
3. CONCRETE: CLASS 4,000. APPLY A SEALING/CURING COMPOUND PER SPECIFICATIONS.
4. JOINTS: PROVIDE A NEAT STRAIGHT JOINT BETWEEN EXISTING AND NEW ASPHALT CONCRETE SURFACES. PROVIDE CONCENTRIC CIRCLE CUT. CLEAN EDGES OF ALL DIRT, OIL AND LOOSE DEBRIS.

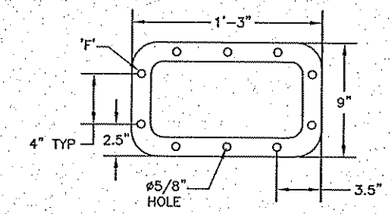
A COVER COLLAR (IN PAVEMENT)△
SCALE



1. INSPECTION: PRIOR TO BACKFILLING AROUND THE ASSEMBLY, SECURE INSPECTION OF INSTALLATION BY ENGINEER.
2. BACKFILL: INSTALL AND COMPACT ALL BACKFILL MATERIAL PER SPECIFICATIONS
3. CONCRETE: CLASS 4,000. APPLY A SEALING/CURING COMPOUND PER SPECIFICATIONS
4. SMALL FITTINGS: PROVIDE BRASS FITTINGS AND NIPPLES IF NOT SPECIFIED OTHERWISE. DO NOT USE GALVANIZED MATERIALS.

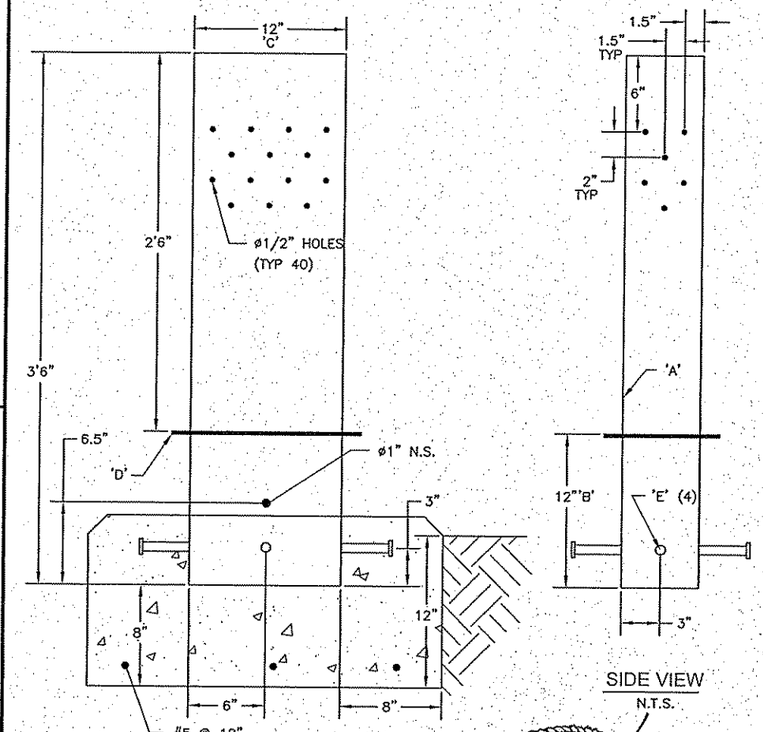
C COMBINATION AIR VACUUM VALVE ASSEMBLY
SCALE

PARTS LIST		
ITEM	QTY	DESCRIPTION
A	1	TS 12" x 6" x 1/4" x 2'-6"
B	1	TS 12" x 6" x 1/4" x 12"
C	1	1/4" PL – 6" x 1'-0"
D	2	1/4" PL – 9" x 1'-3"
E	4	ø3/4" x 4" H.S.A.
F	10	ø1/2" x 3" BREAKAWAY BOLTS

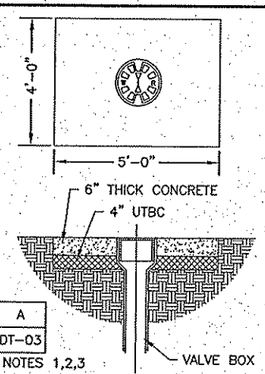


FLANGE DETAIL
ITEMS REMOVED FOR CLARITY, N.T.S.

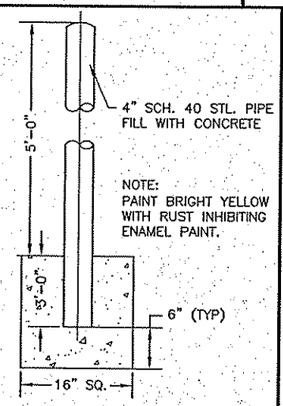
1. OPEN TO AIR–PLACE A NO. 14 MESH NON-CORRODIBLE SCREEN OVER THE OPEN END OF P.V.C. PIPE. ATTACH W/S.S. HOSE CLAMP.
2. HOT DIPPED GALVANIZED STEEL STAND PIPE FOR AIR VENT.
3. 1 ½" MIN. CHAMFER ALL AROUND CONCRETE BASE.



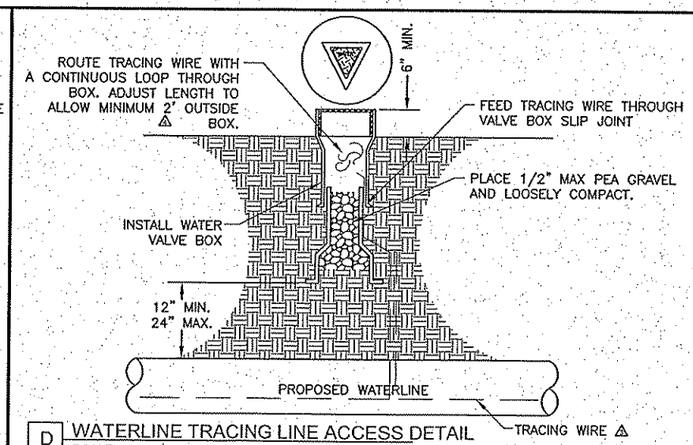
E AIR VENT DETAIL
SCALE



F VALVE PAD (OUTSIDE PAVEMENT)△
SCALE



B BOLLARD DETAIL
SCALE



D WATERLINE TRACING LINE ACCESS DETAIL
SCALE

△	11-21-03 PSE REVIEW	CS	11/03
△	12-12-03 REVIEW	CS	12/03
△	1-04 REVIEW	CS	01/04
△	2-04 REVIEW	CS	02/04
△	2-04 REVIEW	CS	02/04
△	2-05 REVIEW	CS	02/05

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
8/24/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED BAK 7/8/05 PROJECT ENGINEER DATE
APPROVED BMC 7/8/05 PROJECT MANAGER DATE

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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THE VILLAGE AT RIVERWALK

STANDARD WATER DETAIL

PROJECT NO.: 04122
SHEET NO. DT-03
FILE NAME: WDT-03
SCALE: AS SHOWN

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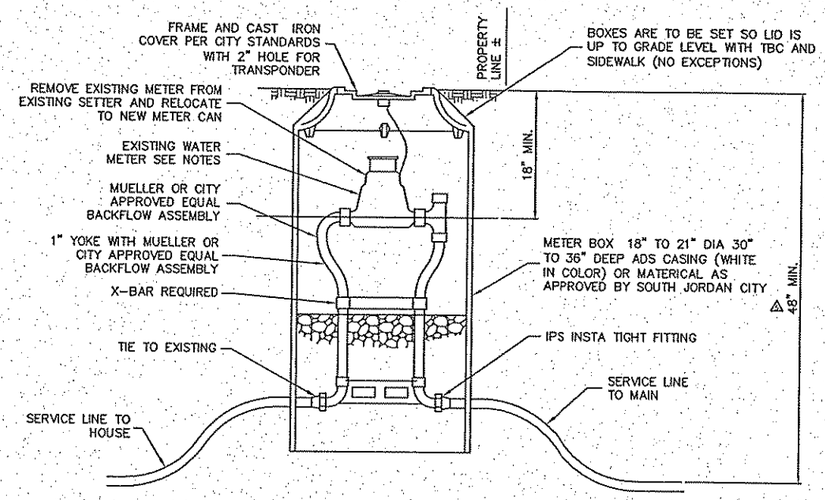
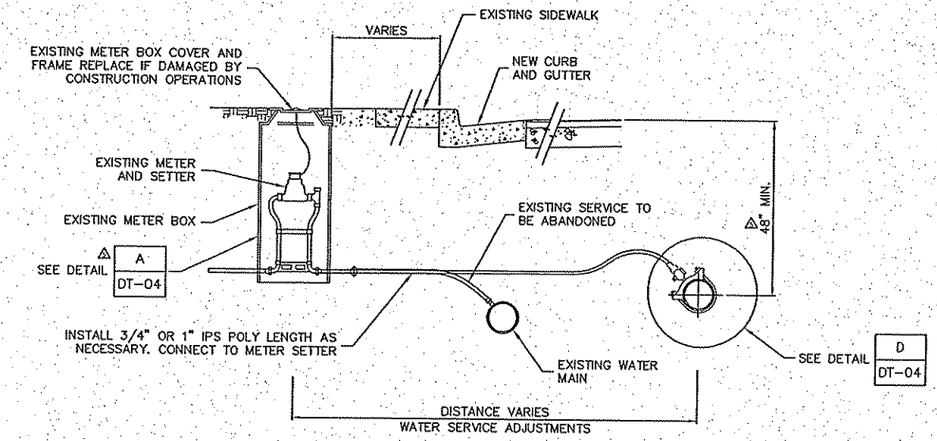


NOTES:
1. INSPECTION: PRIOR TO BACKFILLING AROUND THE METER BOX, SECURE INSPECTION OF INSTALLATION BY ENGINEER.
2. BACKFILLING: INSTALL ALL BACKFILL MATERIAL PER APWA SECTION 02320 IN LIFTS NOT EXCEEDING 6 INCHES AFTER COMPACTION. COMPACT EACH LIFT TO A MINUMUM RELATIVE DENSITY OF 95 PERCENT.
3. PLACEMENT:
   A. DO NOT INSTALL METERS UNDER DRIVEWAY APPROACHES, SIDEWALKS, OR CURB AND GUTTER.
   B. IN NEW CONSTRUCTION, INSTALL METER AT CENTER OF LOT OR PER SOUTH JORDAN CITY REQUIREMENTS.
   C. ALL METERS ARE TO BE INSTALLED IN THE PARK STRIP OR WITHIN 4 FEET OF THE PROPERTY LINE (STREET SIDE).
4. METER ISSUES:
   A. PROTECT REMOTE READ METER ASSEMBLY INCLUDING TRANSDUCER AND CONNECTING WIRE.
   B. COORDINATE METER ASSEMBLY REMOVAL AND REPLACEMENT IN NEW YOKE WITH CITY WATER DEPARTMENT STAFF.
   C. COMPLETE METER RELOCATION WITHIN 4 HOUR SERVICE DISRUPTION WINDOW.
   D. REPAIR / REPLACE METER, TRANSDUCER AND/OR WIRING ON REMOTE METER READ ASSEMBLY AT NO COST TO CITY, AND TO CITY WATER DEPARTMENT SATISFACTION, IF DAMAGED DURING CONSTRUCTION.

A 1" METER SERVICE
SCALE

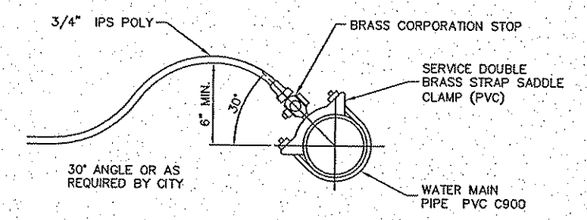


NOTE: FITTINGS – PROVIDE BRASS FITTINGS AND NIPPLES ON ALL SERVICE LINE CONNECTIONS. DO NOT USE GALVANIZED MATERIALS

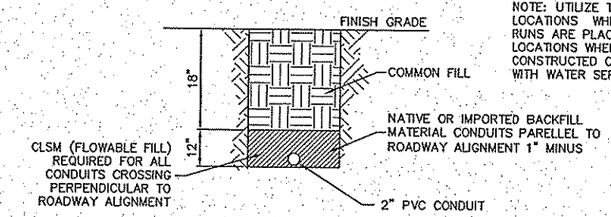
B TYPICAL CULINARY WATER SERVICE CONNECTION
SCALE

NOTES:
1. INSPECTION – PRIOR TO BACKFILLING AROUND TAPS, SECURE INSPECTION OF INSTALLATION BY SOUTH JORDAN WATER DEPARTMENT
2. BACKFILL – INSTALL AND COMPACT ALL BACKFILL MATERIAL PER
3. APWA SECTION 02320
4. TAPPING – PLACE TAPS A MINIMUM OF 24" APART. USE A TAPPING TOOL WHICH IS SIZED CORRESPONDING TO THE SIZE OF THE SERVICE LINE TO BE INSTALLED. NO TAPS WITHIN 24" OF END OF ANY PIPE.

TAPE – TEFLON TAPE IS REQUIRED ON ALL TAPS

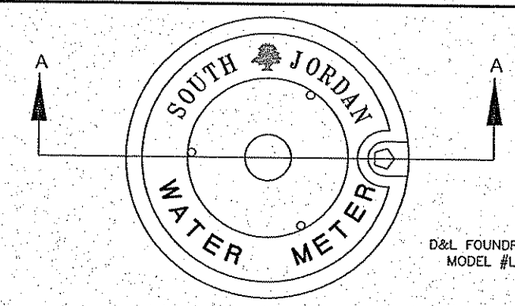


D SERVICE TAPS
SCALE

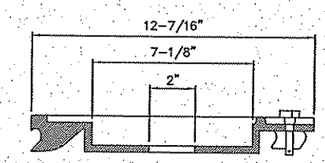


NOTE: UTILIZE THIS TRENCH DETAIL FOR ALL LOCATIONS WHERE FUTURE USE UTILITY CONDUIT RUNS ARE PLACED CROSSING ROADWAYS AND IN LOCATIONS WHERE CONDUITS CANNOT BE CONSTRUCTED ON BENCH OR SHELF IN COMBINATION WITH WATER SERVICE LINE INSTALLATION AS SHOWN.

C 2" FUTURE USE UTILITY CONDUIT TYPICAL TRENCHING DETAIL
SCALE

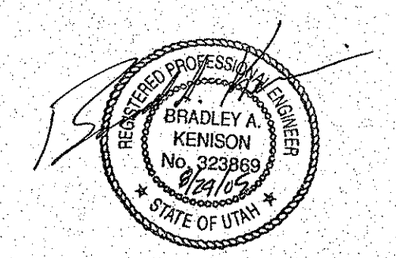


D&L FOUNDRY & SUPPLY
MODEL #L-2240-13



SECTION A-A

E WATER METER COVER
SCALE



NO	REVISIONS	BY	DATE
△	11-21-03 PSE REVIEW	CS	11/03
△	12-12-03 REVIEW	CS	12/03
△	1-04 REVIEW	CS	01/04
△	2-04 REVIEW	CS	02/04

SOUTH JORDAN CITY
1600 W TOWNE CENTER DRIVE
SOUTH JORDAN, UTAH 84095

SOUTH JORDAN
CITY OF

DRAWN	TT	7/8/05 DATE
CHECKED	BAK PROJECT ENGINEER	7/8/05 DATE
APPROVED	BMC PROJECT MANAGER	7/8/05 DATE

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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THE VILLAGE AT RIVERWALK

STANDARD WATER DETAIL

PROJECT NO.: 04122
SHEET NO. DT-04
FILE NAME: WDT-04
SCALE: AS SHOWN

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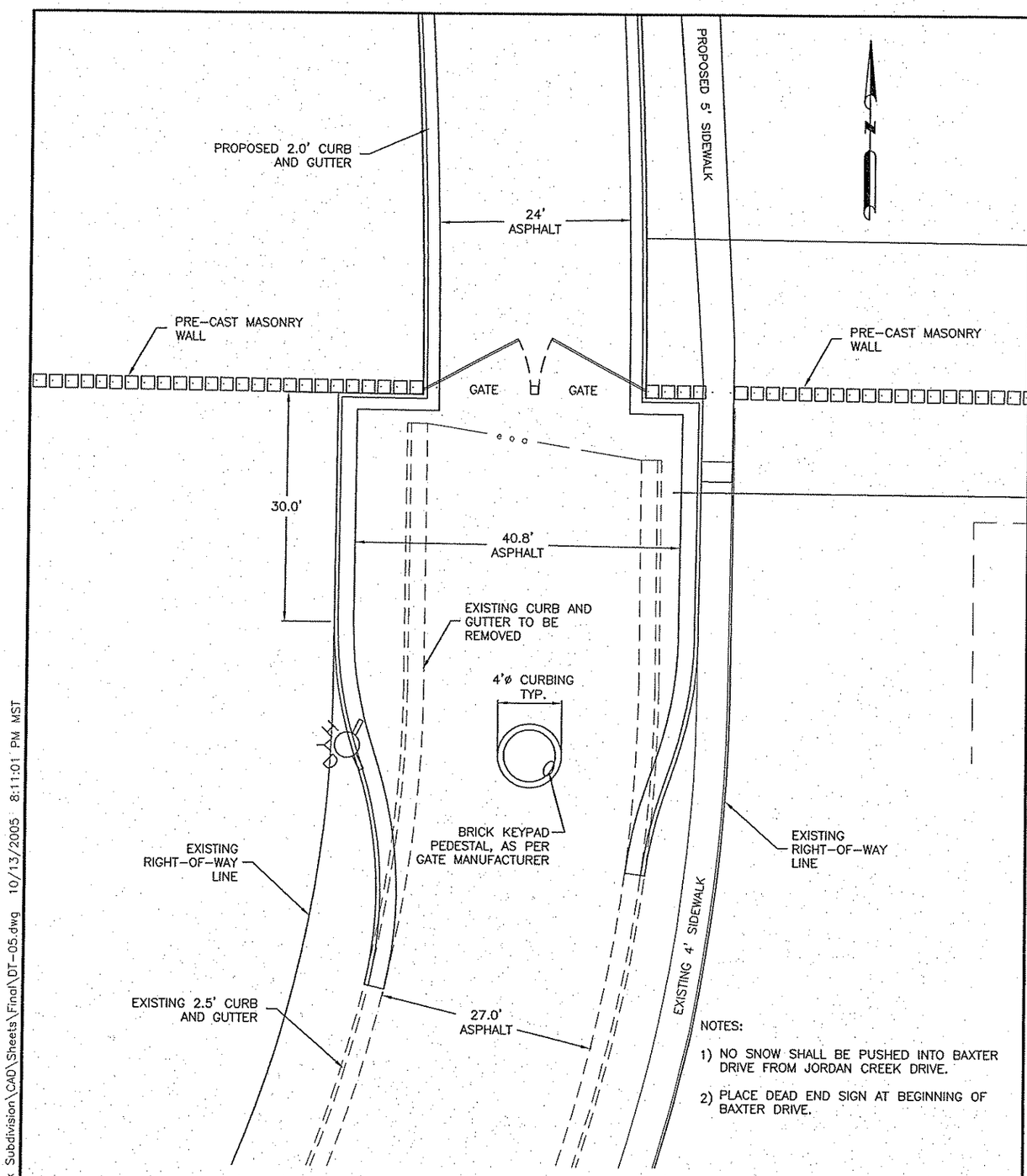
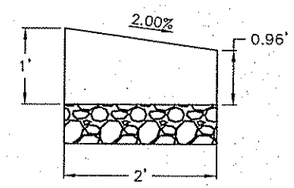


NOTES:

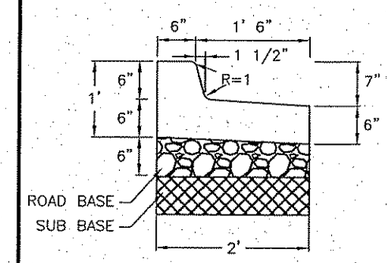
1) NO SNOW SHALL BE PUSHED INTO BAXTER DRIVE FROM JORDAN CREEK DRIVE.

2) PLACE DEAD END SIGN AT BEGINNING OF BAXTER DRIVE.

A ENTRANCE DETAIL
N.T.S.



SLOPED CURB
N.T.S.



REVERSE SLOPE CURB & GUTTER
N.T.S.

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
10/14/05
STATE OF UTAH

NO.	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED BAK 7/8/05 DATE
PROJECT ENGINEER
APPROVED BMC 7/8/05 DATE
PROJECT MANAGER

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COMMERCIAL/RESIDENTIAL
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THE VILLAGE AT RIVERWALK

MISC. DETAILS

PROJECT NO.: 04122
SHEET NO. DT-05
FILE NAME: DT-05
SCALE: AS SHOWN

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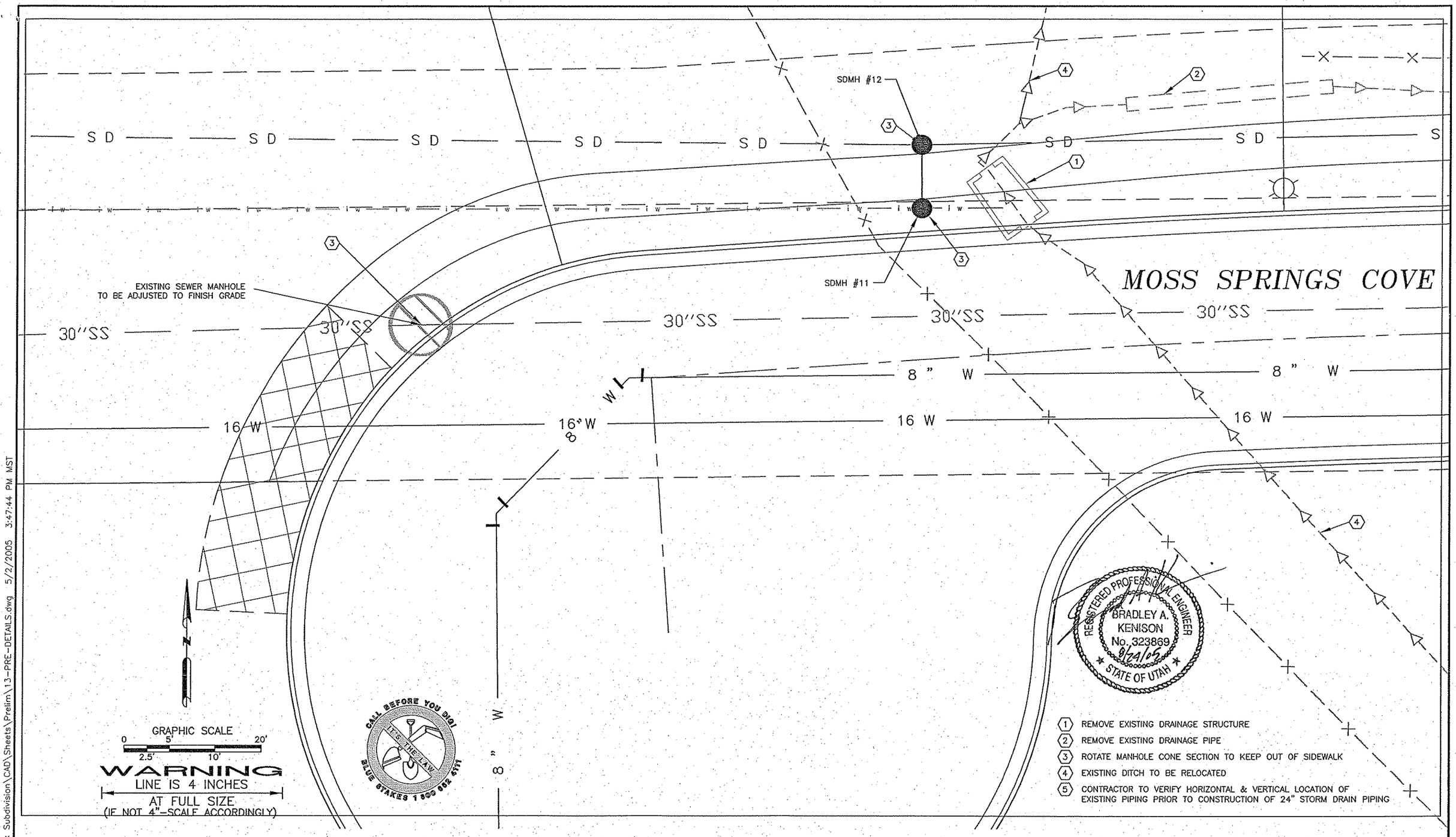

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NO	REVISIONS	BY	DATE

DRAWN GSB	7/8/05 DATE	
CHECKED RWA PROJECT ENGINEER	7/8/05 DATE	
APPROVED BAK PROJECT MANAGER	7/8/05 DATE	

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COMMERCIAL/RESIDENTIAL
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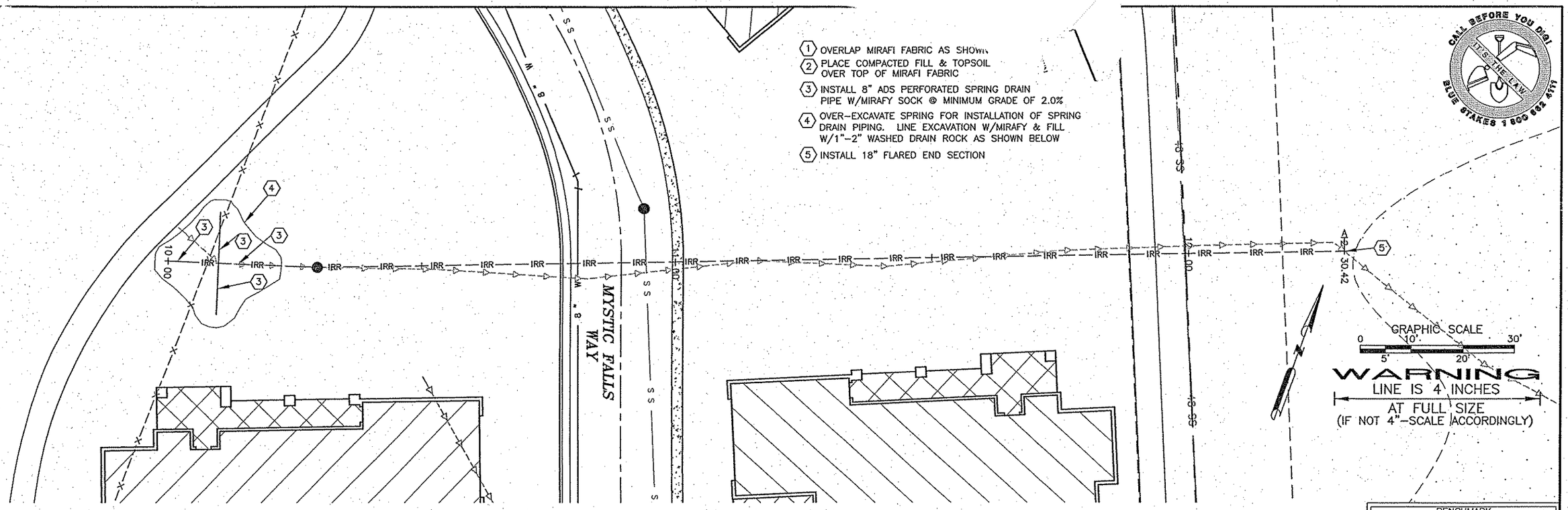
THE VILLAGE AT RIVERWALK

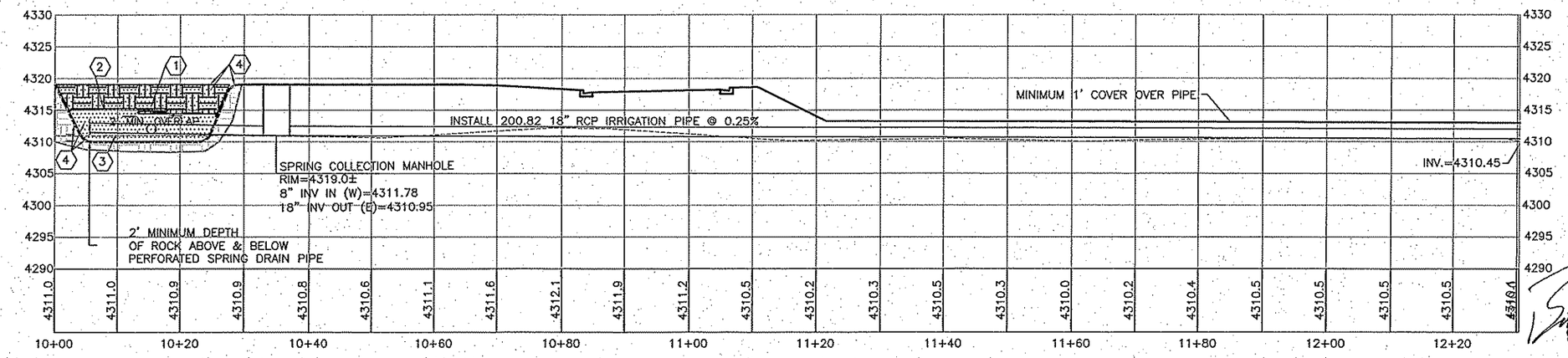
MISC. DETAILS

PROJECT NO.: 04122
SHEET NO. DT-07
FILE NAME: DT-07 SCALE: AS SHOWN

1. OVERLAP MIRAFI FABRIC AS SHOWN
2. PLACE COMPACTED FILL & TOPSOIL OVER TOP OF MIRAFI FABRIC
3. INSTALL 8" ADS PERFORATED SPRING DRAIN PIPE W/MIRAFY SOCK @ MINIMUM GRADE OF 2.0%
4. OVER-EXCAVATE SPRING FOR INSTALLATION OF SPRING DRAIN PIPING. LINE EXCAVATION W/MIRAFY & FILL W/1"-2" WASHED DRAIN ROCK AS SHOWN BELOW
5. INSTALL 18" FLARED END SECTION



BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47



REGISTERED PROFESSIONAL ENGINEER
BRADLEY A. KENISON
No. 323869
9/24/05
STATE OF UTAH

NO	REVISIONS	BY	DATE

DRAWN TT	7/8/05 DATE	
CHECKED RWA PROJECT ENGINEER	7/8/05 DATE	
APPROVED BAK PROJECT MANAGER	7/8/05 DATE	

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THE VILLAGE AT RIVERWALK

SPRING COLLECTION SYSTEM

PROJECT NO.: 04122
SHEET NO. DT-08
FILE NAME: DT-08
SCALE: AS SHOWN

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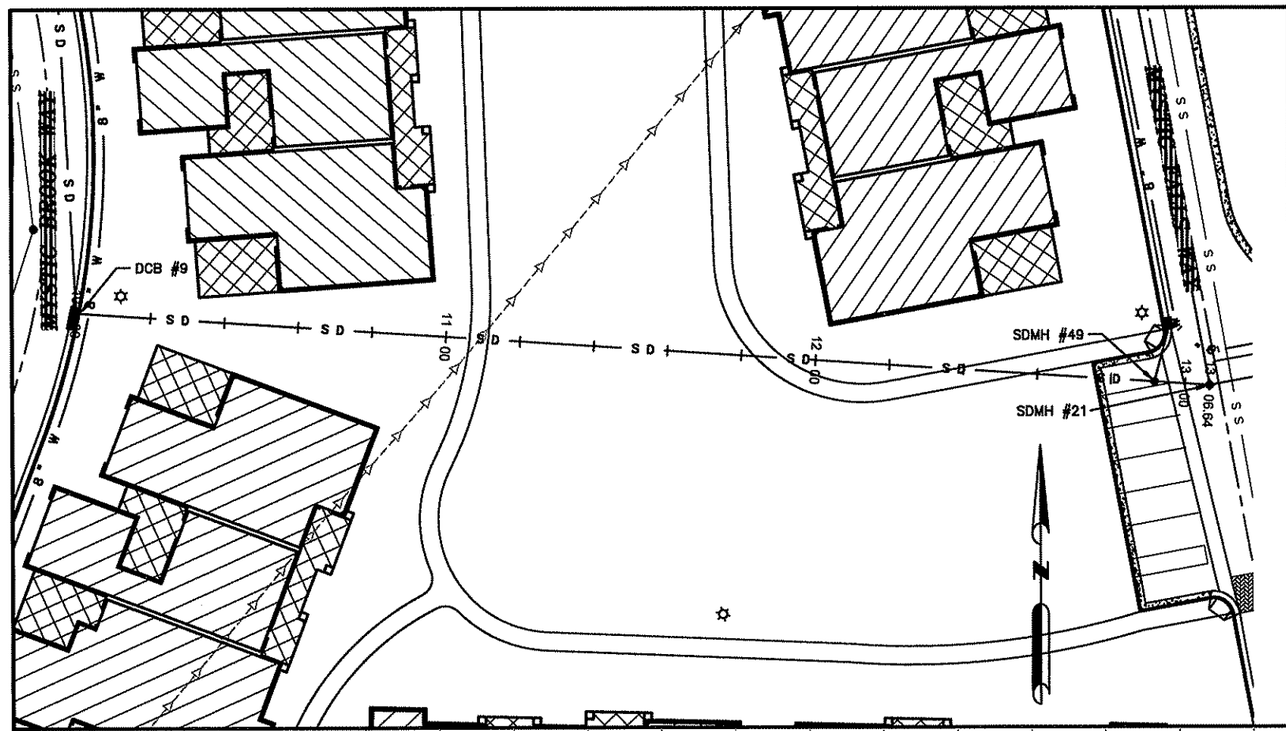

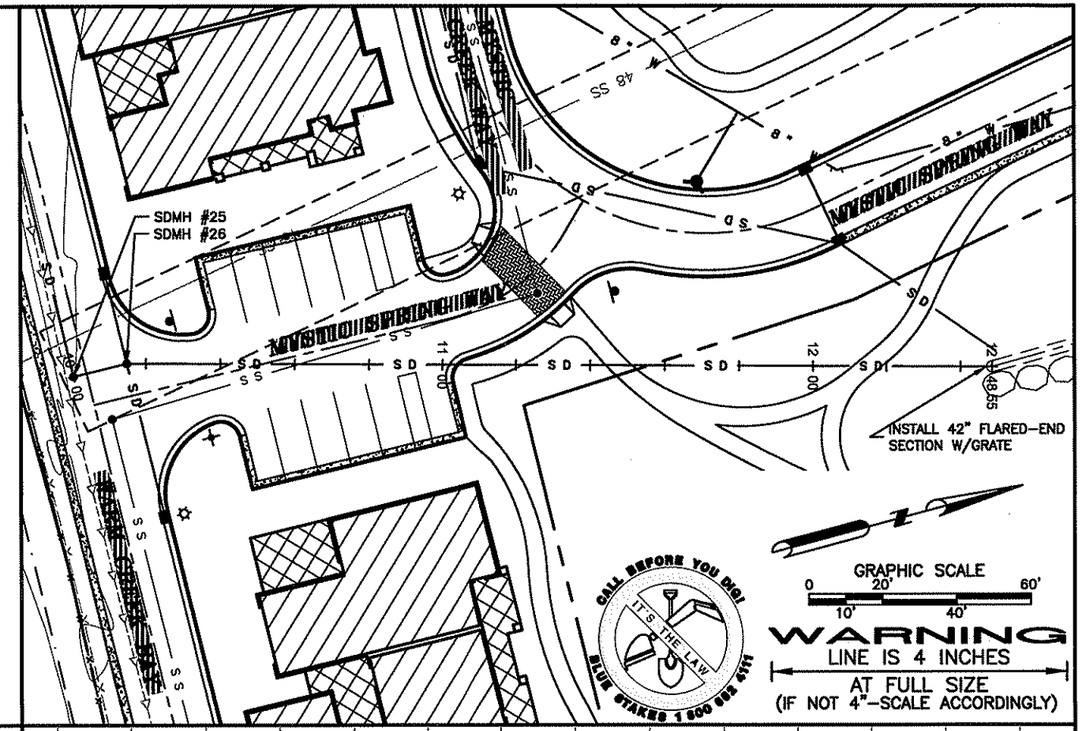

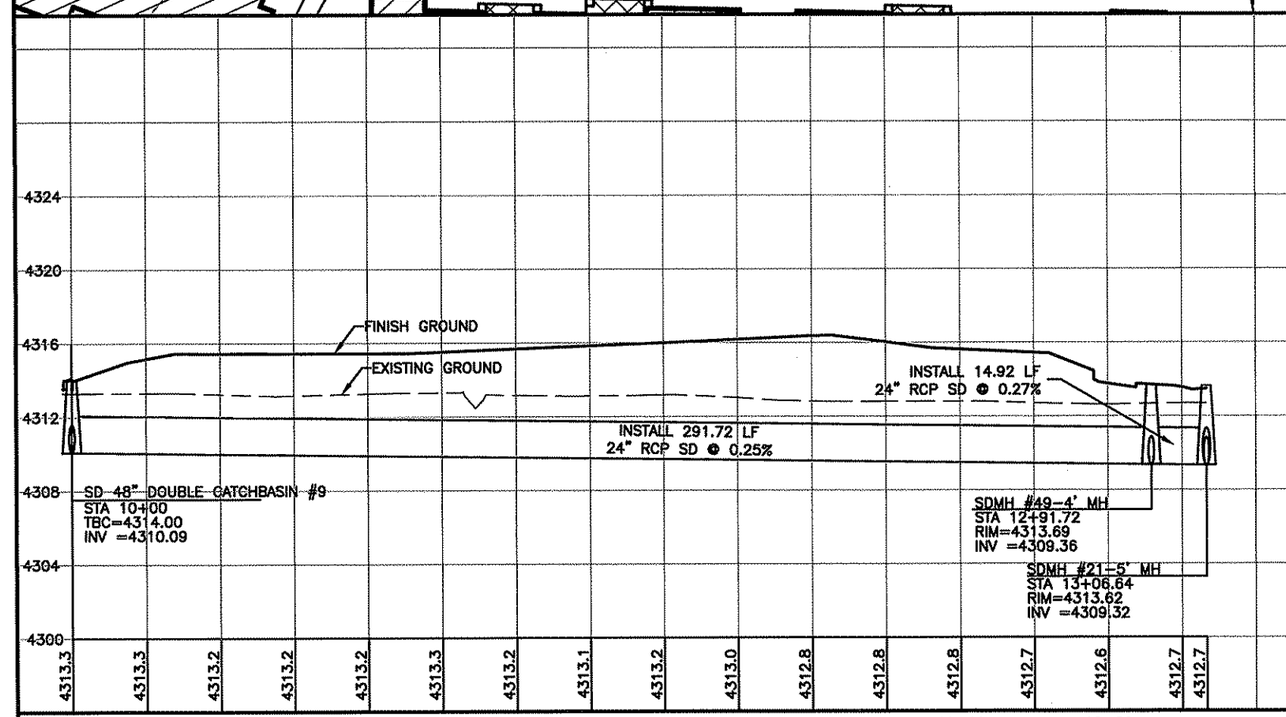

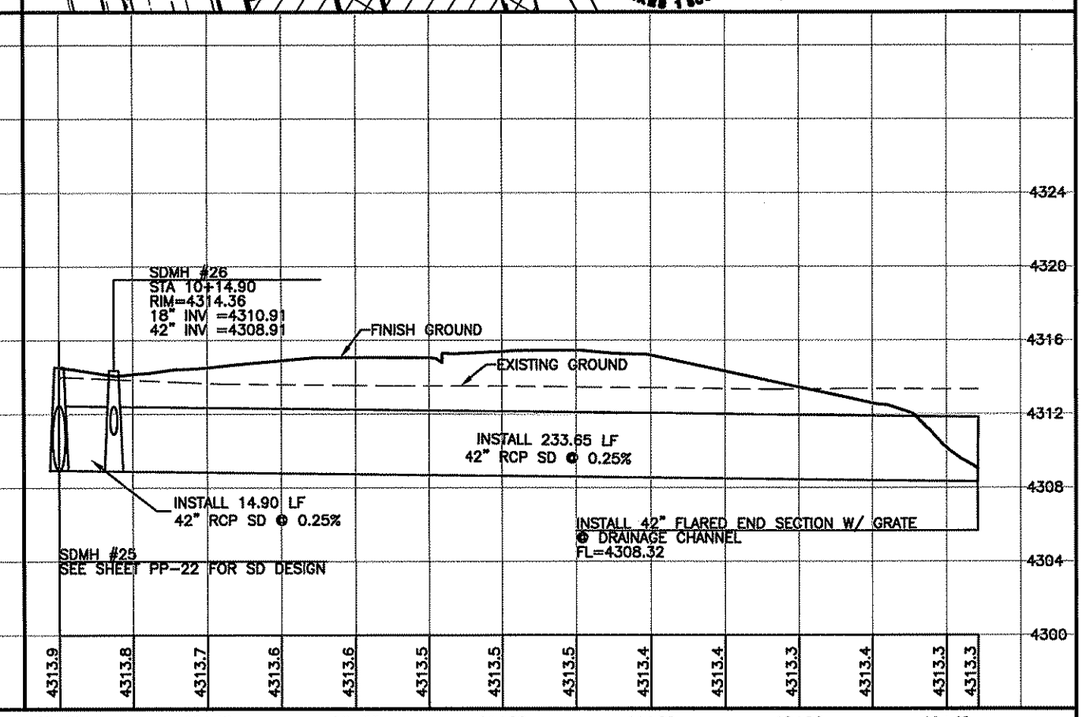

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CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
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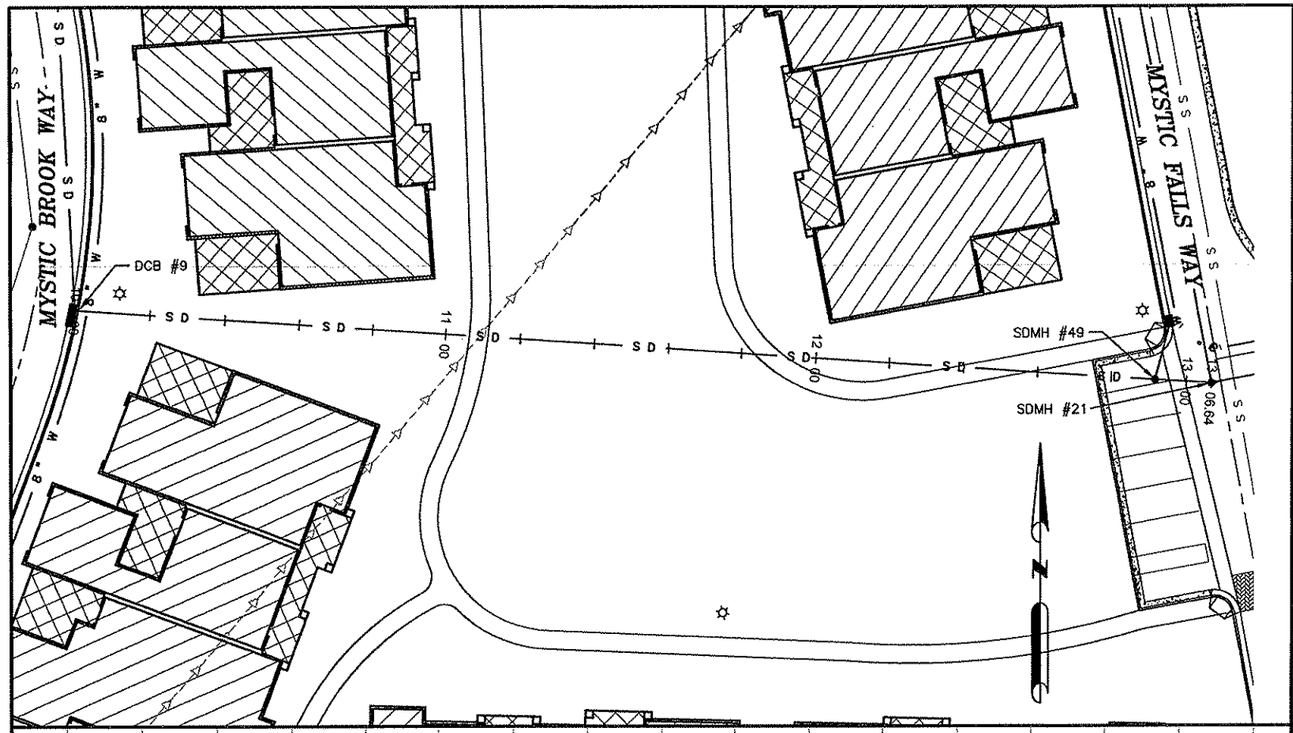
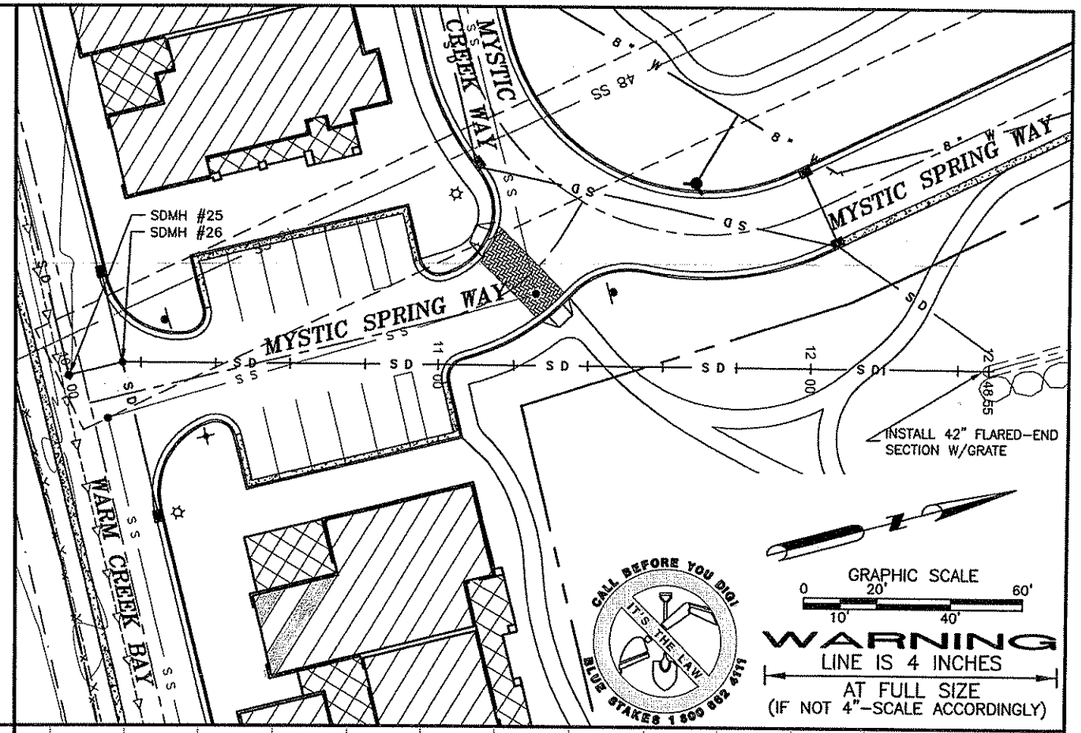
THE VILLAGE AT RIVERWALK

ONSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-05
FILE NAME: SD-05
SCALE: AS SHOWN





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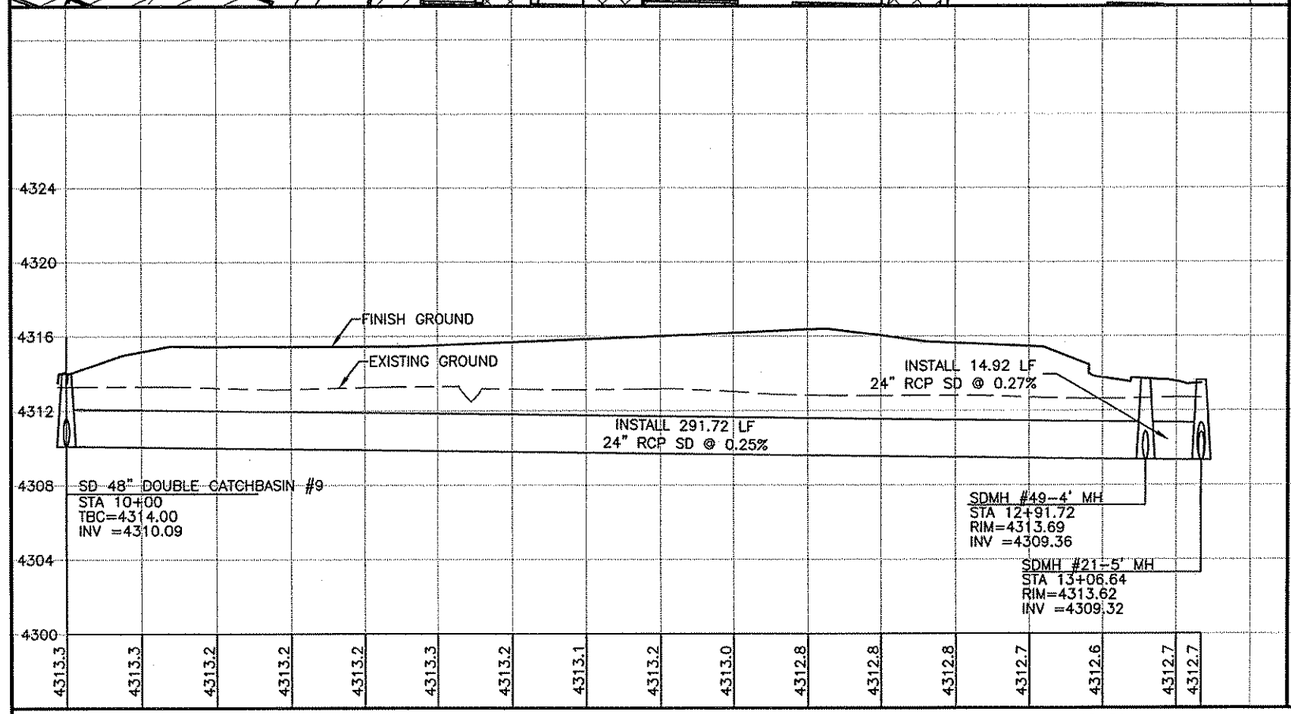
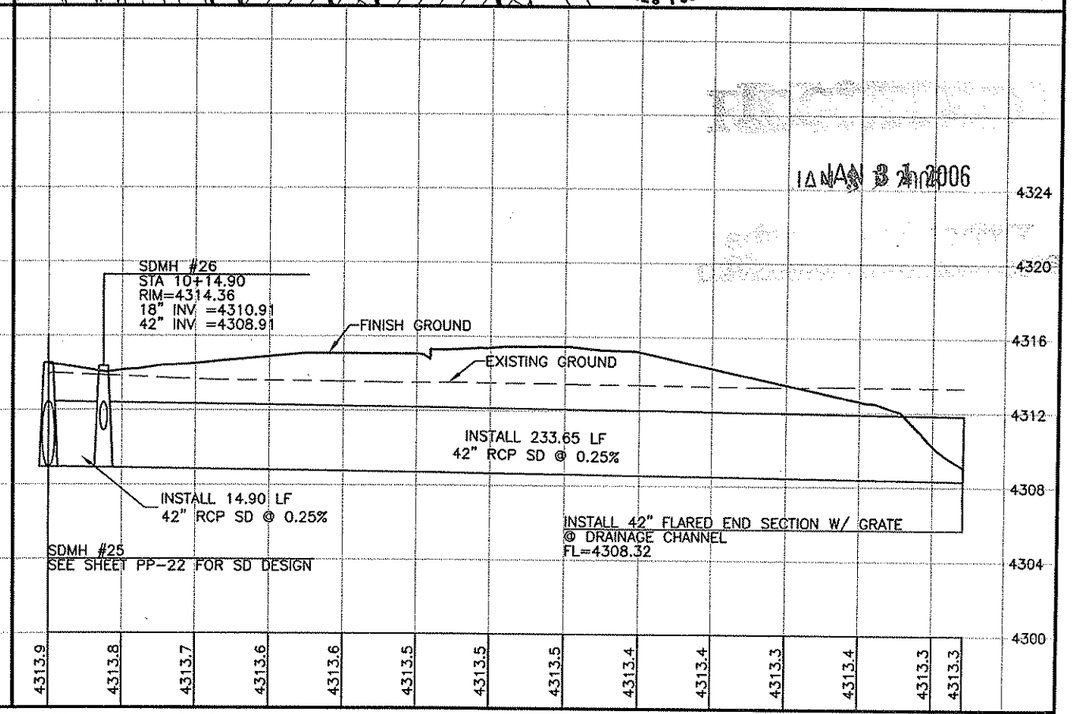
GRAPHIC SCALE
0 20' 60'
10' 40'

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)





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NO.	REVISIONS	BY	DATE

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CHECKED RWA 7/8/05 PROJECT ENGINEER DATE
APPROVED BAK 7/8/05 PROJECT MANAGER DATE

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THE VILLAGE AT RIVERWALK

ONSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-05
FILE NAME: SD-05
SCALE: AS SHOWN

Figure 2

Riverwalk Subdivision
Calculation of Project Drainage Coefficient ("C" – Factor)

Town Houses

Impermeable Surface -	6.41 acres
Permeable Surface -	5.66 acres
Total -	12.07 acres

C = 0.55

Access Road

Impermeable Surface -	0.52 acres
Permeable Surface -	0.00 acres
Total -	0.52 acres

C = 0.90

Mansion Homes - Northern Portion

Impermeable Surface -	6.35 acres
Permeable Surface -	9.69 acres
Total -	16.04 acres

C = 0.45

Mansion Homes - Southern Portion

Impermeable Surface -	0.78 acres
Permeable Surface -	4.55 acres
Total -	5.33 acres

C = 0.26

Entire Subdivision

Impermeable Surface -	14.1 acres
Permeable Surface -	19.9 acres
Total -	34.0 acres

C_{AVG} = 0.46

Figure 3

Riverwalk Subdivision
Detention Basin Sizing

Total Area (acres):	33.97	
Average Runoff Coefficient:	0.46	average for Subdivision
Basin Percolation Rate - Outflow (min/in):	120.00	
Basin Percolation Rate - Outflow (cfs):	0.52	
Max required storage (from table below) (ft^3):	**106,200**	
Max required storage (from table below) (AF):	**2.44**	

Retention Basin Volume

Time (min)	Rainfall (I) 100-year Storm (in/hr)	C	Area (Acre)	Q (CIA)	Inflow Volume (ft^3)	Discharge volume (percolation) (ft^3)	Required Retention Volume (ft^3)	Required Retention Volume (AF)
5	5.26	0.46	33.97	82.247	24,674	155	24,500	0.56
10	4.30	0.46	33.97	67.287	40,372	309	40,100	0.92
15	3.56	0.46	33.97	55.645	50,080	464	49,600	1.14
30	2.44	0.46	33.97	38.119	68,614	927	67,700	1.55
60	1.42	0.46	33.97	22.283	80,219	1,854	78,400	1.80
120	0.85	0.46	33.97	13.223	95,203	3,708	91,500	2.10
180	0.60	0.46	33.97	9.373	101,231	5,562	95,700	2.20
360	0.32	0.46	33.97	4.960	107,146	11,125	96,000	2.20
720	0.19	0.46	33.97	2.973	128,440	22,250	106,200	2.44
1440	0.11	0.46	33.97	1.706	147,368	44,500	102,900	2.36

Outflow Calculations

Time (min)	Perc Area (ft^2)	Perc rate (min/in)	Perc rate (cfs)	Discharge (ft^3)
5	44,500	120	0.515	155
10	44,500	120	0.515	309
15	44,500	120	0.515	464
30	44,500	120	0.515	927
60	44,500	120	0.515	1,854
120	44,500	120	0.515	3,708
180	44,500	120	0.515	5,562
360	44,500	120	0.515	11,125
720	44,500	120	0.515	22,250
1440	44,500	120	0.515	44,500

Preliminary Storm Drainage Report

Riverwalk Subdivision
10100 South 750 West
South Jordan, Utah

REGISTERED PROFESSIONAL ENGINEER
BRADLEY A.
KENISON
No. 323869
3-26-04
STATE OF UTAH

March 2004

RECEIVED
MAR 2 6 2004
SOUTH JORDAN CITY
DEVELOPMENT SERVICES

Narrative:

The Riverwalk Subdivision is located at approximately 10100 South 750 West in South Jordan, Utah, immediately west of the Jordan River. This subdivision is being proposed as a Planned Unit Development (PUD) with several unique amenities, including a water-feature used to convey existing irrigation flows throughout the project. This water feature proposed is expected to flow year-around, and has also been designed as a storm drainage conveyance channel to the proposed project detention area, which is an existing wetland area which eventually outlets to the Jordan River.

Purpose:

The purpose of this preliminary storm drainage report is to determine the amount of expected storm drainage runoff from the proposed Riverwalk Subdivision during a 100-year 24-hour storm event. The sizing and design of the conveyance channel will be discussed as part of the Final Storm Drainage report submitted with the final construction plans.

Given:

Project acreage	40.34 Acres (Including offsite lots and access road)
Project "C" Factor	0.45 (See attached Calculations)
Rainfall Intensity required by South Jordan City	Varies as per South Jordan City storm data

Drainage Calculations:

Step 1: Calculate the project drainage coefficient ("C"-Factor).
Figure 1 – Calculation of Project Drainage Coefficient ("C" – Factor) compares the ratio of the permeable to the impermeable acreages to compute an average "C"-Factor.

Step 2: Calculate the expected detention basin size for the project.
A spreadsheet, Figure 2 – Riverwalk Subdivision – Detention Basin Sizing, was used to design the maximum expected size of the detention basin, given the: project acreage, runoff coefficient, 100-year storm rainfall intensities, and the allowable detention basin release rate of 0.2 cfs/acre. This spreadsheet calculates the maximum expected storage volume by comparing the anticipated inflow volume with the anticipated storage and outflow volumes, over different time periods. The anticipated inflow volume is calculated based upon rainfall data, whereas the outflow volume is based on the allowable detention basin discharge. The time period where the required storage "peaks" is considered to be the maximum required storage for the entire site.

Drainage Conclusions:

As shown in Figure 2, the drainage calculations indicate that the minimum required detention volume for this Riverwalk Subdivision is approximately 68,900 cubic feet. The calculations also indicate that the water level within the existing wetland (proposed detention) area will rise by approximately 0.5 feet with the addition of the anticipated 66,250 cubic feet of storm drainage water flows from the 100-year storm.

FIGURE 1

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CLIENT South Jordan City JOB NO. 03050.07.001
PROJECT Riverwalk Subdivision
MADE BY BAK DATE 3-26-04
CHECKED BY _____ DATE _____ SHEET ____ OF ____

RIVERWALK SUBDIVISION

CALCULATION OF PROJECT DRAINAGE COEFFICIENT ("C"-FACTOR)

GIVEN:

HARD SURFACE "C"-FACTOR	=	0.90	
PERMEABLE SURFACE "C"-FACTOR	=	0.15	
PROJECT ACREAGE	=	39.27	Acres
OFFSITE PROJECT ACREAGE	=	2.66	Acres

TOTAL HARD SURFACE AREA:

SUBDIVISION ROADS	=	7.31	Acres
OFFSITE (ACCESS) ROAD	=	1.38	Acres
ROOFS & DRIVEWAYS	=	6.79	Acres
2500 ft² building footprint & driveways (2900 ft²/lot)		15.48	ACRES

TOTAL PERMEABLE SURFACE AREAS

DEDICATED OPEN SPACES	=	4.53	Acres
ADDITIONAL WETLAND "UNBUILDABLE" AREAS	=	0.81	Acres
LANDSCAPED AREAS WITHIN LOTS	=	21.11	Acres
		26.45	Acres

CALCULATION OF PROJECT DRAINAGE COEFFICIENT ("C"-FACTOR)

$$\frac{(15.48 \text{ Acres})(0.90) + (26.45 \text{ Acres})(0.15)}{41.93 \text{ PROJECT ACRES}} = 0.426$$

USE "C"-FACTOR OF 0.45

- Figure 2 -

RIVERWALK SUBDIVISON - DETENTION BASIN SIZING

Determination of Detention Basin Size based on 0.2 cfs / acre release rate

Detention Volume using Rational Formula Method

Project Size, acres (A):	41.93	
Runoff Coefficient (C):	0.45	
Design Frequency:	100	Yr. Storm
Allowable Outflow, cfs (Q) (0.2 cfs/acre):	8.386	
Min Req'd Volume :	68,864	

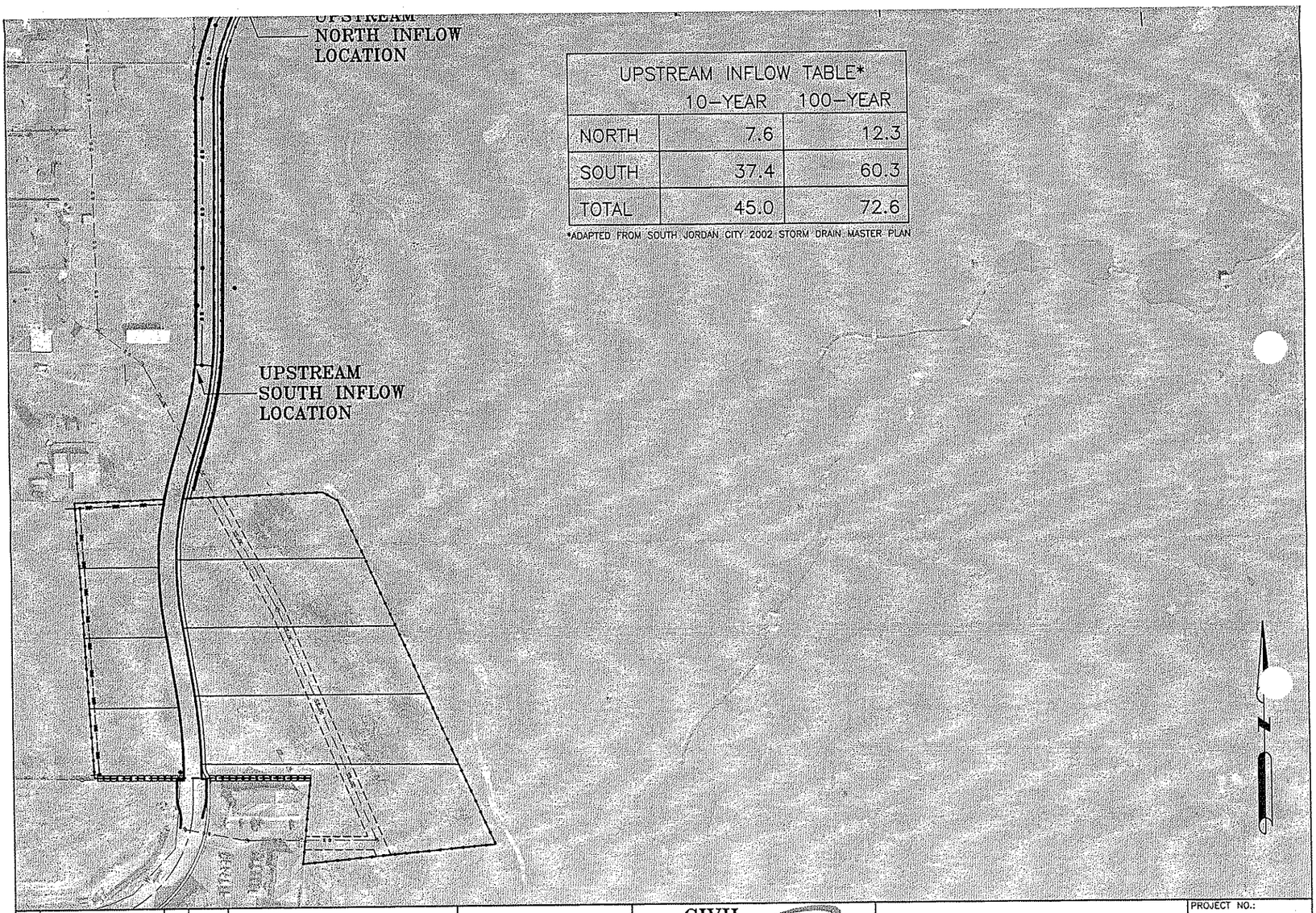
Storm Duration (min.)	Rainfall intensity (in/hr)	Runoff volume (cu.ft.)	Outflow volume (cu.ft.)	Storage volume (cu.ft.)	Storage volume (acre ft.)
(T)	(I)	CIAT	QT	CIAT-QT	
5	5.53	31280	2516	28764	0.66
10	4.30	48681	5032	43649	1.00
15	3.56	60387	7547	52839	1.21
20	3.05	69127	10063	59063	1.36
25	2.70	76417	12579	63838	1.47
30	2.44	82735	15095	67640	1.55
40	1.96	88939	20126	68812	1.58
50	1.66	94022	25158	68864	1.58
60	1.42	96727	30190	66538	1.53
120	0.85	114796	60379	54417	1.25
180	0.60	122064	90569	31495	0.72
1440	0.11	177696	724550	-546854	-12.55

2 Year Intensity (in/hr)	10 Year Intensity (in/hr)	100 Year Intensity (in/hr)
1.99	3.50	5.53
1.54	2.74	4.30
1.19	2.14	3.56
1.00	1.79	3.05
0.89	1.58	2.70
0.81	1.42	2.44
0.66	1.15	1.96
0.56	0.97	1.66
0.509	0.874	1.424
0.325	0.55	0.845
0.245	0.41	0.599
0.049	0.079	0.109

Detention volume needed for a 100 year storm = 68,864 cu. ft.

Determination of approximate rise in current detention basin water elevation

Detention Volume Required	(cu. ft.)	68,864
Area of existing det. Basin/wetland area	(sq. ft)	136,295
Approximate rise in current detention basin water elevation if surface area remains constant	(feet)	0.51



UPSTREAM INFLOW TABLE*	10-YEAR	100-YEAR
NORTH	7.6	12.3
SOUTH	37.4	60.3
TOTAL	45.0	72.6

*ADAPTED FROM SOUTH JORDAN CITY 2002 STORM DRAIN MASTER PLAN

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THE VILLAGE AT RIVERWALK

FIGURE 1

PROJECT NO.: 03050.07
SHEET NO.
FILE NAME:
SCALE: NTS

Figure 2

Riverwalk Subdivision
Calculation of Project Drainage Coefficient ("C" – Factor)

Mansion Homes

Impermeable Surface -	8.63 acres
Permeable Surface -	5.42 acres
Total -	14.05 acres

C = 0.61

Access Road

Impermeable Surface -	0.52 acres
Permeable Surface -	0.00 acres
Total -	0.52 acres

C = 0.90

Single Family - Northern Portion

Impermeable Surface -	6.35 acres
Permeable Surface -	9.69 acres
Total -	16.04 acres

C = 0.45

Single Family - Southern Portion

Impermeable Surface -	0.78 acres
Permeable Surface -	4.55 acres
Total -	5.33 acres

C = 0.26

Entire Subdivision

Impermeable Surface -	16.3 acres
Permeable Surface -	19.7 acres
Total -	35.9 acres

C_{AVG} = 0.49

Figure 3

Riverwalk Subdivision
Retention Basin Sizing

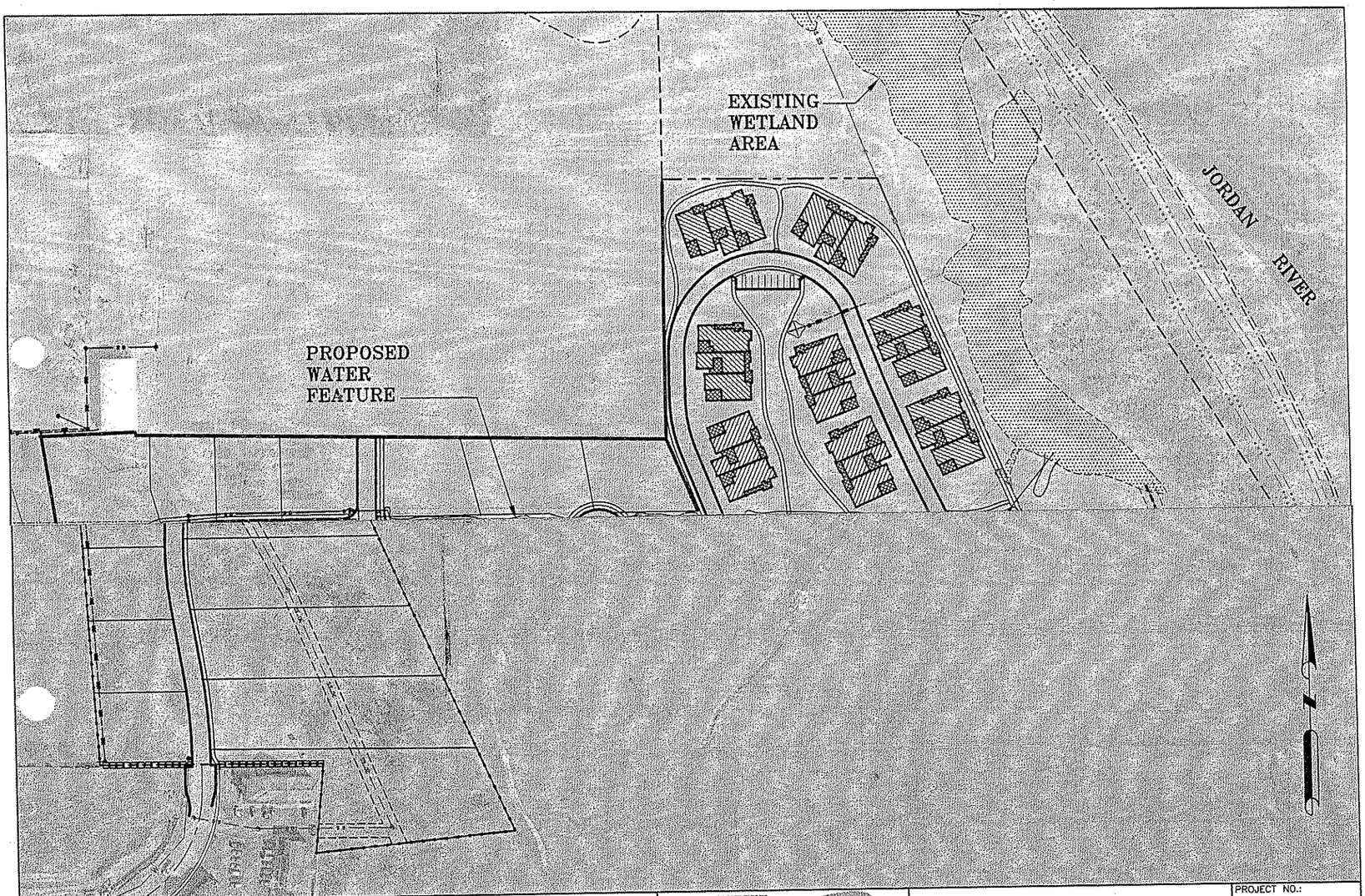
Total Area (acres):	35.95	
Average Runoff Coefficient:	0.49	average for Subdivision
Basin Percolation Rate - Outflow (min/in):	120.00	
Basin Percolation Rate - Outflow (cfs):	0.68	
Max required storage (from table below) (ft^3):	**115,000**	
Max required storage (from table below) (AF):	**2.64**	

Retention Basin Volume

Time (min)	Rainfall (I) 100-year Storm (in/hr)	C	Area (Acre)	Q (CIA)	Inflow Volume (ft^3)	Discharge volume (percolation) (ft^3)	Required Retention Volume (ft^3)	Required Retention Volume (AF)
5	5.26	0.49	35.95	92.551	27,765	205	27,600	0.63
10	4.30	0.49	35.95	75.717	45,430	410	45,000	1.03
15	3.56	0.49	35.95	62.616	56,354	615	55,700	1.28
30	2.44	0.49	35.95	42.894	77,210	1,229	76,000	1.74
60	1.42	0.49	35.95	25.075	90,269	2,458	87,800	2.02
120	0.85	0.49	35.95	14.879	107,131	4,917	102,200	2.35
180	0.60	0.49	35.95	10.548	113,913	7,375	106,500	2.44
360	0.32	0.49	35.95	5.582	120,569	14,750	105,800	2.43
720	0.19	0.49	35.95	3.346	144,531	29,500	115,000	2.64
1440	0.11	0.49	35.95	1.919	165,830	59,000	106,800	2.45

Outflow Calculations

Time (min)	Perc Area (ft^2)	Perc rate (min/in)	Perc rate (cfs)	Discharge (ft^3)
5	59,000	120	0.683	205
10	59,000	120	0.683	410
15	59,000	120	0.683	615
30	59,000	120	0.683	1,229
60	59,000	120	0.683	2,458
120	59,000	120	0.683	4,917
180	59,000	120	0.683	7,375
360	59,000	120	0.683	14,750
720	59,000	120	0.683	29,500
1440	59,000	120	0.683	59,000



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THE VILLAGE AT RIVERWALK

FIGURE 1

PROJECT NO.: 03050.07

SHEET NO.

FILE NAME:

SCALE: NTS

Preliminary Storm Drainage Report

Riverwalk Subdivision
10100 South 750 West
South Jordan, Utah

REGISTERED PROFESSIONAL ENGINEER
6-15-05
362187
REBECCA W
ANDRUS
STATE OF UTAH

June 2005

Narrative:

The Riverwalk Subdivision is located at approximately 10100 South 750 West in South Jordan, Utah, immediately west of the Jordan River. This subdivision is being proposed as a Planned Unit Development (PUD) with several unique amenities, including a water-feature used to convey existing irrigation flows through the project. This proposed water feature is expected to flow year-round and will discharge in the same location that it has discharged historically, an existing wetland area which eventually outlets to the Jordan River. Figure 1 is a map showing the overall site layout and major features.

The storm drainage system, which will be separate from the water feature, will convey storm flows through the subdivision to the proposed project retention area. The retention basin has been sized to retain all storm drain flows generated within the subdivision.

Storm water flows generated in South Jordan City upstream of the subdivision are currently designed to discharge on the west side of the new development. The developer has agreed to size the proposed storm drain system to convey these flows through the subdivision. Figure 1 shows where these upstream flows will enter the conveyance system of the subdivision. South Jordan City is not requiring the retention basin to be sized to retain these flows.

Purpose:

The purpose of this preliminary storm drainage report is two-fold. The first part is to determine the amount of expected storm drainage runoff from the proposed Riverwalk Subdivision during a 100-year 24-hour storm event in order to size the retention pond. The second is to discuss the methodology used to design the conveyance piping in order to adequately convey the storm water, including upstream flows, through the subdivision.

Given:

- Project Acreage 49.6 Acres (34.0 Acres Contributing)

- Project "C" Factor 0.46 (See attached Calculations)

- Rainfall Intensity required by South Jordan City as shown in the following table

South Jordan City Rainfall Intensity			
Time (min)	2-year (in/hr)	10-year (in/hr)	100-year (in/hr)
5	1.992	3.504	5.256
10	1.540	2.736	4.300
15	1.192	2.144	3.556
30	0.812	1.422	2.436
60	0.509	0.874	1.424
120	0.325	0.550	0.845
180	0.245	0.410	0.599
360	0.146	0.231	0.317
720	0.088	0.139	0.190
1440	0.049	0.079	0.109

- Measured Percolation rate for the Retention Basin at 120 min/inch

- Upstream flows from the South Jordan City 2002 Storm Drainage Master Plan prepared by Forsgren Associates.

Retention Basin Calculations:

Step 1: Calculate the project drainage coefficient ("C"-Factor).
Figure 2 – Calculation of Project Drainage Coefficient ("C" – Factor) compares the ratio of the permeable to the impermeable acreages to compute an average "C"-Factor.

Step 2: Calculate the expected retention basin size for the project.
A spreadsheet, Figure 3 – Riverwalk Subdivision – Retention Basin Sizing, was used to design the maximum expected size of the retention basin, given the: project acreage, runoff coefficient, 100-year storm rainfall intensities, and the long term retention basin percolation rate of 120 min/inch. This spreadsheet calculates the maximum expected storage volume by comparing the anticipated inflow volume with the anticipated storage and outflow volumes, over different time periods. The anticipated inflow volume is calculated based upon rainfall data, whereas the outflow volume is based on the long term retention basin percolation rate. The time period where the required storage "peaks" is considered to be the maximum required storage for the entire site.

Conveyance System Design Methodology:

The final construction plans will show the conveyance system designed as described below.

Step 1: Determine high points and low points

Step 2: Layout the preliminary storm drain conveyance system including inlet, manhole, and pipe locations.

Step 3: Identify the catchment areas for each inlet, the appropriate "C" factor as determined during the retention basin calculations, and time of concentration.

Step 4: Design the piping to convey the 10-year flows.
With the use of StormCAD, the piping was modeled and designed to convey flows from the 10-year 24-hour storm including the upstream flows. The design criteria were set up as follows:
- Minimum allowable pipe size was 18"
- Only the more common pipe sizes were allowed including 18", 24", 30", 36", and 42" (the largest pipe size necessary for this system is 42").
- The system was designed to match pipe crowns.
- Minimum allowable slope was 0.25%.

Step 5: Check the system against the 100-year flows and make necessary adjustments.
The design obtained from Step 4 was then modeled to see how well it handled the 100-year flows. Some minor resizing and grade adjustments were made to ensure that the

100-year flows would be conveyed without causing extensive ponding at the inlets according to South Jordan Standards.

Drainage Conclusions:

As shown in Figure 3, the drainage calculations indicate that the minimum required retention volume for this Riverwalk Subdivision is approximately 106,000 cubic feet for the storm drainage water flows from the 100-year storm. The area of the basin is approximately 44,500 square feet (1.02 acres). The basin has been designed to retain this volume with additional depth to provide adequate freeboard. The conveyance system has been designed and sized to convey onsite and offsite storm flows for the 10-year storm event while keeping the hydraulic grade line below the lip of gutter.

Figure 2

Riverwalk Subdivision
Calculation of Project Drainage Coefficient ("C" – Factor)

Town Houses

Impermeable Surface -	6.41 acres
Permeable Surface -	5.66 acres
Total -	12.07 acres

C = 0.55

Access Road

Impermeable Surface -	0.52 acres
Permeable Surface -	0.00 acres
Total -	0.52 acres

C = 0.90

Mansion Homes - Northern Portion

Impermeable Surface -	6.35 acres
Permeable Surface -	9.69 acres
Total -	16.04 acres

C = 0.45

Mansion Homes - Southern Portion

Impermeable Surface -	0.78 acres
Permeable Surface -	4.55 acres
Total -	5.33 acres

C = 0.26

Entire Subdivision

Impermeable Surface -	14.1 acres
Permeable Surface -	19.9 acres
Total -	34.0 acres

C_{AVG} = 0.46

Figure 3

Riverwalk Subdivision
Retention Basin Sizing

Total Area (acres):	33.97	
Average Runoff Coefficient:	0.46	average for Subdivision
Basin Percolation Rate - Outflow (min/in):	120.00	
Basin Percolation Rate - Outflow (cfs):	0.52	
Max required storage (from table below) (ft^3):	**106,200**	
Max required storage (from table below) (AF):	**2.44**	

Retention Basin Volume

Time (min)	Rainfall (I) 100-year Storm (in/hr)	C	Area (Acre)	Q (CIA)	Inflow Volume (ft^3)	Discharge volume (percolation) (ft^3)	Required Retention Volume (ft^3)	Required Retention Volume (AF)
5	5.26	0.46	33.97	82.247	24,674	155	24,500	0.56
10	4.30	0.46	33.97	67.287	40,372	309	40,100	0.92
15	3.56	0.46	33.97	55.645	50,080	464	49,600	1.14
30	2.44	0.46	33.97	38.119	68,614	927	67,700	1.55
60	1.42	0.46	33.97	22.283	80,219	1,854	78,400	1.80
120	0.85	0.46	33.97	13.223	95,203	3,708	91,500	2.10
180	0.60	0.46	33.97	9.373	101,231	5,562	95,700	2.20
360	0.32	0.46	33.97	4.960	107,146	11,125	96,000	2.20
720	0.19	0.46	33.97	2.973	128,440	22,250	106,200	2.44
1440	0.11	0.46	33.97	1.706	147,368	44,500	102,900	2.36

Outflow Calculations

Time (min)	Perc Area (ft^2)	Perc rate (min/in)	Perc rate (cfs)	Discharge (ft^3)
5	44,500	120	0.515	155
10	44,500	120	0.515	309
15	44,500	120	0.515	464
30	44,500	120	0.515	927
60	44,500	120	0.515	1,854
120	44,500	120	0.515	3,708
180	44,500	120	0.515	5,562
360	44,500	120	0.515	11,125
720	44,500	120	0.515	22,250
1440	44,500	120	0.515	44,500

Preliminary Storm Drainage Report

Riverwalk Subdivision
10100 South 750 West
South Jordan, Utah

REGISTERED PROFESSIONAL ENGINEER
362187
REBECCA W ANDRUS
5/3/05
STATE OF UTAH

May 2005

RECEIVED
MAY 11 2005
SOUTH JORDAN CITY
DEVELOPMENT SERVICES

Narrative:

The Riverwalk Subdivision is located at approximately 10100 South 750 West in South Jordan, Utah, immediately west of the Jordan River. This subdivision is being proposed as a Planned Unit Development (PUD) with several unique amenities, including a water-feature used to convey existing irrigation flows through the project. This proposed water feature is expected to flow year-round and will discharge in the same location that it has discharged historically, an existing wetland area which eventually outlets to the Jordan River. Figure 1 is a map showing the overall site layout and major features.

The storm drainage system, which will be separate from the water feature, will convey storm flows through the subdivision to the proposed project retention area. The retention basin has been sized to retain all storm drain flows generated within the subdivision.

Storm water flows generated in South Jordan City upstream of the subdivision are currently designed to discharge on the west side of the new development. The developer has agreed to size the proposed storm drain system to convey these flows through the subdivision. Figure 1 shows where these upstream flows will enter the conveyance system of the subdivision. South Jordan City is not requiring the retention basin to be sized to retain these flows.

Purpose:

The purpose of this preliminary storm drainage report is two-fold. The first part is to determine the amount of expected storm drainage runoff from the proposed Riverwalk Subdivision during a 100-year 24-hour storm event in order to size the retention pond. The second is to discuss the methodology used to design the conveyance piping in order to adequately convey the storm water, including upstream flows, through the subdivision.

Given:

- Project Acreage 49.6 Acres (34.0 Acres Contributing)

- Project "C" Factor 0.46 (See attached Calculations)

- Rainfall Intensity required by South Jordan City as shown in the following table

South Jordan City Rainfall Intensity			
Time (min)	2-year (in/hr)	10-year (in/hr)	100-year (in/hr)
5	1.992	3.504	5.256
10	1.540	2.736	4.300
15	1.192	2.144	3.556
30	0.812	1.422	2.436
60	0.509	0.874	1.424
120	0.325	0.550	0.845
180	0.245	0.410	0.599
360	0.146	0.231	0.317
720	0.088	0.139	0.190
1440	0.049	0.079	0.109

- Measured Percolation rate for the Retention Basin at 120 min/inch

- Upstream flows from the South Jordan City 2002 Storm Drainage Master Plan prepared by Forsgren Associates.

Retention Basin Calculations:

Step 1: Calculate the project drainage coefficient ("C"-Factor).
Figure 2 – Calculation of Project Drainage Coefficient ("C" – Factor) compares the ratio of the permeable to the impermeable acreages to compute an average "C"-Factor.

Step 2: Calculate the expected detention basin size for the project.
A spreadsheet, Figure 3 – Riverwalk Subdivision – Detention Basin Sizing, was used to design the maximum expected size of the detention basin, given the: project acreage, runoff coefficient, 100-year storm rainfall intensities, and the long term retention basin percolation rate of 120 min/inch. This spreadsheet calculates the maximum expected storage volume by comparing the anticipated inflow volume with the anticipated storage and outflow volumes, over different time periods. The anticipated inflow volume is calculated based upon rainfall data, whereas the outflow volume is based on the long term retention basin percolation rate. The time period where the required storage "peaks" is considered to be the maximum required storage for the entire site.

Conveyance System Design Methodology:

The final construction plans will show the conveyance system designed as described below.

Step 1: Determine high points and low points

Step 2: Layout the preliminary storm drain conveyance system including inlet, manhole, and pipe locations.

Step 3: Identify the catchment areas for each inlet, the appropriate "C" factor as determined during the retention basin calculations, and time of concentration.

Step 4: Design the piping to convey the 10-year flows.
With the use of StormCAD, the piping was modeled and designed to convey flows from the 10-year 24-hour storm including the upstream flows. The design criteria were set up as follows:

- Minimum allowable pipe size was 15"
- Only the more common pipe sizes were allowed including 18", 24", 30", 36", and 42" (the largest pipe size necessary for this system is 42").
- The system was designed to match pipe crowns.
- Minimum allowable slope was 0.25%.

Step 5: Check the system against the 100-year flows and make necessary adjustments.
The design obtained from Step 4 was then modeled to see how well it handled the 100-year flows. Some minor resizing and grade adjustments were made to ensure that the

100-year flows would be conveyed without causing extensive ponding at the inlets according to South Jordan Standards.

Drainage Conclusions:

As shown in Figure 3, the drainage calculations indicate that the minimum required detention volume for this Riverwalk Subdivision is approximately 106,000 cubic feet for the storm drainage water flows from the 100-year storm. The area of the basin is approximately 44,500 square feet (1.02 acres). The basin has been designed to retain this volume with additional depth to provide adequate freeboard. The conveyance system has been designed and sized to convey onsite and offsite storm flows for the 10-year storm event while keeping the hydraulic grade line below the lip of gutter.

NO.	REVISIONS	BY	DATE

DRAWN _____ DATE

CHECKED _____ PROJECT ENGINEER DATE

APPROVED _____ PROJECT MANAGER DATE

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CIVIL SCIENCE
ENGINEERS – SURVEYORS – PLANNERS – SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

THE VILLAGE AT RIVERWALK

FIGURE 1

PROJECT NO.: 03050.07

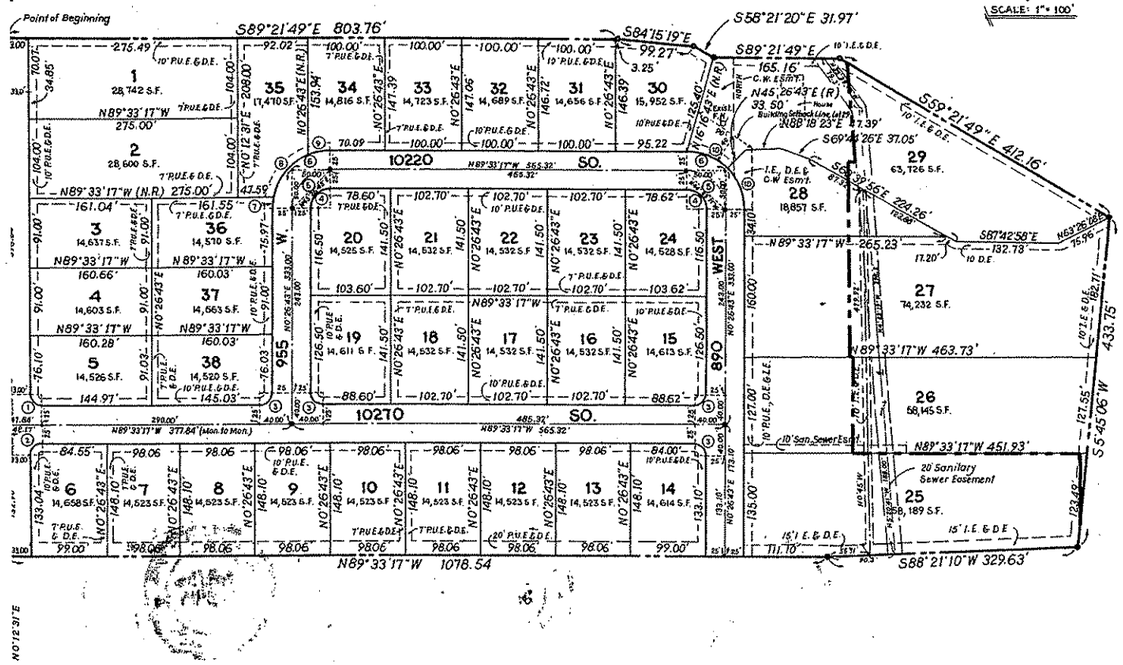
SHEET NO.

FILE NAME:

SCALE: NTS

STREET ADDRESS SCHEDULE

LOT NO.	STREET ADDRESS	LOT NO.	STREET ADDRESS	LOT NO.	STREET ADDRESS
1	10197 S.	14	897 W. or 10282 S.	27	10241 S.
2	10213 S.	15	902 W. or 10252 S.	28	10221 S.
3	10227 S.	16	912 W.	29	892 W.
4	10241 S.	17	924 W.	30	902 W.
5	10255 S. or 989 W.	18	936 W.	31	914 W.
6	10281 S. or 991 W.	19	948 W. or 10251 S.	32	926 W.
7	979 W.	20	947 W. or 10231 S.	33	938 W.
8	967 W.	21	935 W.	34	950 W.
9	955 W.	22	923 W.	35	10214 S.
10	943 W.	23	911 W.	36	10228 S.
11	931 W.	24	901 W. or 10232 S.	37	10242 S.
12	919 W.	25	10281 S.	38	10256 S. or 969 W.
13	907 W.	26	10263 S.		



SCALE: 1" = 100'

CURVE DATA

CURVE	RADIUS	Δ	LENGTH	CHORD	TANGENT
1	15.00'	89°45'48"	23.50'	21.17'	14.94'
2	15.00'	90°14'12"	23.62'	21.26'	15.06'
3	15.00'	90°00'00"	23.56'	21.21'	15.00'
4	25.00'	90°00'00"	39.27'	35.36'	25.00'
5	50.00'	90°00'00"	78.54	70.71'	50.00'
6	75.00'	90°00'00"	117.81'	106.07'	75.00'
7	75.00'	11°33'44"	15.14'	15.11'	7.59'
8	75.00'	54°56'16"	71.91'	69.19'	38.99'
9	75.00'	23°30'00"	30.76	30.55'	15.60'
10	75.00'	45°00'00"	58.905'	57.40'	31.07'

LEGEND

- • Monument to be Set
- Fire Hydrant
- P.U.E. Public Utilities Easement
- D.E. Drainage Easement
- ③ Curve (See Curve Data)
- (R) Radial Line
- (N.R.) Non-Radial Line
- I.E. Irrigation Easement
- C.W. Culinary Water

FRONTAGE

E. W. 3
N. W. 4

AY OF

H

HEALTH	FLOOD CONTROL DEPT.	CITY ENGINEER	APPROVAL AS TO FORM	PRESENTED TO
APPROVED THIS 9th DAY OF May A.D. 19	APPROVED THIS 4th DAY OF June A.D. 19 84	I HEREBY CERTIFY THAT THIS OFFICE HAS EXAMINED THIS PLAT AND IT IS CORRECT IN ACCORDANCE WITH INFORMATION ON FILE IN THIS OFFICE.	APPROVED AS TO FORM THIS 7th DAY OF August A.D. 19 84	5th A.D. 19 84 AND ACCEPTED
SEWER DISTRICT MANAGER	FLOOD CONTROL COORDINATOR	6/3/84 DATE CITY ENGINEER	CITY ATTORNEY	ATTEST:

27-14-451-012 27-14-201-003 27-14-201-013
" " -004 " " -014
" " -008 " " -015
" " -011 " " -016

Parcel No. Affected
27-11-451-018

Salt Lake County

Ohrn Lot 29 Remainder Parcel

A parcel of land within the boundary of Lot 29, Ridgecrest Estates, a Subdivision, located in Section 14, T.3 S.,R.1 W.,S.L.B. & M. The boundaries of said parcel of land are described as follows:

Beginning at the southwest corner of Lot 29, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, page 116 and running thence North 16°32'20" East 125.41 feet; thence South 89° 06'09" East 165.16 feet; thence South 59° 06'09" East 10.64 feet; thence South 04°08'44" East 127.72; thence North 89° 17'37" West 9.37 feet; thence South 00° 08'00" West 8.54 feet; thence West 28.78 feet; thence North 60° 24'16" West 25.56 feet; thence North 69° 28'46" West 37.05 feet; thence South 88° 34'03" West 47.39 feet; thence South 45° 42'23" West 33.50 feet; thence 58.90 feet westerly along the arc of a 75.00 foot radius curve left, chord bears North 66° 47'54" West 57.40 feet to the Point of Beginning.

Contains 0.58 acres more or less

(Note: Rotate above Described Legal Description counter-clockwise 00° 15'40" to coincide with Record information)

Parcel No. Affected
27-14-203-030

Salt Lake County

Alleman Lot 28 Remainder Parcel

A parcel of land within the boundary of Lot 28, Ridgecrest Estates, a Subdivision, located in Section 14, T.3 S.,R.1 W.,S.L.B. & M. The boundaries of said parcel of land are described as follows:

Beginning at the southwest corner of Lot 28, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, page 116 and running thence North 00°42'23" East 34.10 feet; thence northerly 58.90 feet along the arc of a 75.00 radius curve to the left, (chord bears North 21 47'23" West 57.40 feet; thence North 45 42'23" East 33.50 feet; thence North 88 34'03" East 47.39 feet; thence South 69°28'46" East 37.05 feet; thence South 60°24'16" East 58.36 feet; thence South 00 08'00" West 71.84 feet; North 89°17'37" West 135.76 feet to the Point of Beginning.

Contains 0.33 acres more or less

(Note: Rotate above Described Legal Description counter-clockwise 00° 15'40" to coincide with Record information)

Parcel No. Affected
27-14-203-024

Salt Lake County

Dabb Lot 27 Remainder Parcel

A parcel of land within the boundary of Lot 27, Ridgecrest Estates, a Subdivision, located in Section 14, T.3 S.,R.1 W.,S.L.B. & M. The boundaries of said parcel of land are described as follows:

Beginning at the southwest corner of Lot 27, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, page 116 and running thence North 00°42'23" East 160.00 feet; thence South 89° 17'37" East 135.76 feet; thence South 00° 08'00" West 160.00 feet; thence North 89°17'37" West 137.36 feet to the Point of Beginning.

Contains 0.50 acres more or less

(Note: Rotate above Described Legal Description counter-clockwise 00° 15'40" to coincide with Record information)

Parcel No. Affected
27-14-203-019

Salt Lake County

Curtis Lot 26 Remainder Parcel

A parcel of land within the boundary of Lot 26, Ridgecrest Estates, a Subdivision, located in Section 14, T.3 S.,R.1 W.,S.L.B. & M. The boundaries of said parcel of land are described as follows:

Beginning at the southwest corner of Lot 26, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, page 116 and running thence North 00°42'23" East 127.00 feet; thence South 89°17'40" East 142.00 feet; thence South 00°42'23" West 127.00 feet; thence North 89°17'40" West 142.00 feet to the Point of Beginning.

Contains 0.41 acres more or less

(Note: Rotate above Described Legal Description counter-clockwise 00° 15'40" to coincide with Record information)

FAX

TO: Bradley Kenison
Civil Science

FAX NUMBER: 801-768-7201

FAX COPY TO:

FROM: Michael H. Foerster, P.E.
PHONE NUMBER: 801-571-1166
FAX NUMBER: 801-571-5339 MHF

DATE: August 16, 2005

SUBJECT: The Village At Riverwalk.

Attached please find the final engineering approval letter for the The Village At Riverwalk. Please contact Annette Cherrington as soon as possible to coordinate any final requirements that she may have in addition to those contained herein.

Thank you. Please feel free to call with any questions.

South Valley Sewer District
874 East 12400 South, P.O. Box 908 • Draper, Utah 84020
Phone 571-1166 • Fax 571-5339

August 16, 2005

VIA FACSIMILE

Bradley Kenison
Civil Science
3160 West Clubhouse Drive
Lehi, UT 84043

RE: FINAL ENGINEERING REVIEW OF THE SEWER SERVICE FOR THE VILLAGE AT RIVERWALK

Dear Mr. Kenison:

This letter is to inform you that the plans submitted to us for the above-mentioned development have been reviewed and meet all applicable requirements of the Design Standards for the South Valley Sewer District. Accordingly, we recommend approval be granted for sewer service for the The Village At Riverwalk.

Please note the following items that must be completed prior to District being able to sign the plat:

1. A bond must be placed with the District.
2. All design review and inspection fees must be paid.
3. The submitted easements must be executed and returned to the District for recordation. Annette Cherrington has the original documents at the District.
4. A subdivision extension agreement must be completed by the developer.

Prior to construction, the following items must be completed:

1. All of the above items must be completed.
2. A preconstruction conference must be held with the District's inspector, the developer, the contractor, and any subcontractors that will be working on the project. Annette Cherrington shall be contacted to set up this meeting.
3. Any applicable contractor product submittals shall be submitted to the District for approval.
4. The contractor must be informed that the sewer shall be constructed as per the District's approved plans and the developer shall ensure that the contractor has the same plans as the District.

During construction, the developer and contractor will be required to meet all the requirements of the District's Construction Specifications. Please be aware, if there are any changes to the plans or if this project is not constructed within the next six months, the plans must be resubmitted for reapproval. For your information, this development is within the District's Service Area One. If you have any questions or require additional information, please do not hesitate to call.

Sincerely,

Michael H. Foerster, P.E.
District Engineer

Final Storm Drainage Report

Riverwalk Subdivision
10100 South 750 West
South Jordan, Utah

REGISTERED PROFESSIONAL ENGINEER
362187
REBECCA W
ANDRUS
6/4/05
STATE OF UTAH

August 2005

RECEIVED
AUG 0 5 2005
SOUTH JORDAN CITY
DEVELOPMENT SERVICES

Narrative:

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The storm drainage system, which will be separate from the water feature, will convey storm flows through the subdivision to the proposed project retention area. The retention basin has been sized to retain all storm drain flows generated within the subdivision for the 100-year 24-hr storm.

Storm water flows generated in South Jordan City upstream of the subdivision are currently designed to discharge on the west side of the new development. If this were left as is, these flows would discharge directly into the development causing many flooding issues. The developer has agreed to construct the proposed storm drain system to convey these flows through the subdivision and safely discharge them into the retention pond. Figure 1 shows where these upstream flows will enter the conveyance system of the subdivision. South Jordan City is not requiring the retention basin to be sized to retain these flows.

Purpose:

The purpose of this final storm drainage report is two-fold. The first part is to determine the amount of expected storm drainage runoff from the proposed Riverwalk Subdivision during a 100-year 24-hour storm event in order to size the retention pond. The second is to discuss the methodology used to design the conveyance piping in order to adequately convey the storm water, including upstream flows, through the subdivision.

Given:

- Project Acreage 49.6 Acres (36.0 Acres Contributing)

- Project "C" Factor 0.49 (See attached Calculations)

- Rainfall Intensity required by South Jordan City as shown in the following table

South Jordan City Rainfall Intensity			
Time (min)	2-year (in/hr)	10-year (in/hr)	100-year (in/hr)
5	1.992	3.504	5.256
10	1.540	2.736	4.300
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1440	0.049	0.079	0.109

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Step 1: Calculate the project drainage coefficient ("C"-Factor).
Figure 2 – Calculation of Project Drainage Coefficient ("C" – Factor) compares the ratio of the permeable to the impermeable acreages to compute an average "C"-Factor.

Step 2: Calculate the expected retention basin size for the project.
A spreadsheet, Figure 3 – Riverwalk Subdivision – Retention Basin Sizing, was used to design the maximum expected size of the retention basin, given the: project acreage, runoff coefficient, 100-year storm rainfall intensities, and the long term retention basin percolation rate of 120 min/inch. This spreadsheet calculates the maximum expected storage volume by comparing the anticipated inflow volume with the anticipated storage and outflow volumes, over different time periods. The anticipated inflow

volume is calculated based upon rainfall data, whereas the outflow volume is based on the long term retention basin percolation rate. The time period where the required storage "peaks" is considered to be the maximum required storage for the entire site.

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- Minimum allowable pipe size was 18"
- Common pipe sizes only were allowed including 18", 24", 30", 36", and 42" (the largest pipe size necessary for this system is 42").
- The system was designed to match pipe crowns.
- Minimum allowable slope was 0.25%.

Step 5: Check the system against the 100-year flows and make necessary adjustments.

The design obtained from Step 4 was then modeled to see how well it handled the 100-year flows. Some minor resizing and grade adjustments were made to ensure that the 100-year flows would be conveyed without causing extensive ponding at the inlets that could overtop the curb and threaten structures according to South Jordan Standards.

Drainage Conclusions:

The conveyance system has been designed and sized to convey onsite and offsite storm flows for the 10-year storm event while keeping the hydraulic grade line below the lip of gutter.

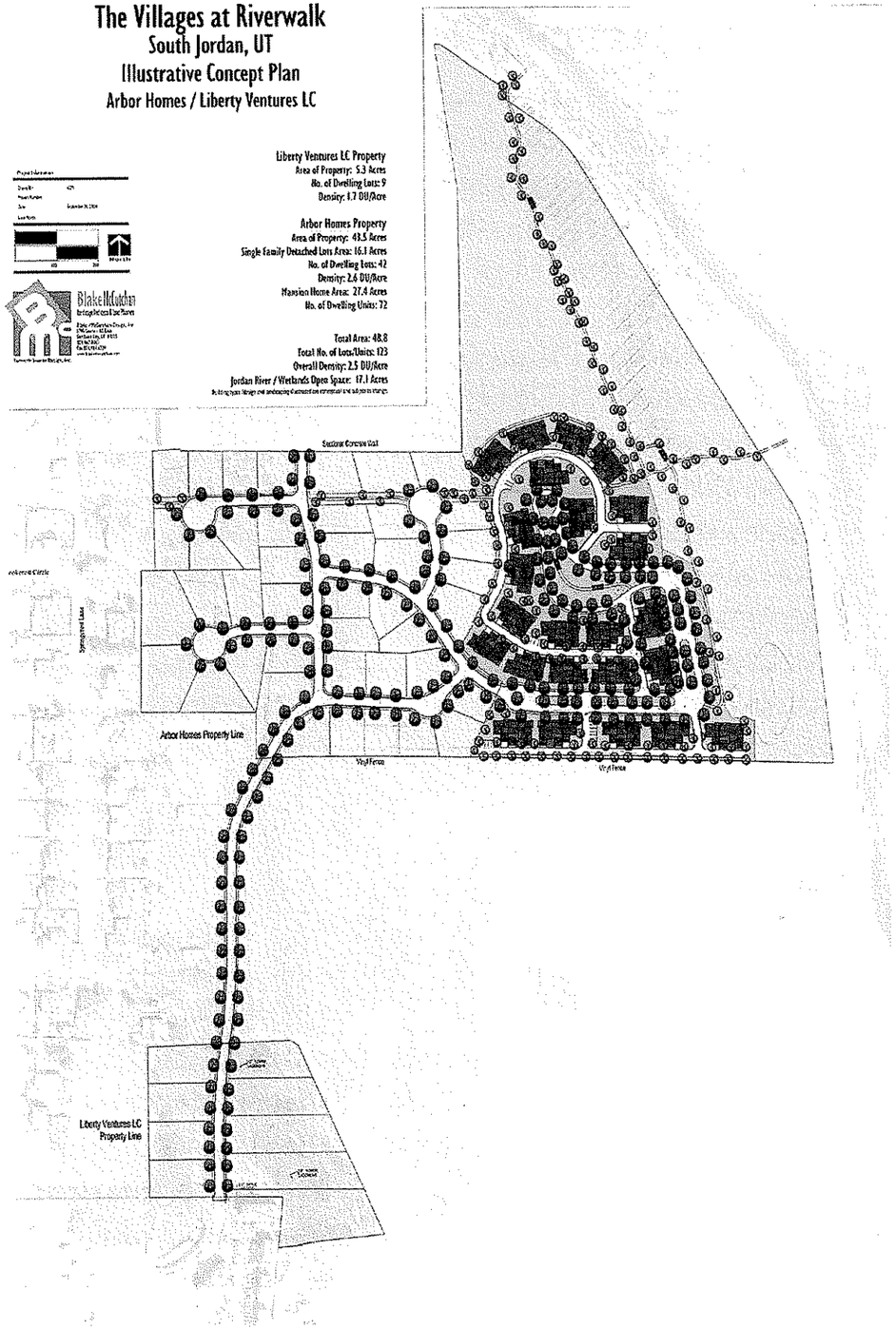
As shown in Figure 3, the drainage calculations indicate that the minimum required retention volume for this Riverwalk Subdivision is approximately 115,000 cubic feet for the storm drainage water flows from the 100-year storm. The basin has been designed to retain this volume with additional depth to provide adequate freeboard. The area of the basin is approximately 59,000 square feet (1.35 acres) with a design capacity of 163,000 cubic feet, which is 140% of required capacity, while still maintaining freeboard.

The Villages at Riverwalk
South Jordan, UT
Illustrative Concept Plan
Arbor Homes / Liberty Ventures LC

Liberty Ventures LC Property
Area of Property: 5.3 Acres
No. of Dwelling Lots: 9
Density: 1.7 DU/Acre

Arbor Homes Property
Area of Property: 43.5 Acres
Single Family Detached Lots Area: 16.1 Acres
No. of Dwelling Lots: 42
Density: 2.6 DU/Acre
Mansion Home Area: 27.4 Acres
No. of Dwelling Units: 72

Total Area: 48.8
Total No. of Lots/Units: 123
Overall Density: 2.5 DU/Acre
Jordan River / Wetlands Open Space: 17.1 Acres



PARCELNUM	OWN_NAME	OWN_NAME_C	OWN_ADDR	OWN_CITYST	OWN_ZIP	PROP_LOCAT	PARCEL_ACR
2714276015	MULLIGANS GOLF AND GAMES SOUTH	INC	1690 W 400 N	OGDEN UT	84404	692 W SOUTHJORDAN PKWY	21.02
2714276015	MULLIGANS GOLF AND GAMES SOUTH	INC	1690 W 400 N	OGDEN UT	84404	692 W SOUTHJORDAN PKWY	21.02
2714276014	MULLIGANS GOLF & GAMES	SOUTH INC	692 W SOUTHJORDAN PKWY	SOUTH JORDAN UT	84095	692 W SOUTHJORDAN PKWY	1.3
2714276022	MULLIGAN GOLF AND GAMES SOUTH	INC	692 W SOUTHJORDAN PKWY	SOUTH JORDAN UT	84095	832 W SOUTHJORDAN PKWY	5.96
2714251008	BOUCK, CHARLES S (TR)		905 W 10400 S	SOUTH JORDAN UT	84095	905 W 10400 S	1.05
2714251009	BOUCK, CHARLES S & CYNTHIA; JT		905 W 10400 S	SOUTH JORDAN UT	84095	905 W 10400 S	2.11
2714251025	GREAT OAKS LLC		1359 E HIDDEN VALLEY DR	SANDY UT	84092	926 W BAXTER PL	2.57
2714226017	MULLIGANS GOLF &	GAMES SOUTH, INC	692 W SOUTHJORDAN PKWY	SOUTH JORDAN UT	84095	692 W SOUTHJORDAN PKWY	14.21
2714251007	SINGLETON, JUDITH ANN		917 W 10400 S	SOUTH JORDAN UT	84095	917 W 10400 S	1.05
2714276025	SOUTHSIDE CHURCH OF CHRIST	INC	901 W BAXTER PL	SOUTH JORDAN UT	84095	878 W BAXTER PL	5.06
2714205012	BROWN, RUSSELL G &	CHERYL A; JT	10357 S 1000 W	SOUTH JORDAN UT	84095	872 W 10400 S	0.59
2714276001	MULLIGAN GOLF AND GAMES SOUTH	INC	692 W SOUTHJORDAN PKWY	SOUTH JORDAN UT	84095	723 W 10400 S # APXBT	6.89
2714276001	MULLIGAN GOLF AND GAMES SOUTH	INC	692 W SOUTHJORDAN PKWY	SOUTH JORDAN UT	84095	723 W 10400 S # APXBT	6.89
2714276001	MULLIGAN GOLF AND GAMES SOUTH	INC	692 W SOUTHJORDAN PKWY	SOUTH JORDAN UT	84095	723 W 10400 S # APXBT	6.89

52.68'
189.05'
14,814 sq.ft.
0.34 acres
70.48'
168.34'
131.69'
16,444 sq.ft.
0.38 acres
74.38'
30.58'
153.37'
113.18'
16,212 sq.ft.
0.37 acres
30.58'
53.07'
153.65'
15,058 sq.ft.
0.35 acres
100.00'
100.19'
150.00'
15,000 sq.ft.
0.34 acres
100.00'
100.00'
150.00'
15,000 sq.ft.
0.34 acres
100.00'
100.00'
200.00'
21,995 sq.ft.
0.50 acres
110.00'
110.01'
199.47'

Lori Vance
254-0070
870-8870

AGREEMENT

SOUTH JORDAN CITY (hereinafter "City") and Lori C. Vance (hereinafter "Owner") and Arbor Homes (hereinafter "Developer") for and in consideration of the mutual promises contained herein do hereby agree and stipulate as follows:

A. Owner is the fee title owner of a parcel of real property known as Lot 25, Ridgecrest Estates, located within the corporate limits of the City of South Jordan, Utah; a legal description and schematic of said real property is attached hereto as Exhibit "A" and by this reference is made a part hereof.

B. Within the boundaries of the property described by Exhibit "A" is a smaller parcel of land described in Exhibit "B" (Owner's small parcel). A legal description and schematic of said real property is attached hereto.

C. City has sold a certain parcel of real property to Developer for the purpose of creating a residential subdivision known as River Walk, a schematic of which is attached hereto as Exhibit "C."

D. As part of the development of the River Walk Subdivision, Developer has or shall construct a private ingress and egress subdivision street and related infrastructure improvements including, and without limitation, water, storm sewer, sewer, electrical, telephone and gas and other improvements consistent with those found on a fully developed lot. However, in order to complete the above referenced improvements, Developer must now acquire the parcel of land referenced in paragraph "B," above.

E. In order to facilitate the acquisition of the parcel of land required to complete the above referenced improvements, City and Owner hereby agree to trade certain real property as part of this transaction. The parcels to be traded are identified as Exhibit "B" and Exhibit "D" (including a legal description and schematic), and are attached hereto.

F. Single and individual Quit Claim Deeds between Owner and City shall accomplish the trade of the parcels. Therefore, Owner does hereby agree to Quit Claim the real property described in Exhibit "B" to City upon signing of this Agreement. A copy of such Quit Claim Deed is attached hereto as Exhibit "E." In addition, City does hereby agree to Quit Claim the real property described in Exhibit "D" to Owner upon signing of this Agreement. A copy of such Quit Claim Deed is attached hereto as Exhibit "F."

G. Furthermore, City agrees to convey to Developer said parcel described in Exhibit "B."

H. Developer agrees to install or cause to be installed on or over the above referenced deeded property described in Exhibit "B," the street and infrastructure, which shall be adjacent to Owner's remaining property and to stub to Owner's adjacent property all utilities for two residential lots. A schematic drawing of the improvements and lot layout and boundaries is attached hereto as Exhibit "G."

I. Subject to legislative discretion, the City agrees that the lot layout described in the above referenced Exhibit "G" is an acceptable zoning lot for the purposes of the over all River Walk development.

J. Owner will be a beneficiary of the private ingress and egress subdivision street and infrastructure. This right extends to the future development of the two residential lots. Owner shall provide her share of the cost of the street and infrastructure for two residential lots and does hereby agree to pay the City $35,000 per lot with interest accruable at 2% simple interest per annum thereon with payment in full being due upon the event of the recording of Owner's lots. This accrued interest is limited to and will be capped at five (5) years, and shall not exceed the amount of $3,500 for each lot.

K. City shall pay the above deposit, in advance, to Developer for the installation of the street and infrastructure and City shall diligently pursue the installation of the street and infrastructure with Developer.

L. In the event the Developer does not install the private ingress and egress subdivision street and infrastructure, the property described in Exhibit "B" shall revert to Owner, the property described in Exhibit "D" shall revert to City, City shall refund any deposit paid by Owner to Owner, and Developer shall refund any deposit paid by City to Developer in connection with this Agreement. The Quit Claim Deeds referred to in Paragraph "F" above shall contain reversionary language consistent with this paragraph.

M. City and Owner hereby agree that any and all development fees which may be payable to the City now or in the future associated with the future development of Owner's lots are to be paid by the person or persons who develop said lots, with said fees being paid at the time of application of building permits or other construction permits for said lot(s). City will allow Owner to record said lots as part of the over all River Walk development project.

N. Developer agrees to remove and relocate a storm drain vault located in the southeast corner of Owner's lot. This action will require the planning and execution of an alternate method for Owner to obtain irrigation water provided by the South Jordan Canal Company. It is anticipated that the Developer will provide a connection to the existing irrigation system by means of a collection box or manhole, where said Owner may obtain irrigation water on a regular basis. This collection box or manhole is to be located in a convenient location for the Owner, and the Developer shall use its best efforts to locate the collection box or manhole close to the southwest corner of Owner's lot; however, the Owner realizes that the location of this collection box or manhole is somewhat determined by the location of existing irrigation appurtenances. Upon completion of the box, the Owner shall take and be responsible for all liability associated with said box and the irrigation water that flows there through.

O. This Agreement constitutes the entire understanding and agreement of all the parties hereto and any amendment or change in this Agreement shall be in writing signed by all the parties hereto.

AGREED to and accepted this 19th day of August, 2005.

Owner:

Lori C. Vance

Lori C. Vance

Developer:

By:

City:

By:

Its: Community Dev. Dir.

Approved as to form:

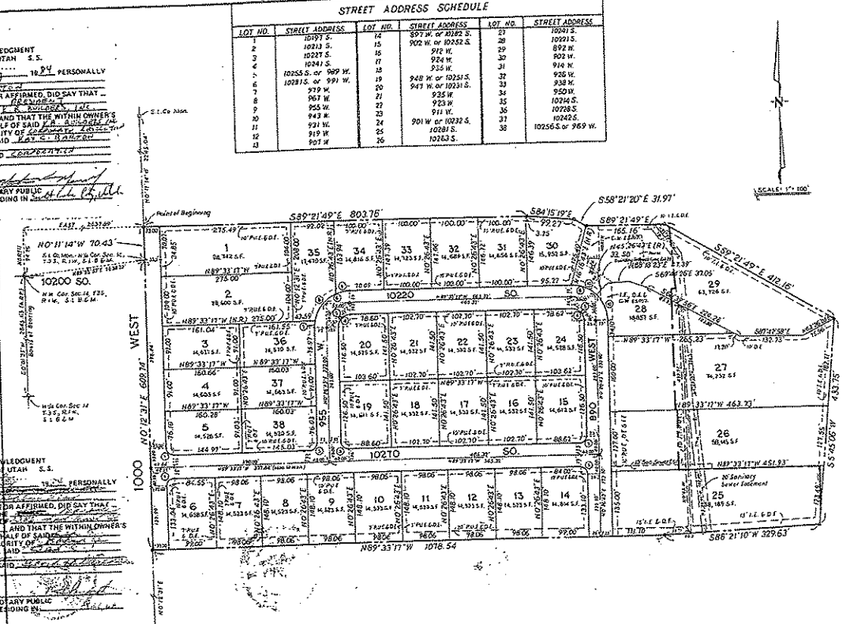
City Attorney

EXHIBIT "A"

COUNTY SURVEYOR STANDARD SUBDIVISION FORM

STREET ADDRESS SCHEDULE

LOT NO.	STREET ADDRESS	LOT NO.	STREET ADDRESS	LOT NO.	STREET ADDRESS
1	10197 S.	14	897 W. or 10183 S.	27	10091 S.
2	10213 S.	15	909 W. or 10253 S.	28	10091 S.
3	10227 S.	16	912 W.	29	892 W.
4	10241 S.	17	924 W.	30	902 W.
5	10255 S. or 949 W.	18	935 W.	31	916 W.
6	10281 S. or 991 W.	19	948 W. or 10281 S.	32	930 W.
7	959 W.	20	947 W. or 10291 S.	33	938 W.
8	967 W.	21	935 W.	34	950 W.
9	955 W.	22	923 W.	35	10296 S.
10	943 W.	23	911 W.	36	10288 S.
11	931 W.	24	901 W. or 10232 S.	37	10242 S.
12	919 W.	25	10281 S.	38	10256 S. or 969 W.
13	907 W.	26	10263 S.		



CURVE DATA

CURVE	RADIUS	Δ	LENGTH	CHORD	TANGENT
1	15.00'	89°45'48"	23.50'	21.17'	14.94'
2	15.00'	90°14'12"	23.62'	21.26'	15.06'
3	15.00'	90°00'00"	23.56'	21.21'	15.00'
4	25.00'	90°00'00"	39.27'	35.36'	25.00'
5	50.00'	90°00'00"	78.54'	70.71'	50.00'
6	75.00'	90°00'00"	117.81'	106.07'	75.00'
7	75.00'	21°33'44"	28.48'	28.31'	14.39'
8	75.00'	54°56'16"	71.91'	69.19'	38.99'
9	75.00'	23°30'00"	30.76'	30.55'	15.60'
10	75.00'	45°00'00"	58.905'	57.49'	31.07'

LEGEND

- ▲ Monument to be Set
- Fire Hydrant
- P.U.E. Public Utilities Easement
- D.E. Drainage Easement
- (1) Curve (See Curve Data)
- (R) Radial Line
- (N.R) Non-Radial Line
- I.E. Irrigation Easement
- C.W. Culinary Water

FRONTAGE INTERVAL SCALE

E. W. 300 to 2640
N. W. 400 to 2640

SURVEYOR'S CERTIFICATE

I, Martin L. Bisney do hereby certify that I am a Registered Civil Engineer, and/or Land Surveyor, and that I hold Certificate No. 4781 as prescribed under the laws of the State of Utah. I further certify that by authority of the Owners, I have made a survey of the tract of land shown on this plat and described below, and have subdivided said tract of land into lots and streets, hereafter to be known as RIDGECREST ESTATES and that the same has been correctly surveyed and staked on the ground as shown on this plat.

BOUNDARY DESCRIPTION

COURSE	DIST.	REMARKS
		Beginning on the centerline of 1000 West Street at a point N0°11'14" W 70.43 feet from the North Quarter Corner of Section 14, T.3.S., R.1W., S.L.B.&M.; said Beginning Point being also North 94.26 feet and EAST 2633.99 feet from the Northwest Corner of said Section 14 and running thence:
S89°21'49"E	803.76	feet; Thence
S84°15'19"E	99.27	feet; Thence
S58°21'20"E	31.97	feet; Thence
S89°21'49"E	165.16	feet; Thence
S59°21'49"E	419.16	feet; Thence
S5°45'06"W	453.75	feet; Thence
S86°21'16"W	329.63	feet; Thence
N89°33'17"W	1078.54	feet; Thence
N0°12'31"E	609.94	feet to the North Quarter Corner of Section 14; Thence
N0°11'14"W	70.43	feet to the Point of Beginning
		38 Lots Contains 21.130 Acres

DATE May 4, 1984

OWNER'S DEDICATION

Know all men by these presents that the undersigned owner( ) of the above described tract of land, having caused same to be subdivided into lots and streets to be hereafter known as the

RIDGECREST ESTATES

do hereby dedicate for perpetual use of the public all parcels of land shown on this plat as intended for Public use.

In witness whereby have hereunto set this 1st day of July A.D. 19 84

ACKNOWLEDGMENT

STATE OF UTAH } S.S.
County of Salt Lake

On the 24th day of July A.D. 19 84, personally appeared before me, the undersigned Notary Public, in and for said County of Salt Lake In said State of Utah, the signer(-) of the above Owner's dedication, in number, who duly acknowledged to me that they signed it freely and voluntarily and for the uses and purposes therein mentioned.

MY COMMISSION EXPIRES 12-3-86 NOTARY PUBLIC RESIDING IN Salt Lake COUNTY

RIDGECREST ESTATES

A SUBDIVISION IN THE S½E¼ OF SEC. 11 & THE N.E.¼ OF SEC. 14, T. 3 S., R.1 W., SALT LAKE BASE & MERIDIAN

ACKNOWLEDGMENT

COUNTY OF Salt Lake } STATE OF UTAH S.S.
ON THIS 8th DAY OF May 19 84 PERSONALLY APPEARED BEFORE ME Martin L. Bisney
WHO BEING BY ME DULY SWORN OR AFFIRMED, DID SAY THAT HE IS THE Engineer
DEDICATION WAS SIGNED IN BEHALF OF SAID Ridgecrest Inc. AND THAT THE WITHIN OWNER'S BY AUTHORITY OF Ridgecrest Inc. AND THE SAID Martin L. Bisney
ACKNOWLEDGED TO ME THAT SAID Corporation
EXECUTED THE SAME.
MY COMMISSION EXPIRES NOTARY PUBLIC RESIDING IN Salt Lake
MARTIN V. BISNELL STATE OF UTAH

ACKNOWLEDGMENT

COUNTY OF Salt Lake } STATE OF UTAH S.S.
ON THE 8th DAY OF May 19 84 PERSONALLY APPEARED BEFORE ME Gordon L. Fletcher
WHO BEING BY ME DULY SWORN OR AFFIRMED, DID SAY THAT HE IS THE President
DEDICATION WAS SIGNED IN BEHALF OF SAID Ridgecrest Inc. AND THAT THE WITHIN OWNER'S BY AUTHORITY OF Ridgecrest Inc. AND THE SAID Gordon L. Fletcher
ACKNOWLEDGED TO ME THAT SAID Corporation
EXECUTED THE SAME.
MY COMMISSION EXPIRES NOTARY PUBLIC RESIDING IN Salt Lake
NOTARY PUBLIC STATE OF UTAH

ACKNOWLEDGMENT

COUNTY OF Salt Lake } STATE OF UTAH S.S.
ON THE 8th DAY OF May 19 84 PERSONALLY APPEARED BEFORE ME Gordon L. Fletcher
WHO BEING BY ME DULY SWORN OR AFFIRMED, DID SAY THAT HE IS THE President
DEDICATION WAS SIGNED IN BEHALF OF SAID Ridgecrest Inc. AND THAT THE WITHIN OWNER'S BY AUTHORITY OF Ridgecrest Inc. AND THE SAID Gordon L. Fletcher
ACKNOWLEDGED TO ME THAT SAID Corporation
EXECUTED THE SAME.
MY COMMISSION EXPIRES NOTARY PUBLIC RESIDING IN Salt Lake
NOTARY PUBLIC STATE OF UTAH

S.L. Co. Monument
S.W. Cor. Sec. 14, T.3S., R.1W., S.L.B.&M.

N.W. Cor. Sec. 14, T.3S., R.1W., S.L.B.&M.

S.L. Co. Monument
S.W. Cor. Sec. 14, T.3S., R.1W., S.L.B.&M.

BOARD OF HEALTH

APPROVED THIS 7th DAY OF June A.D. 19 84
DIRECTOR, CO. BOARD OF HEALTH

PLANNING COMMISSION

APPROVED THIS 6th DAY OF June A.D. 19 84
BY THE CITY PLANNING COMMISSION.
CHAIRMAN, PLANNING COMM.

HEALTH

APPROVED THIS ____ DAY OF ____ A.D. 19__
SEWER DISTRICT MANAGER

FLOOD CONTROL DEPT.

APPROVED THIS 6th DAY OF June A.D. 19 84
FLOOD CONTROL COORDINATOR

CITY ENGINEER

I HEREBY CERTIFY THAT THIS OFFICE HAS EXAMINED THIS PLAT AND IT IS CORRECT IN ACCORDANCE WITH INFORMATION ON FILE IN THIS OFFICE.
DATE 6/13/84 CITY ENGINEER

APPROVAL AS TO FORM

APPROVED AS TO FORM THIS 18 DAY OF August A.D. 19 84
CITY ATTORNEY

CITY COUNCIL

PRESENTED TO THE SOUTH JORDAN CITY COUNCIL, THIS 6th DAY OF June A.D. 19 84 AT WHICH TIME THIS SUBDIVISION WAS APPROVED AND ACCEPTED.
ATTEST: CITY CLERK MAYOR

RECORDED # 5980481

STATE OF UTAH, COUNTY OF SALT LAKE
RECORDED AND FILED AT THE REQUEST OF
MERRILL TITLE
DATE 8-14-84 TIME 3:44PM BOOK 84-8 PAGE 116
$9.00 FEE
COUNTY RECORDER

84-8-116 K-365

Vance 2SJ

EXHIBIT "B"

Parcel No. Affected
27-14-203-028

Salt Lake County

A parcel of land within the boundary of Lot 25, Ridgecrest Estates, a Subdivision, located in Section 14, T.3 S.,R.1 W.,S.L.B. & M. The boundaries of said parcel of land are described as follows:

Beginning at the southeast corner of Lot 25, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, page 116, said point also lies North 0° 04'29" East 98.24 feet and South 89° 44'17" East 1402.88 feet and South 706.87 feet from the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian, and running thence South 88°36'50" West 41.04 feet; thence northeasterly 48.99 feet along the arc of a 314.00 foot non-tangent radius curve to the right, having a central angle of 8°56'23", (chord bears North 37° 32'15" East 48.94 feet); thence northeasterly 35.16 feet along the arc of a 60.00 foot reverse curve to the left, having a central angle of 33°34'16", (chord bears North 25° 13'18" East 34.66 feet); thence northerly 17.37 feet along the arc of a 50.00 foot reverse curve to the right, having a central angle of 19° 54'16",(chord bears North 18° 23'18" East 17.28 feet); thence South 06° 00'46" West 86.04 feet to the Point of Beginning.

Contains 1,376 sq. ft. or 0.03 acre more or less

(Note: Rotate above Described Legal Description counter-clockwise 00° 15'40" to coincide with Record information)

LOGI VANCE
27-14-203-029
QUIT CLAIM TO RIVERWALK
1,376 SQ. FT.
LOGI VANCE
27-14-236-017
2,628 SQ. FT.

EXHIBIT "B 1"

EXHIBIT "C"

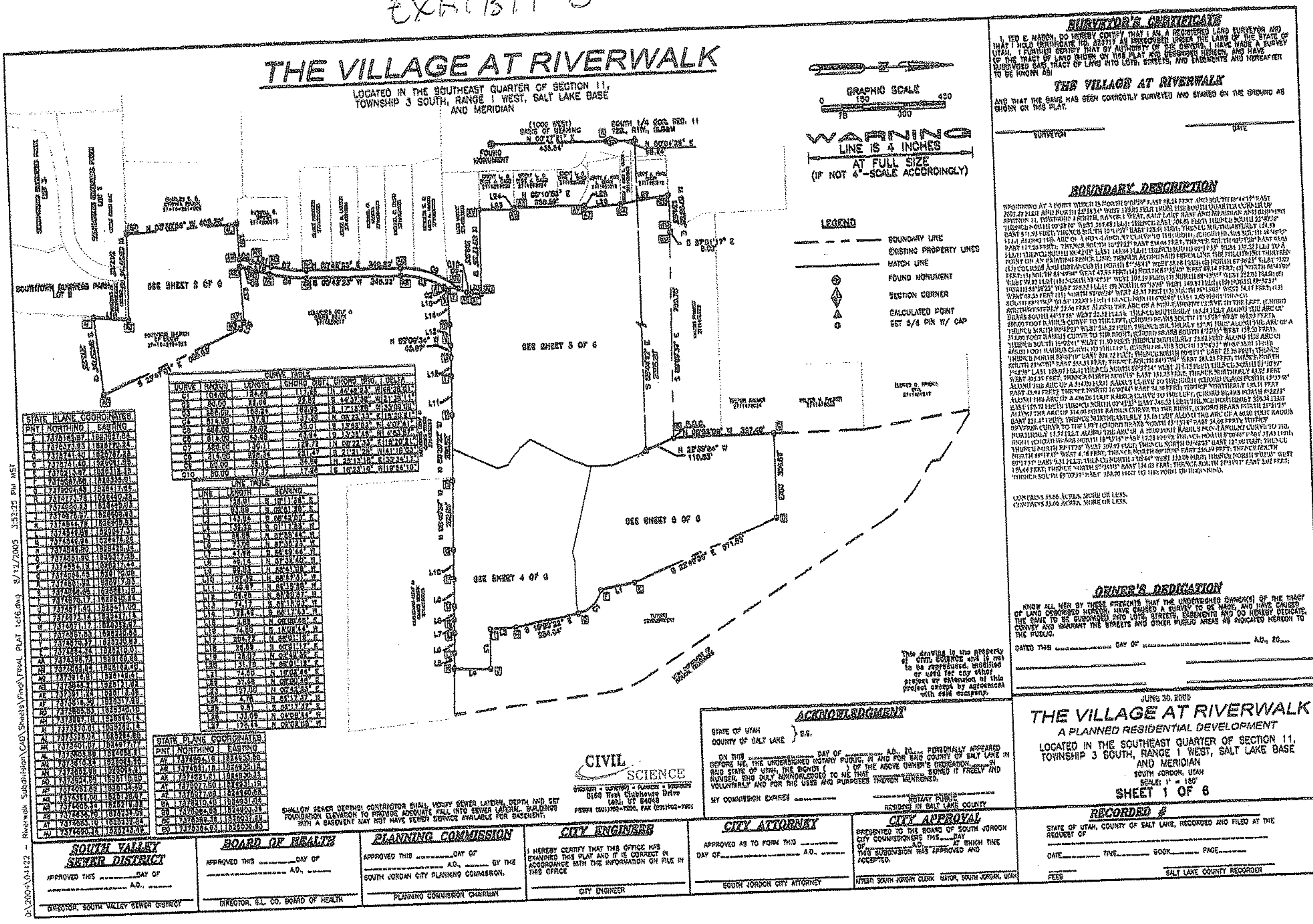

THE VILLAGE AT RIVERWALK
LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN
GRAPHIC SCALE
WARNING
LINE IS 4 INCHES AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)
LEGEND
BOUNDARY LINE
EXISTING PROPERTY LINES
MATCH LINE
FOUND MONUMENT
SECTION CORNER
CALCULATED POINT SET 5/8 PIN W/ CAP
SEE SHEET 2 OF 6
SEE SHEET 3 OF 6
SEE SHEET 4 OF 6
SEE SHEET 5 OF 6
CURVE TABLE
LINE TABLE
STATE PLANE COORDINATES
SURVEYOR'S CERTIFICATE
THE VILLAGE AT RIVERWALK
SURVEYOR
DATE
BOUNDARY DESCRIPTION
OWNER'S DEDICATION
ACKNOWLEDGMENT
STATE OF UTAH
COUNTY OF SALT LAKE
MY COMMISSION EXPIRES
NOTARY PUBLIC
RESIDING IN SALT LAKE COUNTY
CIVIL SCIENCE
JUNE 30, 2005
THE VILLAGE AT RIVERWALK
A PLANNED RESIDENTIAL DEVELOPMENT
LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN
SOUTH JORDON, UTAH
SCALE: 1" = 150'
SHEET 1 OF 6
SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.
SOUTH VALLEY SEWER DISTRICT
APPROVED THIS ____ DAY OF ____ A.D., ____
DIRECTOR, SOUTH VALLEY SEWER DISTRICT
BOARD OF HEALTH
APPROVED THIS ____ DAY OF ____ A.D., ____
DIRECTOR, S.L. CO. BOARD OF HEALTH
PLANNING COMMISSION
APPROVED THIS ____ DAY OF ____ A.D., ____ BY THE SOUTH JORDAN CITY PLANNING COMMISSION.
PLANNING COMMISSION CHAIRMAN
CITY ENGINEER
I HEREBY CERTIFY THAT THIS OFFICE HAS EXAMINED THIS PLAT AND IT IS CORRECT IN ACCORDANCE WITH THE INFORMATION ON FILE IN THIS OFFICE
CITY ENGINEER
CITY ATTORNEY
APPROVED AS TO FORM THIS ____ DAY OF ____ A.D. ____
SOUTH JORDON CITY ATTORNEY
CITY APPROVAL
PRESENTED TO THE BOARD OF SOUTH JORDON CITY COMMISSIONERS THIS ____ DAY OF ____ A.D. ____ AT WHICH TIME THIS SUBDIVISION WAS APPROVED AND ACCEPTED.
ATTEST: SOUTH JORDAN CLERK
MAYOR, SOUTH JORDAN, UTAH
RECORDED #
STATE OF UTAH, COUNTY OF SALT LAKE, RECORDED AND FILED AT THE REQUEST OF ____
DATE ____ TIME ____ BOOK ____ PAGE ____
FEES
SALT LAKE COUNTY RECORDER
O:\2004\04122 - Riverwalk Subdivision\CAD\Sheets\Final\FINAL PLAT 1of6.dwg 8/12/2005 3:52:25 PM MST

EXHIBIT "D"

Parcel No. Affected
27-14-226-017

Salt Lake County

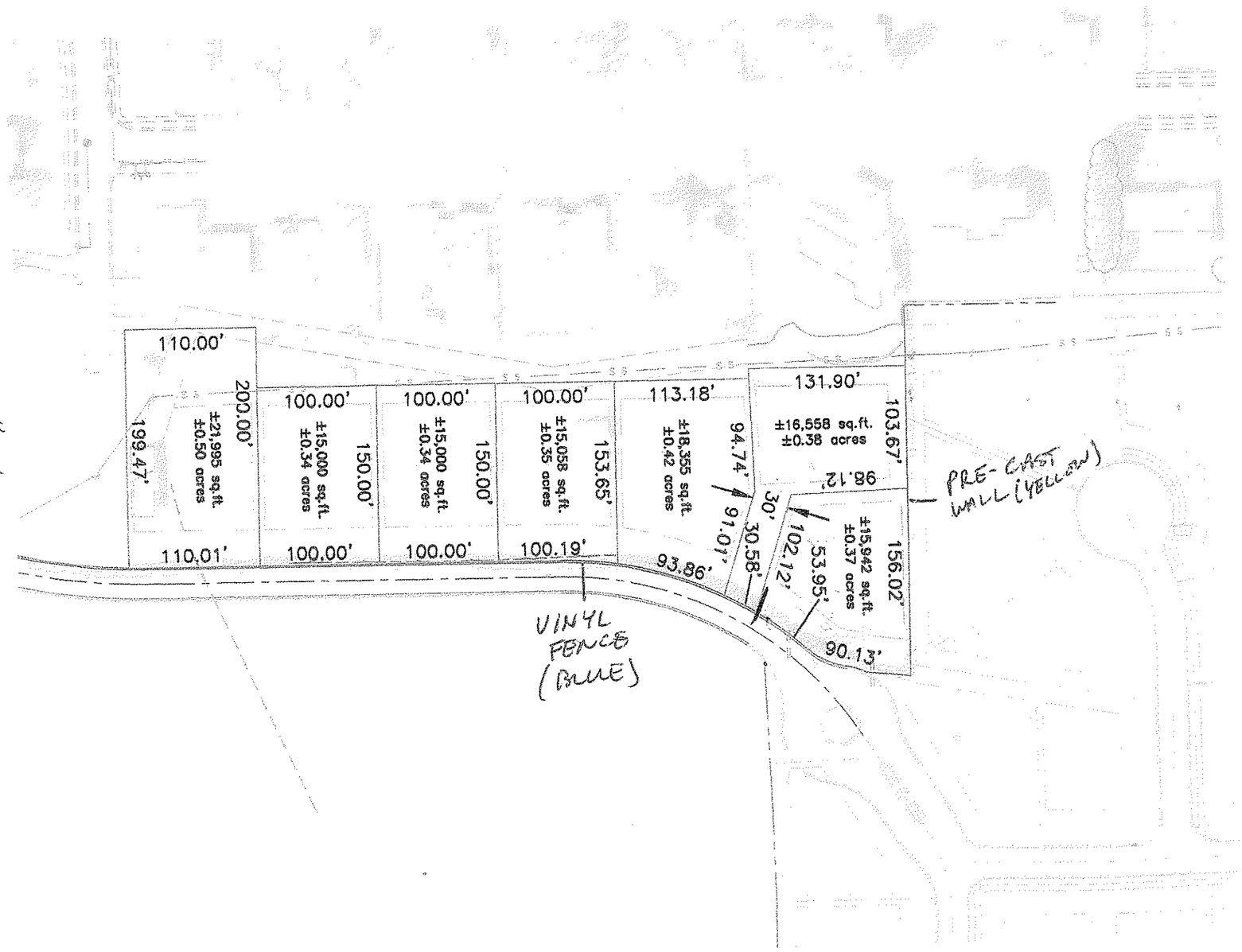
(SJ-Vance)

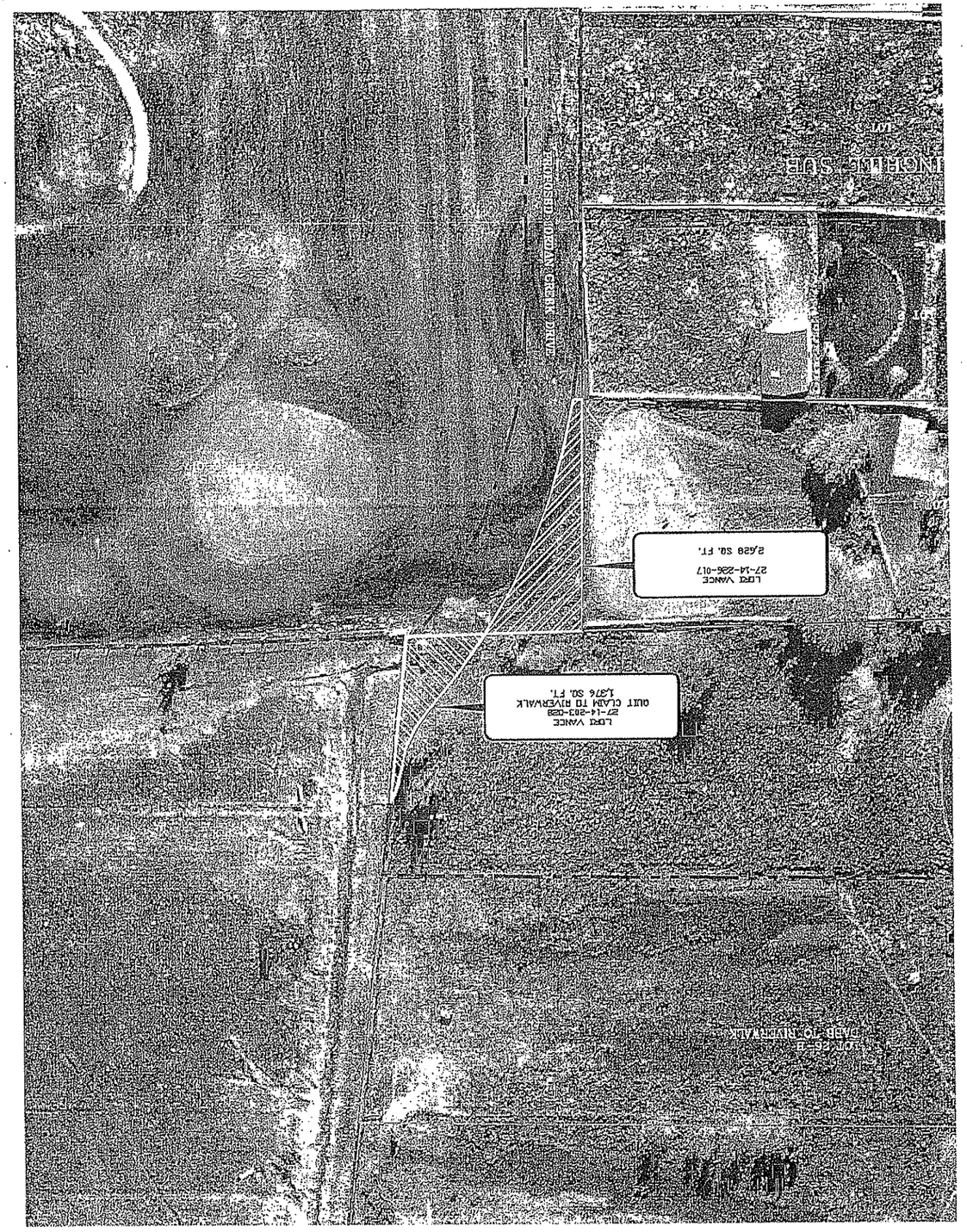
Beginning at the northeast corner of Lot 1, Springhill Subdivision, a subdivision on file in the Salt Lake County Recorders Office in Book 90-11, page 134, said point also lies North 0° 04'29" East 98.24 feet and South 89° 44 17" East 1310.87 feet and South 828.020 feet from the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian, and running thence North 00°42'23" East 118.73 feet to the southerly boundary line of Ridgecrest Subdivision, on file in the Salt Lake County Recorders Office in Book 84-8, Page 116; thence along said boundary North 88° 36'50" East 49.53 feet; thence southerly 129.63 feet along the arc of a 314.00 foot non-tangent radius curve to the left, having a central angle of 23°39'16", (chord bears South 21° 14'25" West 128.72 feet); thence North 89° 17' 37" West 4.35 feet to the Point of Beginning.

Contains 2,628 sq. ft. or 0.06 acre more or less

(Note: Rotate above Described Legal Description counter-clockwise 00° 15'40" to coincide with Record information)

EXHIBIT "G"


110.00'
200.00'
±21,995 sq.ft.
±0.50 acres
199.47'
110.01'
100.00'
±15,000 sq.ft.
±0.34 acres
150.00'
100.00'
100.00'
±15,000 sq.ft.
±0.34 acres
150.00'
100.00'
100.00'
±15,058 sq.ft.
±0.35 acres
153.65'
100.19'
113.18'
±18,355 sq.ft.
±0.42 acres
94.74'
91.01'
93.86'
131.90'
±16,558 sq.ft.
±0.38 acres
103.67'
98.12'
30'
30.58'
102.12'
53.95'
±15,942 sq.ft.
±0.37 acres
156.02'
90.13'
PRE-CAST WALL (YELLOW)
VINYL FENCE (BLUE)


LOT 26-B
DARB TO RIVERWALK
LORI VANCE
27-14-203-028
QUIT CLAIM TO RIVERWALK
1,376 SQ. FT.
LORI VANCE
27-14-226-017
2,628 SQ. FT.
PROPOSED JORDAN CREEK DRIVE
INGRILL SUB

SOUTH JORDAN CITY
ENGINEERING DEPARTMENT
PUNCHLIST

Type of Inspection:	*90% Warranty Punch list*
Date:	**8/3/09**
Project:	**Villages @ Riverwalk**
Project Address:	**10200 South 500 West**
Owner / Developer:	**Arbor/Gardner L.C.**
Engineering Inspector:	**Jerimie Thorne**
Phone Number:	**801-330-2861**

The following items are to be corrected or completed to meet City Construction Standards:

~~$1500~~ $2000 1. Clean all SD inlets, install or maintain correct BMP $
$1000 2. Clean all gutters.
~~$300~~ $700 3. Set storm drain lid to grade in park strip on lot 25.
$ $12000 4. Energize all street lights. 2 poles 12 heads $6,000
$2500 5. Submit as built drawings per City of South Jordan standards.
$11500 6. Complete fencing/ gate at the north end of Meadow Creek Ln.
~~$500~~ 7. Remove construction debris from lot 25. $
~~$1000~~ 8. Repair street/curb/sidewalk around settling sewer manhole lot#28.
$750 9. Replace missing street signage and place all signs @ 7' from tbc.
$30000 10. Replace curb on lots, and roadways with pink X. 90 Sections
$15,000 11. Patch all sidewalk/curb with pink dots.
12. Replace sidewalk, ramps with pink X.
$2500 13. Repair hydrant, and replace hydrant pad @ mystic spring way and mystic falls way. ~~$2500~~
$125,200 14. Overlay due to raveling and road damage (4) 8'x8'
$6000 15. Repair settling in roadway locations
16. Water can lid lot #28.
$100 17. Replace Valve pad on lot #11.
~~$500~~ 18. ~~Scarify for seeding around pond and all necessary open spaces.~~
$800 19. Grade around walking path and pond.
$ ~~[illegible]~~ 20. Install waterway or provide solution to ponding at warm creek bay and mystic spring way.
$2000 21. Replace curb and ADA ramp causing ponding on mystic wells way.
~~22. Repair damaged areas to the roadway marked with pink.~~
$300 23. Mystic Brook Way curb east side, was not able to be inspected due to construction activity and debris.
$800 24. Finish all grading around open spaces, and adjacent properties.
$500 25. All meters to grade & dug out 12" below top of yoke
$750 26. Hydrant on Jordan Creek Drive Valve box full of rock & hydrant won't turn
$75 27. Valve box at Jordan Creek Dr. & Meadow Creek Lane needs water lid
$300 28. Valve at 748 W Jordan Creek Dr needs a riser

SOUTH JORDAN CITY
ENGINEERING DEPARTMENT
PUNCHLIST

$2500 29. Valve at ~~Meadow~~ Mystic Creek Lane & Moss Springs Cove won't turn
$2500 30. Hydrant at Mystic springs & Mystic Falls Way won't close all the way
$2500 31. Aux Valve for hydrant across from 17 & 16 won't turn
$2500 32. East Valve on cluster between building 14 & 13 won't turn
$200 33. Valve box @ Meadow Creek Bay and Meadow Creek Lane needs water lid (not irrigation)
$200 34. Debris in valve box for North valve on Meadow Creek Lane and Mystic Creek Way
$200 35. Aux. Valve north of Meadow Creek Lane and Mystic Creek Way needs water lid (not sewer)
$200 36. Valve at Mystic Creek Bay needs water lid (not sewer)
$500 37. East valve at end of Mystic Creek Bay needs tracer wire raised to top of box
$500 38. Complete walkway to trail
$1000 for Drainage 39. Complete necessary grading and drainage on adjacent properties

*** Please be advised: Conditions at the side change with time. This punch list will expire on September 4, 2009. Please complete these items by that time or the terms of the contract may be enforced. The Engineering Inspector <u>must be</u> notified and given a schedule 48 hours prior to when repairs are to be made. By contract The City of South Jordan has the right to inspect any work being done. Any items completed without notifying the Engineering Inspector will be rejected and required to be taken out and completed with the Inspector on-site.**

$ 230,825
+ 20%

$ 276,990 11/12/09

Oct. 17, 2005

Village at Riverwalk
10100 South 770 West

Name	Representing	Contact #
Brad Kenison	Civil Science - Engineer	768-7200 ext 192
Joel Glenn	Earthmovers	755-8981
Jeff Harrison	Earthmovers	864-0950
Kevin Neff	Earthmovers	864.0770
Mike Maddox	ARBOR	652-6916 / 561-859[illegible]
Larry Kesler	South Jordan	330-3000
Shane Greenwood	South Jordan City	254-3742
[illegible]	[illegible]	254-3742
Jed Beil	SJC	330-3026

24 hr Contact

Name	Contact #
Joel Glenn	(801) 352-2610

Receipt of Construction Standards

I MIKE MADDOX,
(print name)

representing, ARBOR Home acknowledge the
(name of company)

receipt of and agree to construct according to the current South Jordan City Construction Standards (dated 10/03/2005).

Signature Mike Maddox Date 10/17/2005

Shane Greenwood

From: Brad Kenison [bkenison@civilscience.com]
Sent: Friday, October 14, 2005 10:04 AM
To: Chris Drent
Cc: Cory Gust; Doug Meldrum; Shane Greenwood
Subject: Village @ Riverwalk - waterline/irrigation construction issues.

Chris,

I spoke with Mr. Palmer again last night regarding the waterline and irrigation construction through his property. I indicated to him that Arbor/Gardner was still willing to install the irrigation lines on his property if he was willing to sign the waterline easement. He again indicated that he would not sign this easement, and that he did understand that by not signing that Arbor/Gardner would not be installing either the irrigation pipe or the waterline stub to his shed. He also said that if he ever wanted to get "his" water to the bottom of the property that he would install the associated irrigation piping with his own funds.

When I indicated that there was a chance that his property could be condemned to install the waterline, he responded that he felt that condemnation should not be an option, and that the waterline should be able to be placed somewhere within the existing sewer easement (particularly along the south side of that easement).

Based on my conversation w/Mr. Palmer last night, and my discussion with you regarding these issues yesterday, I will change the construction plans to indicate that the irrigation line and the 1" water service line to Mr. Palmer's property are Not within the Contract (NIC). I will subsequently deliver the requested construction plans to the City of South Jordan in preparation for the 10:00 a.m. pre-construction meeting on Monday morning.

Please let me know if you have any further questions or comments regarding this issue.

Brad A. Kenison, P.E.
Civil Science, Inc.
3160 W. Clubhouse Drive
Lehi, Ut 84043
(801) 768-7200 ext. 142 (office)
(801) 768-7201 (Facsimile)
(801) 367-4202 (Cellular)
bkenison@civilscience.com

Shane Greenwood

From: Brad Kenison [bkenison@civilscience.com]
Sent: Thursday, October 13, 2005 10:02 AM
To: Chris Drent
Cc: Cory Gust; Shane Greenwood; Rebecca Andrus
Subject: Village @ Riverwalk - Irrigation / waterline issues discussed w/Mr. Van Palmer

Chris,

I finally got a hold of Van Palmer last night at his home. During our phone conversation we discussed the following:

a) If Mr. Palmer would not grant the waterline easement as previously agreed, then Arbor will run the waterline from the east through the Ohrn property, but will not "stub" it through the Palmer Property. Mr. Palmer understands that the water would not be installed across his property by Arbor.

b) Unless Mr. Palmer can provide information indicating that he has a right to the irrigation water flowing onto the Arbor property, Arbor will not run any of the irrigation / water improvements to get that water to Mr. Palmer. Mr. Palmer said that he could not provide documentation that he has the right to that water, and that he understood that Arbor would not be running any of the irrigation/water improvements to his property.

Note: Mr. Palmer was not very happy with the decision not to run any of the water to his property, but seemed to understand that he would probably have a hard time "forcing" Arbor to pipe this water to him. Mr. Palmer also mentioned that he felt that Arbor would have quite a "fight on their hands" if they ever needed anything from him in the future. One example that Mr. Palmer gave was that in the future he may choose to run a pipe across his property which would take all of this free-flowing irrigation water onto his property. This action could possibly leave the water feature within the Riverwalk Subdivision without water.

Please give me a call if you have any further questions regarding my conversation w/Mr. Palmer.

Thanks,

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bkenison@civilscience.com

Shane Greenwood

From: Chris Drent [drent2@hotmail.com]
Sent: Thursday, October 06, 2005 11:13 AM
To: Brad Kenison; Shane Greenwood
Cc: John Hunt; Cory Gust
Subject: Re: Village at Riverwalk Subdivision - Van Palmer Waterline Easement Conflicts

Brad
We met with Rick Horst today. The plan for right now is to stub the water line to Van Palmers property and the City will take over from there. We are not going to do the water of irrigation line for Van Palmer. If I am not mistaken we should be able to just eliminate these things and let the water go through the water feature all the time. Let me know if this is correct. Thanks Chris

----- Original Message -----
From: Brad Kenison
To: sgreenwood@sjc.utah.gov
Cc: Chris Drent
Sent: Tuesday, October 04, 2005 11:12 AM
Subject: Village at Riverwalk Subdivision - Van Palmer Waterline Easement Conflicts

Shane,

Last Thursday I e-mailed you a .pdf exhibit showing the waterline/sewer easement conflicts through the Palmer and Ohrn properties for the proposed Village at Riverwalk Subdivision.

Did you receive that e-mail? Do you have any questions regarding the provided information? What is the status of a resolution to these conflicts?

Please advise.

Thank you,

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(801) 768-7201 (Facsimile)
(801) 367-4202 (Cellular)
bkenison@civilscience.com

Shane Greenwood

From: Brad Kenison [bkenison@civilscience.com]
Sent: Monday, May 02, 2005 1:58 PM
To: mikef@southvalley.dst.ut.us
Cc: garymac@networld.com; Shane Greenwood; Mike Maddox
Subject: Riverwalk Subdivision - Revised Sewer exhibit

Mike,

A few weeks ago we spoke about some sewer utility changes that you recommended for this proposed subdivision in South Jordan.

Accompanying this e-mail is a .pdf copy of the proposed sewer utility layouts for this subdivision, as well as the proposed subdivision at the top of the hill (extending from Baxter Drive).

Please let me know if you have any comments or concerns with this information.

Also, it is my understanding that you are NOT planning to have a sewerline installed parallel to your existing 48" sewerline along the Jordan River, and that the developer of this property will NOT need to install this future line as part of his development. Please let me know whether or not my understanding is correct concerning this future sewerline.

Thank you,

Civil Science has Moved !!!
Brad A. Kenison, P.E.
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(801) 768-7201 (Facsimile)
(801) 367-4202 (Cellular)

Shane Greenwood

From: Brad Kenison [bkenison@civilscience.com]
Sent: Friday, April 29, 2005 10:09 AM
To: Chris Drent
Cc: Mike Maddox; cory@arborbuilds.com; Ricky A. Horst; Shane Greenwood; Judy Hansen
Subject: Meeting w/Van Palmer regarding storm drain and irrigation issues

Chris,

Last night I met w/Van Palmer to discuss how we could get the irrigation / canal water to his property.

He indicated that he received his irrigation/canal water through the existing pipes. I mentioned that we were planning to get water to him through one of our lot lines, and that he would have to go into our subdivision and turn the water into his property whenever he is scheduled to receive his water turn (approx. every 7 days).

Van indicated that instead of this option, he would require that we pipe water from the top of the hill into his property, so that he could turn the headgates on top of the hill instead of driving all the way around to the subdivision entrance. Either option will work, but piping to Palmer's property from the top of the hill would likely be less trouble for the development in the long run (not to mention that you wouldn't need to have a headgate in someone's yard).

Accompanying this e-mail are two sketches showing these options. Option 1 shows what we would do if we placed a headgate within the subdivision, whereas option 2 indicates the option that Mr. Palmer is pushing for.

Please let me know what you think.

Thanks,

Civil Science has Moved !!!
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(801) 367-4202 (Cellular)

Shane Greenwood

From: Brad Kenison [bkenison@civilscience.com]
Sent: Monday, April 18, 2005 12:28 PM
To: Shane Greenwood
Cc: Chris Drent; Mike Maddox; cory@arborbuilds.com
Subject: Village @ Riverwalk Storm Drainage proposal

Shane,

As we discussed this morning, I spoke w/Mr. Van Palmer last Friday about some storm drainage options for the Riverwalk Subdivision. It sounds like that Mr. Palmer is pretty-much "okay" with the following field drain and storm drainage improvements:

1) Relocate the existing storm drainage and field drain lines within the Ohrn property into his property to keep them out of the Riverwalk Subdivision.

2) Pipe the existing storm drainage flows from Lori Vance's property to his property. Mr. Palmer agreed to this option as long as Arbor Commercial agrees to make some ditch improvements east of this proposed storm drainage tie-in to handle the additional flows.

I believe that these storm drainage improvements will be beneficial to both Arbor Commercial Residential and the City of South Jordan because the RETENTION pond will not need to be designed to store flows from other developments. I believe that Mr. Palmer also sees this option as a positive solution because he is able to control the storm drainage and field drain flows onto his property.

Accompanying this e-mail is a .pdf copy of this proposed storm drainage design for the Riverwalk Subdivision.

Please review this information and call me back so that we can discuss it.

Thank you,

Brad A. Kenison, P.E.
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Prepared for
South Jordan City
c/o Jeremy Nielson
1600 West Towne Center Drive
South Jordan, UT 84095

IGES Job Number: 00605-001

Site Geotechnical Investigation
Jordan River Drive
South Jordan, UT

LICENSED PROFESSIONAL ENGINEER
No. 374860
JARED A. HAWES
9/24/04
STATE OF UTAH

Jared Hawes, P.E.
Staff Engineer

Reviewed by

John Wallace, P.E.
Principal

IGES, Inc.
4153 South Commerce Dr.
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(801) 270-9400

September 24, 2004

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TABLE OF CONTENTS

1.0 EXECUTIVE SUMMARY 1
2.0 INTRODUCTION 3
2.1 PURPOSE AND SCOPE OF WORK 3
2.2 PROJECT DESCRIPTION 3
3.0 METHODS OF STUDY 5
3.1 FIELD INVESTIGATION 5
3.2 LABORATORY INVESTIGATION 5
3.3 ENGINEERING ANALYSIS 7
4.0 GENERALIZED SITE CONDITIONS 8
4.1 SURFACE CONDITIONS 8
4.2 SUBSURFACE CONDITIONS 8
4.2.1 Soils 8
4.2.2 Groundwater/Moisture Content Conditions 9
5.0 GEOLOGIC CONDITIONS 10
5.1 GEOLOGIC SETTING 10
5.2 SEISMICITY AND FAULTING 10
5.3 OTHER GEOLOGIC HAZARDS 12
5.3.1 Liquefaction 12
6.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS 13
6.1 GENERAL CONCLUSIONS 13
6.2 EARTHWORK 13
6.2.1 General Site Preparation and Grading 13
6.2.2 Excavation Stability 14
6.2.3 Embankment Fill and Compaction 14
6.3 SETTLEMENT 15
6.4 MOISTURE PROTECTION AND SURFACE DRAINAGE 16
6.5 ASPHALTIC PAVEMENT 16
6.6 SOIL CORROSION POTENTIAL 17
6.7 RETAINING WALL SYSTEM 17
7.0 CLOSURE 22
7.1 LIMITATIONS 22
7.2 ADDITIONAL SERVICES 22
8.0 REFERENCES CITED 24

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APPENDICES

Appendix A	Plate A-1	Site Vicinity Map
	Plate A-2	Exploration Location Map
	Plates A-3 to A-5	Boring Logs
	Plate A-6	Key to Soil Symbols and Terms
Appendix B	Plate B-1	Atterberg Limit Test Results
	Plates B-2 to B-3	Consolidation Test Results
	Plate B-4	CBR and Proctor Test Results
	Plate B-5	Summary of Laboratory Test Results Table
Appendix C	Plate C-1	Retaining Wall Plan and Section View
	Plate C-2	Retaining Wall Construction Details
	Plate C-3	Global Stability Results (Static)
	Plate C-4	Global Stability Results (Seismic)

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1.0 EXECUTIVE SUMMARY

This report presents the results of a geotechnical investigation conducted for the proposed Jordan River Drive and the required retaining wall system located east of the Jordan River and north of 10600 South in South Jordan, Utah. The road alignment is bounded on the east by Mulligan's Golf Course.

Exploration of the subsurface soil conditions was accomplished by advancing 3 borings on the site. The boring locations were spread along the proposed roadway in the area where the soil retaining system will be located. The depths of the borings ranged from 21½ to 41½ feet below the existing site grade. In general, the soils encountered along the alignment consisted of lean and fat clay (CL & CH), silty clay (CL-ML), silt (ML), sandy silt (ML), silty sand (SM), and silty gravel (GM). A spring is located along the alignment of the roadway and is channeled into a PVC pipe. In the boring south of the spring, groundwater was encountered at a depth of 30 feet. However, north of the spring groundwater was encountered at 16.5 feet. Soil moisture contents ranged from a low of 16.2% to a high of 54.0%. Graphical representations of the observed soil stratigraphy are shown on the attached boring logs. A summary of the completed laboratory testing is also included.

Soluble sulfate and resistivity laboratory tests were completed to assess the potential for corrosion due to the chemistry of the native soils. It was found that the existing soils have a soluble sulfate content of approximately 50 mg/kg and therefore a low potential for sulfate attack on concrete. Based on these results, it is anticipated that conventional Type I/II cement may be used in all concrete in contact with site soils.

Metal corrosion was evaluated based on the resistivity tests conducted. The minimum resistance results of 1200 ohm-cm indicate the on-site soils are severely corrosive to metal. Based on these results, it is anticipated that a corrosion engineer will need to be consulted as necessary to develop site-specific recommendations for sacrificial thickness or cathodic protection for underground, exposed metal portions of the project.

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Based on soil classifications and a laboratory obtained CBR value of 5.1, the near surface soils are expected to provide relatively good pavement support. Anticipated traffic volumes were not available at the time this report was prepared. However, based on our understanding of the project development we assumed traffic in the residential areas would consist of approximately 1,600 passenger vehicle trips per day with 2 percent trucks to account for occasional heavy equipment over a 20 year design period. Based on the CBR value and the assumed traffic information, the recommended pavement thickness is:

Asphalt (in.)	**Untreated Road Base (in.)**	**Granular Borrow (in)**
3	6	12

NOTICE: The scope of services provided within this report are limited to the assessment of the subsurface conditions at the subject site. The executive summary is provided solely for purposes of overview and is not intended to replace the report of which it is part and should not be used separately from the report.

2.0 INTRODUCTION

2.1 PURPOSE AND SCOPE OF WORK

This report presents the results of a geotechnical investigation conducted for the proposed road construction and associated retaining wall system for the proposed Jordan River Drive east of the Jordan River, north of 10600 South in South Jordan, Utah. The property is bounded on the east by Mulligan's Golf Course. The purposes of this investigation were to assess the nature and engineering properties of the subsurface soils along the proposed alignment for general site grading and roadway pavement design and to provide a design for a retaining wall system. It is our understanding that the completed roadway will serve as access to a mostly residential development consisting of approximately 200 units.

The scope of work completed for this study included a site reconnaissance, subsurface exploration, soil sampling, laboratory testing, engineering analyses, and preparation of this report. Our services were performed in accordance with our proposal, dated August 4, 2004 and your signed authorization.

The recommendations contained in this report are subject to the limitations presented in the "Limitations" section of this report.

2.2 PROJECT DESCRIPTION

The project site is located immediately west of Mulligan's Golf Course and north of 10600 South in South Jordan, Utah as illustrated on Plate A-1 (Site Vicinity Map) located in Appendix A. Cross sections of the proposed roadway construction provided by Civil Science Inc. (CSI) show grading for the proposed roadway will consist of cut and fill slopes of 2H:1V (Horizontal: Vertical). We anticipate the bulk of fill soils required for embankment construction will be derived from cuts performed during road grading. A material balance of the proposed cut and fill was outside the scope of work performed by IGES; however, it is possible that soil will be imported to the site for road grading, pavement section and retaining wall construction.

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Embankment fill for the proposed roadway will be supported by a retaining wall system on the east side of the road to limit encroachment on the golf course from Sta 17+50 - 24+00 (approximate). The retaining wall height will range from 5 to 15 feet. South Jordan City has selected a Mechanically Stabilized Earth (MSE) retaining wall with Keystone™ modular block wall facing to retain embankment fill in this section of the proposed roadway. IGES performed retaining wall design based on manufacturer supplied material properties. For settlement and bearing capacity design purposes, we have assumed embankment loads to be as high as 1.9 kips/ft^2.

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3.0 METHODS OF STUDY

3.1 FIELD INVESTIGATION

As a part of this investigation, subsurface soil conditions were explored by advancing three exploratory borings to depths of 21.5-41.5 feet below the existing site grade. The approximate locations of the explorations are shown in relation to the proposed road alignment on the Exploration Location Map, Plate A-2 in Appendix A. Logs of the subsurface conditions, as encountered in the explorations, were recorded at the time of exploration by a qualified geotechnical engineer and are presented in Appendix A, Plates A-3 through A-5, Boring Logs. A key to soil symbols and terms used in the boring logs is found on Plate A-6.

The borings were advanced with the aid of a truck mounted drill rig. Both disturbed and relatively "undisturbed" soil samples were obtained in the borings. Soil samples were obtained at regular intervals and/or noticeable changes in the soil profile. All samples were transported to our laboratory for testing to evaluate engineering properties of the various soil types observed. Our geotechnical engineer classified the soils observed in the explorations according to the Unified Soil Classification System (USCS). Classifications of the individual soil stratum are shown on the attached boring logs.

3.2 LABORATORY INVESTIGATION

Representative soil samples were tested in the laboratory to assess the soils pertinent engineering properties. Unit weight and moisture content determinations were performed to estimate the in-place moisture and density conditions of the on-site soils. Triaxial and direct shear tests were performed to assess the engineering strength characteristics of the native soils and assess their suitability for use in the proposed embankments. Consolidation tests were performed to assess the potential settlement characteristics of the on-site soils under increased loading moisture conditions. Atterberg Limit tests were completed to aid in classifying the soils and assessing the plasticity of the silt and clay soils. A moisture density relationship (ASTM D-698) and a California Bearing Ratio (CBR) test were completed to assess the strength of the pavement

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subgrade soils. Electrochemical tests were completed to provide a preliminary assessment of the soil corrosion potential with respect to concrete and steel.

Results of the laboratory tests indicate that the on-site soils have dry unit weights ranging from 70.1 pcf to 106.0 pcf in the in-situ soils. The subsurface soils moisture content ranged from a low of 16.2% to a high of 54.0%.

Atterberg limit tests indicate that the soils plasticity index ranged from a low of 4 to a high of 35. The majority of the site soils classified as Lean CLAY (CL), Fat CLAY (CH), or Silty CLAY (CL-ML), as noted in the boring logs.

One dimensional Consolidation tests were performed on undisturbed samples throughout the site at varying depths. The results of the tests are contained in the Appendices of this report.

Results of the CBR test indicate that the near surface site soils will provide relatively good support for roadway pavements. A CBR value of 5.1 was obtained for the near surface soils.

As a preliminary indication of the soil corrosion potential, a soil soluble sulfate content of approximately 50 mg/kg, a pH of 8.2 and a electrical resistivity of 1200 ohm-cm were obtained in the laboratory for a sample of the soil taken from B-3 at a depth of 3 feet.

A direct shear and triaxial tests were performed on undisturbed samples to obtain strength parameters. The tests were performed on samples taken from B-1 at a depth of 3 feet and B-3 at a depth of 4.5 feet. The results of the test are contained in the Appendices of this report.

The results of the laboratory tests are presented on the attached Boring Logs and in the Summary of Laboratory Test Results located in the Appendices at the end of this report.

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3.3 ENGINEERING ANALYSIS

Based on the proposed construction at the site, the following engineering analyses were performed:

- Excavation Stability
- Settlement
- Retaining Wall Design
- Pavement Design

Engineering analyses were performed using soil data obtained from the laboratory test results and empirical correlations based on material density, depositional characteristics and classification. Appropriate factors of safety were applied to the results consistent with industry standards and the accepted standard of care.

Excavation stability was evaluated based on the field conditions encountered, laboratory test results and soil type. OSHA minimum requirements are typically prescribed unless conditions warrant further flattening of slopes.

Lateral earth pressures were calculated using Rankine's lateral active and passive earth pressures based on an assumed internal friction angle for the material. A conservative friction angle of 30 degrees for reinforced fill was used based on empirical data, field observations and laboratory data similarly classified soils as the recommended retaining wall backfill.

Pavement design was completed using Pavement Analysis Software (PAS). PAS uses standard methods to evaluate Asphaltic Concrete pavements. A California Bearing Ratio (CBR) of 5.1 was established in the laboratory and used in the program to define the strength of the subgrade soils. Traffic counts were not provided and are therefore assumed based on our understanding of the road use for design uses. If the projected traffic volumes vary significantly from those stated in this report IGES should be contacted to reevaluate the suitability of our recommended pavement section.

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4.0 GENERALIZED SITE CONDITIONS

4.1 SURFACE CONDITIONS

The topography of the site varies dependant of the location along the road alignment. Just west of the proposed roadway near station 20+00 a spring was observed; water from the spring was visible at the surface in a small unlined channel and pond prior to being transmitted beneath the proposed alignment in a PVC pipe. The alignment of the proposed roadway is bounded on the east by Mulligan's Golf Course and on the west by single family residences. The proposed roadway runs north from 10600 South and continues into a planned development north of the golf course. Existing grade elevations along the road alignment range from approximately 4,310 to 4,388 (see pg 10 for other elevations) feet above mean sea level (msl).

4.2 SUBSURFACE CONDITIONS

As previously mentioned, the subsurface soil conditions were explored at the site by advancing 3 borings. The borings extended to depths of 21.5 to 41.5 feet below existing site grade. The subsurface soil conditions were logged at the time of the investigation and are included in the Boring Logs in Appendix A (Plates A-3 to A-5). The soil and moisture conditions encountered, during our investigation, are discussed below.

4.2.1 Soils

Subsurface soils at the site were comprised of layers of Clay (CH and CL), Silty CLAY (CL-ML), Silt (ML), and some Silty SAND (SM) and GRAVEL (GM) at the deepest extents of exploration. The stratification lines shown on the enclosed boring logs represent the approximate boundary between soil types. The actual in situ transition may be more gradual.

Please note that soil samples are normally discarded 30 days after submittal of the report unless this office receives a specific request to retain the samples for a longer period.

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4.2.2 Groundwater/Moisture Content Conditions

At the time of investigation groundwater was encountered at 16 feet below the current surface level north of the spring and at 30 feet below current surface level to the south of the spring. Seasonal fluctuations in precipitation, surface runoff from adjacent properties, or other on or offsite sources may increase moisture conditions at the site. Given the late summer season and the recent drought conditions experienced in Utah we anticipate that the groundwater levels are below their seasonal high. Previous investigations performed by IGES in the Jordan River plain near 10600 South have encountered artesian pressures at various depths. It is possible for construction excavations to remove confining soil layers allowing groundwater to come to the surface. Based on the relatively dry conditions encountered in the area of planned excavation and the absence of artesian pressures in our exploratory borings we do not anticipate that groundwater levels will raise to within planned excavation depths for the proposed construction.

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5.0 GEOLOGIC CONDITIONS

5.1 GEOLOGIC SETTING

The site is located, at an elevation of approximately 4,310 to 4,388 feet, within the southern portion of the Salt Lake Valley. The Salt Lake Valley is a deep, sediment-filled structural basin of Cenozoic age flanked by two uplifted blocks, the Wasatch Range on the east and the Oquirrh Mountains to the west (Hintze, 1980). The northern portion of the Salt Lake Valley extends beyond the northern limits of the Oquirrh mountain range and is bordered on the west by the southeast shore of the Great Salt Lake. The Wasatch Range is the easternmost expression of pronounced Basin and Range extension in north-central Utah.

The near-surface geology of the Salt Lake Basin is dominated by sediments, which were deposited within the last 30,000 years by Lake Bonneville (Scott and others, 1983; Personius and Scott, 1992). As the lake receded, streams began to incise large deltas formed at the mouths of major canyons along the Wasatch Range, and the eroded material was deposited in shallow lakes and marshes in the basin and in a series of recessional deltas and alluvial fans. Sediments toward the center of the valley are predominately deep-water deposits of clay, silt and fine sand. However, these deep-water deposits are in places covered by a thin post-Bonneville alluvial cover. Surface sediments at the project site are mapped as upper Pleistocene lacustrine clay and silt undivided (lbpm) related to undivided deposits of the Bonneville Lake Cycle and middle Holocene to uppermost Pleistocene Stream alluvium 2 (al2) consisting of sand, silt and clay (Personius and Scott, 1992).

5.2 SEISMICITY AND FAULTING

Review of the "Surface Fault Rupture and Liquefaction Potential Special Study Areas" map dated March 31, 1989 and published by Salt Lake County Public Works - Planning Division, as well as other published maps indicate that no active faults are located through or near the property (Personius and Scott, 1992; Hecker, 1993). The site is located approximately 5 miles west of the Wasatch fault zone. The site is also located approximately 7 miles south of the West

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Valley fault zone (Keaton and Curry, 1993). The West Valley fault zone trends in a north - south orientation and is located in the central portion of the Salt Lake Valley. While the West Valley fault zone is reported to be active and probably seismically independent of the Wasatch fault zone, sympathetic movement on the West Valley fault zone resulting from major earthquakes on the Wasatch fault zone is a possibility. Analyses of ground shaking hazards along the Wasatch Front suggest that the Wasatch fault zone is the single greatest contributor to the seismic hazard in the Salt Lake City region. However, due to its close proximity to the site, the West Valley fault zone should be considered a large contributor to the seismic hazard at the site.

Seismic hazard maps depicting probabilistic ground motions and spectral response have been developed for the United States by the U. S. Geological Survey as part of NEHRP/NSHMP (Frankel et al, 1996). These maps have been incorporated into both *NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures* (FEMA, 1997) and the *International Building Code* (International Code Council, 2000). Spectral responses for the Maximum Credible Earthquake (MCE) are shown in the table below as determined using the Seismic Design Parameters software by Leyendecker et al. These values generally correspond to a two percent probability of exceedance in 50 years (2PE50) for a "firm rock" site. To account for site effects, site coefficients which vary with the magnitude of spectral acceleration are used. Based on our field exploration and soils at this site it is our opinion that the site is best classified as IBC Site Class E. The spectral accelerations are shown in the table below. The spectral accelerations are calculated based on the site's approximate latitude and longitude of 40.56° and -111.91° respectively. Based on IBC, the site coefficients are F_a=0.9 and F_v=2.4. The peak ground acceleration (PGA) from these data is 0.47 g.

Parameter	Short Period (0.2 sec)	Long Period (1.0 sec)
MCE Spectral Acceleration Site Class A or Hard Rock (g)	1.30	0.54
MCE Spectral Acceleration Site Class E (g)	1.17	1.17

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5.3 OTHER GEOLOGIC HAZARDS

Geologic hazards can be defined as naturally occurring geologic conditions or processes that could present a danger to human life and property. These hazards must be considered before development of the site. There are several hazards in addition to seismicity and faulting that may be present at the site, and which should be considered in the design of habitable structures as well as roads and other critical infrastructure. The geologic hazard considered pertinent for this site is liquefaction.

5.3.1 Liquefaction

Certain areas within Utah also possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

Referring to the "Liquefaction-Potential Map for a Part of Salt Lake County, Utah" published by the Utah Geological Survey the site is located within an area designated as "high" for liquefaction potential. Based on the field data collected for this site, it is our opinion that the soil deposits at the site generally have a moderate potential for liquefaction. Given the nature of construction addressed in this report, a detailed analysis of liquefaction potential is not considered necessary.

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6.0 ENGINEERING CONCLUSIONS AND RECOMMENDATIONS

6.1 GENERAL CONCLUSIONS

Based on the subsurface conditions encountered at the site, it is our opinion that the subject site is suitable for the proposed construction provided that the recommendations contained in this report are complied with. In general, the development can be completed using standard construction practices.

The following sub-sections present our recommendations for general site grading and lateral earth pressures and moisture protection and soil corrosion.

6.2 EARTHWORK

General site grading is recommended to provide proper support for asphalt pavement sections and the retaining wall system. Site grading is also recommended to provide proper drainage and moisture control on the subject property.

6.2.1 General Site Preparation and Grading

Beneath the asphalt pavement sections and proposed fill sections associated with road grading any existing vegetation, debris, and non-engineered fill soils should be removed. Following the removal of vegetation, debris, and loose or disturbed soils, as described above, site grading may be conducted to bring the site to grade.

In areas where embankment fill is to be placed, and prior to construction, the exposed native soils should be proof-rolled with heavy rubber-tired equipment such as a scraper or loader. Any soft areas identified during proof-rolling should be stabilized prior to embankment construction or removed and replaced with structural fill.

During winter or spring months, moderate to high moisture conditions may be encountered in the upper fine-grained soils. If proof-rolling identifies soft or pumping soils, these soils should be

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stabilized prior to construction of pavement section or placement of embankment fill. Stabilization of the subgrade soils can be accomplished using a clean, coarse angular material worked into the soft subgrade. We recommend the material be greater than two-inches in nominal diameter, but less than six-inches. Locally available pit-run gravel may be suitable but should contain a high percentage of particles larger than two-inches and have less than seven percent fines (material passing the No. 200 Sieve). Pit-run gravel may not be as effective as a coarse, angular material in stabilizing the soft soils and will likely require more material be placed. The stabilization material should be worked (pushed) into the soft subgrade soils until a firm unyielding surface is established. Once a firm, unyielding surface is achieved, the area may be brought to final design grade using structural fill.

6.2.2 Excavation Stability

Grading plans prepared by CSI for Jordan River Drive show proposed 2H:1V cuts of up to 15 feet in height. The area containing the deepest of proposed cuts (Sta: 24+00-26+00) is located on an existing slope and was inaccessible by truck mounted drilling equipment. Prior investigations performed by IGES in the project vicinity indicate that the majority of soils within the cut region will consist of silty or sandy clays similar to Occupational Safety and Health (OSHA) type B soils. Based on OSHA guidelines for excavation safety, cuts up to 20 feet in depth with sidewalls sloped no steeper than 1H: 1V are stable for short periods. As stated previously exploration was not feasible on the slope; however, IGES created a theoretical model of the proposed cut to assess the slope stability. Using soil strength data from laboratory testing, the proposed cut slopes are suitable with safety factors of 2.1 and 1.4 for static and seismic conditions, respectively. In order to maintain the integrity of the cut slopes IGES recommends that short and long term erosion control measures be included as part of construction

6.2.3 Embankment Fill and Compaction

All fill employed for the support of pavements, should consist of structural fill. Structural fill may consist of native soils in cut areas and small fill height areas that are not adjacent to retaining walls provided that they are properly moisture conditioned, placed/scarified and compacted. Imported structural fill shall be used in all embankments that are retained by modular

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block wall construction and should have a minimum of 35 percent passing the number 200 sieve and a Plasticity Index no greater than 10. Because of their potential to swell, native fat clays should not be used as structural fill. Embankment fill should be free of vegetation and debris, and contain no inert materials larger than 2-inches in nominal size.

Embankment fill should be placed in maximum 8-inch loose lifts and compacted on a horizontal plane, unless otherwise approved by the Geotechnical Engineer. Soils in compacted fills beneath pavements should be compacted to at least 98% of the maximum dry density, as determined by ASTM D-698 (Standard Proctor). Any imported fill materials should be approved prior to importing.

Exposed native soils in grading cuts or fill soils placed for subgrade below pavement sections should also be compacted to at least 98% of the maximum density as determined by ASTM D-698 (Standard Proctor). In addition, all utility trenches backfilled below pavement sections, curb and gutter and sidewalks, should be compacted to at least 95% of the maximum density. All other trenches, including landscape areas, should be backfilled and compacted to at least 90% of the maximum density. The onsite soils may be used as embankment fill below the recommended pavement section construction.

Backfill near retaining walls should be compacted to a minimum of 95% of the maximum density as determined by ASTM D-698 (Standard Proctor). Only small compaction equipment should be used near (within 3 ft of) retaining walls.

6.3 SETTLEMENT

A maximum of 2.5 inches of settlement may occur in areas where up to 15 feet of fill will be placed. In order to minimize the potential damage to utilities, pavements and other structures, we recommend that the constructed embankment and wall be left in place for a period of no less than 6 weeks prior to final construction and installation of utilities. This time will allow settlement adjustments to occur and minimize the potential damage to the structures noted.

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6.4 MOISTURE PROTECTION AND SURFACE DRAINAGE

Excessive moisture should not be allowed to infiltrate the pavement subgrade soils, particularly in the vicinity of the retaining wall. Water runoff from the spring north of the roadway should be diverted to flow beyond the south end of the retaining wall or transmitted in piping at least 3 ft below the retaining wall leveling pad. A slope away from the wall should be maintained to allow free drainage from the wall.

6.5 ASPHALTIC PAVEMENT

Based on soil classifications and a laboratory obtained CBR value of 5.1, the near surface soils are expected to provide relatively good pavement support. Anticipated traffic volumes were not available at the time this report was prepared. However, based on our understanding of the project development we assumed traffic in the residential areas would consist of approximately 1,600 passenger vehicle trips per day with 2 percent trucks to account for occasional heavy equipment and over a 20 year design period. Based on the CBR value and the assumed traffic information, the recommended pavement thickness is:

Area	Asphalt (in.)	Untreated Road Base (in.)	Granular Borrow (in)
Roadway	3	6	12

Because of heavier loads associated with construction traffic additional (sacrificial) asphalt thickness will be required if pavement is to be installed prior to construction. As an alternative pavement thickness may be reduced to 2-in during construction and then increased to 4-inches with an overlay at the end of construction. An IGES representative should inspect all exposed roadway soils to confirm they meet a minimum CBR value of 5.1 prior to construction. Granular borrow material should possess a minimum California Bearing Ratio (CBR) value of 30, be relatively free draining with no particles greater than 4-inches in nominal diameter and a maximum fines content (material passing the No. 200 sieve) of 20 percent. Granular borrow material should be compacted to a minimum of 95 percent of the maximum dry density as

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determined by ASTM D-1557 (modified proctor). Asphalt has been assumed to be a high stability plant mix and base course material composed of crushed stone with a minimum CBR of 70.

Native subgrade preparation should be performed prior to placement of granular borrow as discussed in Section 6.2.1, i.e., scarification, moisture conditioning and compaction of at least 12-inches to at least 98 percent of the maximum dry density as determined by ASTM D-698 (Standard Proctor).

6.6 SOIL CORROSION POTENTIAL

Soluble sulfate, resistivity and pH laboratory tests were completed to assess the potential for corrosion due to the chemistry of the native soils. It was found that the existing soils have a low degree of sulfate attack with concrete (50 mg/kg soluble sulfates). Based on these results conventional Type I/II Cement may be used in all concrete in contact with site soils.

Metal corrosion was evaluated based on the resistivity tests conducted. The minimum resistance results of 1200 ohm-cm indicate the on-site soils are severely corrosive to metal. Based on these results, it is anticipated that a corrosion engineer will need to be consulted to develop site-specific recommendations for sacrificial thickness or cathodic protection for underground, exposed metal portions of the project.

6.7 RETAINING WALL SYSTEM

Based on the information provided, IGES, Inc. has completed the modular concrete block wall design to retain embankment fill utilized in the construction of the proposed Jordan River Drive. The design was completed in accordance with the plans and specifications provided to us. The maximum wall height is approximately 15 feet near Station 23+00. As requested by South Jordan City, Keystone™ modular concrete block units (Standard 21.5-inch Block) were selected for design. Using this modular concrete block product the wall batter will be 7.1 degrees (1H:8V). Tensar UX 1400SB geogrid reinforcement was selected for use in the analysis.

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Owing to the nature of the retaining structure, results of field observations, prior experience in the area and laboratory testing of soils encountered in this investigation, fine-grained native soils derived from local cuts are not considered suitable for embankment backfill in the retaining wall. Imported granular soils meeting the following specifications are recommended as embankment backfill.

Recommended Backfill Parameters					
Designation	Max Particle Size	% passing #40 Sieve	% passing #200 sieve	Plasticity Index (PI)	Liquid Limit (LL)
Select Backfill	2-in	≤60	≤15	≤6	-
Semi-Select Backfill	2-in	-	≤35	≤10	≤40

Assuming that the semi-select backfill is used, soil strength values of 30 degrees and 0 psf cohesion were assumed. The in-place soil unit weight was assumed to average 120 pcf. Traffic dead and live loads of 100 and 120 psf, respectively were assumed based on recommendations by the National Concrete Masonry Association (NCMA).

As described above, the location of the groundwater is below the proposed wall elevations and hydrostatic forces were not included in the wall analysis. Should groundwater conditions encountered during construction be different from those indicated, IGES should be notified and modifications to the design be incorporated as necessary. The NCMA's design methodology for segmental retaining walls (second edition) was followed.

Site reconnaissance indicated the presence of a spring which surfaces uphill of the proposed embankment. Water from the spring flows through an unlined channel into a small unlined pond near the east fence of the Blake Hancock property; consideration should be given to lining of the channel and pond to minimize the potential for seepage losses from the pond to saturate the embankment fill. Overflow from the pond is currently transmitted beneath the proposed road

alignment via a PVC pipe. The depth of the existing pipe installation was not determined as part of this investigation. It is probable that the location of the pipe may interfere with the installation of geogrid reinforcing for the proposed wall. If possible, the location of the pipe should be accurately determined prior to construction. IGES further recommends that the suitability of the existing pipe be evaluated given the proposed embankment and road loading. If necessary, the pipe should be replaced or relocated to minimize the potential for spring water to saturate the embankment fill. Appropriate collection/diversion measures should also be prepared by the contractor to prevent saturation of soils and the work areas during construction.

Internal and external stability analysis of the wall was completed using NCMA's Segmental Retaining Wall Software SRWall (Version 3.22, March 2002). Internal connection forces between the Keystone Standard 21.5-inch blocks and Tensar UX 1400SB geogrid were based on test data obtained from Keystone Retaining Walls. Additional geogrid reinforcement parameters and reduction factors used in the analysis were also obtained from Keystone. The following table summarizes the long-term allowable tensile design load reduction and safety factors used.

FACTOR	VALUE USED
RF_{cr} (creep reduction)	2.64
RF_d (durability reduction)	1.00
RF_{id} (installation reduction)	1.05
FS (overall factor of safety)	1.50

The tallest section of the wall was considered to be the most critical section for the design of the reinforcement and global stability. The remainder of the wall reduces in height on either side. A graphical representation of retaining wall and reinforcement installation at the critical section is included on Plate C-1.

Using these design parameters, the reinforcement layers were designed based on the internal and external stability assessment under both static and seismic conditions for a maximum considered wall height of approximately 15.33 feet (approximately 13.8-feet exposed). Seismic analysis of

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retaining wall and global stability were performed using a design horizontal acceleration of 0.31g which represents 67% of the horizontal acceleration attributed to the Maximum Considered Earthquake (MCE) for the site (Leyendecker et al, 2000). Based on our analysis a total of 11 layers of geogrid are required at the maximum height with the minimum lengths and relative elevations shown in the following table.

Geogrid Placement		
Height (ft) From bottom of wall	Overlying Course	Minimum Length
1.33	3	10.5
3.33	6	10.5
5.33	9	10.5
7.33	12	10.5
8.67	14	10.5
10.67	17	11.5
11.33	18	11.5
12.67	20	14.0
13.33	21	14.0
14.00	22	16.0
14.67	23	26.0

As the wall decreases in height the upper layers of reinforcement may be omitted; however, for walls greater than 10 feet in overall height the topmost layer should always be at least 26 feet in length. The upper layers of grid were lengthened to provide additional pullout resistance during a seismic event. It should also be noted that while the wall is stable it is possible that the topmost 2 or 3 modular block units will need to be replaced after an earthquake event.

Manufacturer's details of the design wall components and installation methods are included in the attached drawing (Plate C-2). The 12-inches of gravel required for drainage behind the wall should consist of clean drain rock gravel that complies with the geogrid reinforcement

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manufacturer's recommendations and should be separated from embankment fill by the placement of filter fabric as shown on Plate C-1. This same gravel material should be used to fill the annulus within the modular block units. All discharge from the installed drainage collection piping should be located downgradient of the wall foundation.

Global stability of the block wall with a 15-degree maximum front slope and a level back slope was evaluated using GSTABL 7 and the soil parameters listed above. Long term design strength parameters for the Tensar UX 1400SB geogrid were also used in the stability model. Based on our analysis, the global stability of the wall was evaluated to be stable under both static and seismic conditions with factors-of-safety of 2.3 and 1.18, respectively. The global stability output plots of the critical wall section are included in this report (Plates C-3 and C-4).

The choice of a road barrier type was not made by South Jordan City at the time of this report. There are several available barriers or copings that may be implemented with the Keystone modular block product and selected reinforcement, such as timber mounted guard rails or cast-in-place concrete barriers. Details for installation of these products can be obtained from Keystone Retaining Walls or AMCOR, their local distributor. In future planning South Jordan City should also take care to ensure that underground utility installation be limited to the west side of the proposed roadway in order to avoid damage to the geogrid reinforcement installed during wall construction on the east side of the road. No utilities should be placed within 30 feet of the retaining wall to minimize the potential for damage during installation and future maintenance.

The design recommendations presented assume an appropriate amount of testing and inspection will be performed during the placement and compaction of embankment fill. Observations should be made during construction to verify compliance with the drawings and specifications. Compaction testing of the fill material should be completed at regular intervals throughout the height of the wall and a minimum of 95 percent of ASTM D 698 (standard proctor) maximum density should be achieved. Within 3-feet of the wall only hand compaction equipment should be used and density requirements reduced. Observation of reinforcement placement at the facing connection and throughout the wall should also be performed.

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7.0 CLOSURE

7.1 LIMITATIONS

The recommendations contained in this report are based on our limited field exploration, laboratory testing, and understanding of the proposed construction. The subsurface data used in the preparation of this report were obtained from the explorations made for this investigation. It is possible that variations in the soil and groundwater conditions could exist between the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site that are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, our firm should also be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, expressed or implied, is made.

It is the Client's responsibility to see that all parties to the project including the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

7.2 ADDITIONAL SERVICES

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during the construction. IGES staff should be on site to verify compliance with these recommendations. These tests and observations should include, but not necessarily be limited to, the following:

- Observations and testing during site preparation, earthwork and structural fill placement.
- Consultation as may be required during construction.

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- Quality control and observation of concrete placement.

We also recommend that project plans and specifications be reviewed by us to verify compatibility with our conclusions and recommendations. Additional information concerning the scope and cost of these services can be obtained from our office.

We appreciate the opportunity to be of service on this project. Should you have any questions regarding the report or wish to discuss additional services, please do not hesitate to contact us at your convenience (801) 270-9400.

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8.0 REFERENCES CITED

Federal Emergency Management Agency [FEMA]. 1997. NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures. FEMA 302, Washington, D.C.

Frankel, A., Mueller, C., Barnard, T., Perkins, D., Leyendecker, E.V., Dickman, N., Hanson, S., and Hopper, M. 1996. "National Seismic-Hazard Maps: Documentation." U.S. Geological Survey Open-File Report 96-532, June.

Hecker, S. 1993. "Quaternary Tectonics of Utah with Emphasis on Earthquake-Hazard Characterization." Utah Geological Survey Bulletin 127.

Hintze, L.F., 1980, Geologic Map of Utah: Utah Geological and Mineral Survey Map-A-1, scale 1:500,000.

International Building Code [IBC], 2003, International Code Council, Inc.

Keaton, J.R., and Currey, D.R., 1993, Earthquake hazard evaluation of the West Valley fault zone in the Salt Lake City urban area, Utah: Utah Geological Survey, Contract Report 93-7, p. 69.

Leyendecker, E.V., Frankel, A.D., and Rukstales, K.S. 2000. "Seismic Design Parameters for use with the 2000 International Building Code, 2000 International Residential Code, 1997 NEHRP Seismic Design Provisions and 1997 NEHRP Rehabilitation Guidelines." Seismic Design 3.01. February.

Personius, S.F., and Scott, W.E., 1992, Surficial geologic map of the Salt Lake City segment of the Wasatch fault zone, Davis, Salt Lake, and Utah Counties, Utah: U.S. Geological Survey Miscellaneous Investigation Series Map I-2106, scale 1:50,000.

Salt Lake County. 1989. [Map of] Surface Rupture and Liquefaction Potential Special Study Areas, Salt Lake County, Utah, Salt Lake County Public Works – Planning Division.

Stokes, W.L. 1986. Geology of Utah. Utah Museum of Natural History [University of Utah] and Utah Geological and Mineral Survey.

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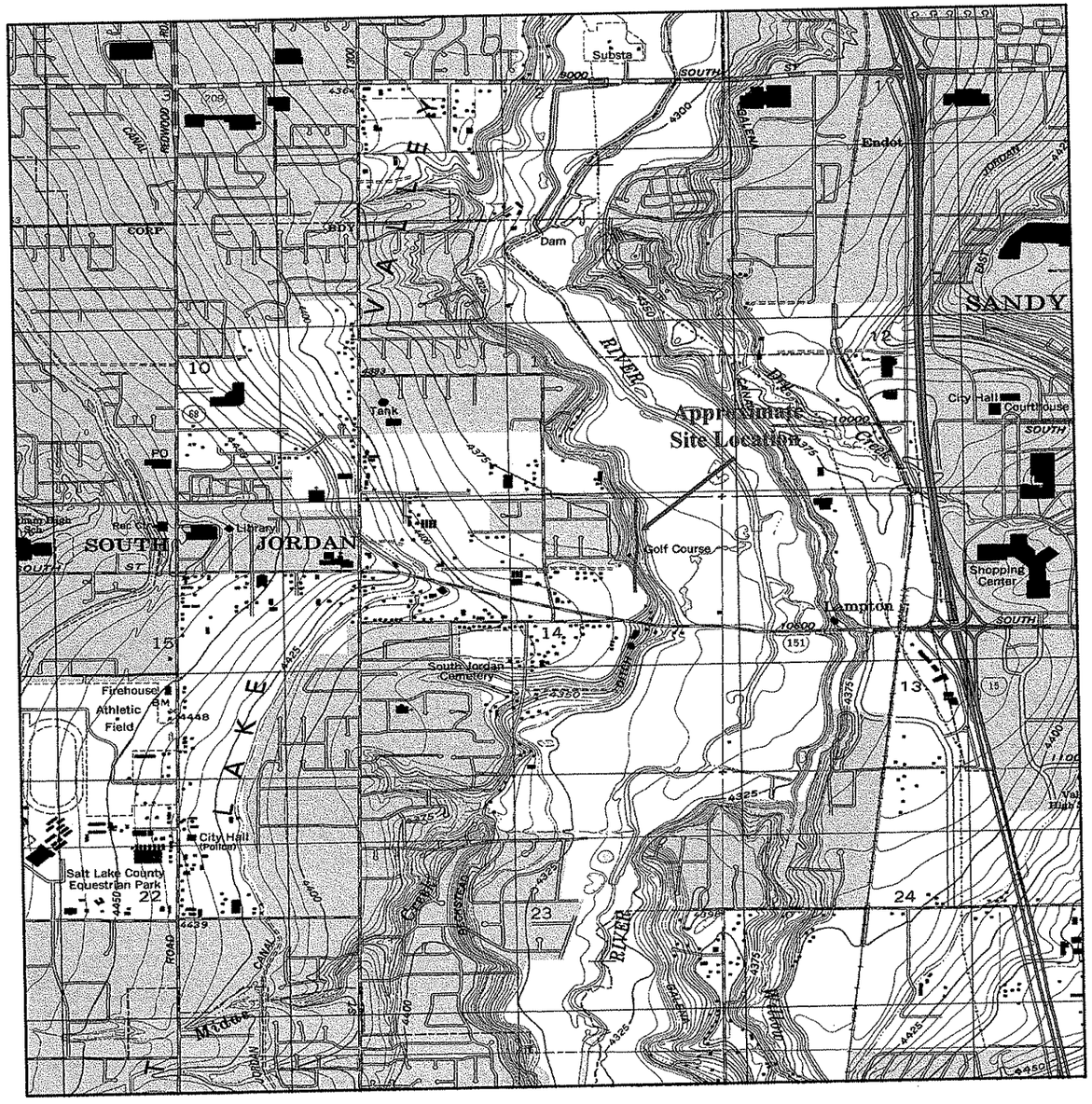
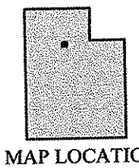


BASE MAP:
SOUTH JORDAN, UTAH
U.S.G.S. 7.5 MINUTE QUADRANGLES

0' 1000' 2000'
SCALE 1:24,000

CONTOUR INTERVAL (5 feet)



MAP LOCATION

N

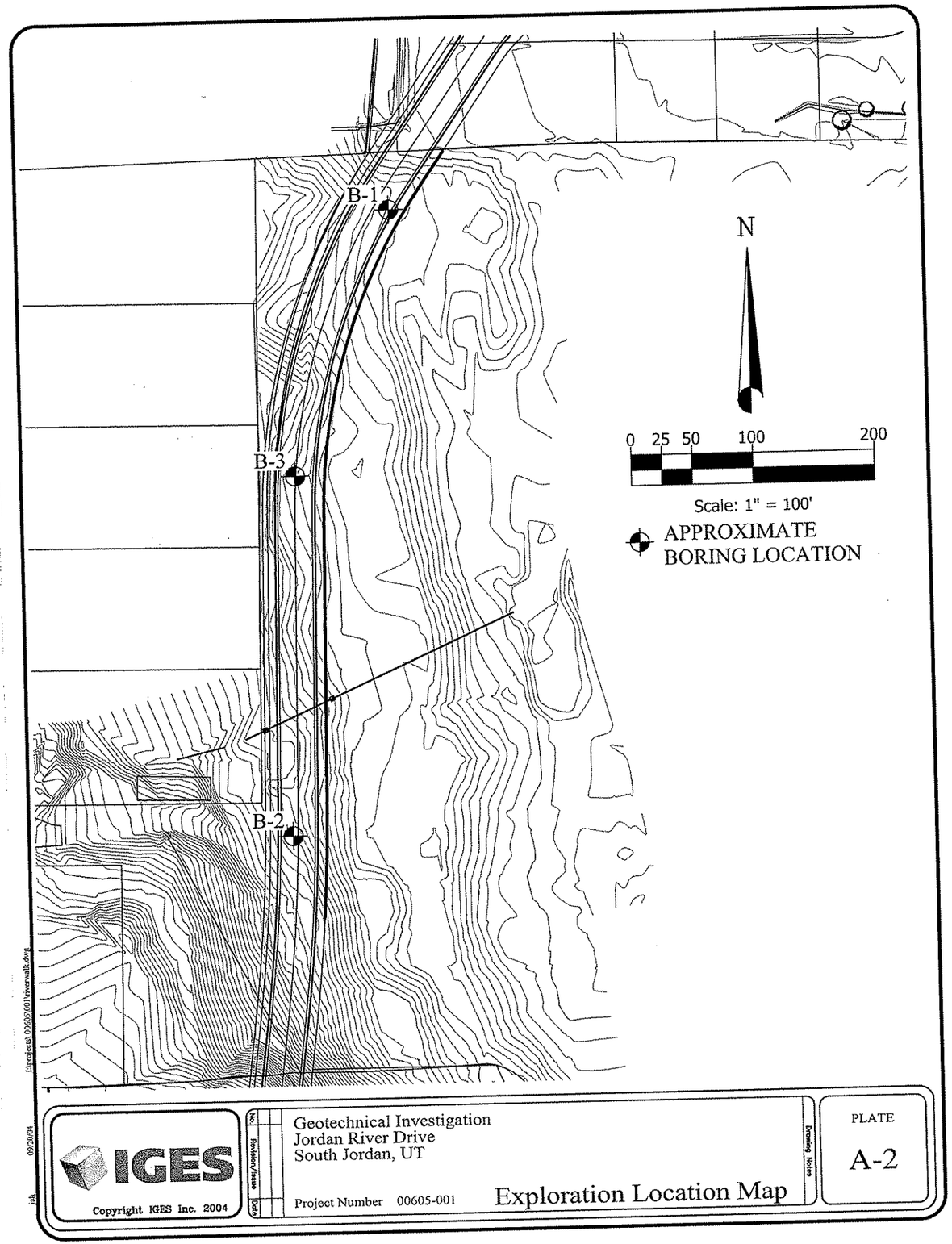
IGES

Project Number – 00605-001

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

SITE VICINITY MAP

Plate
A-1


B-1
B-2
B-3
N
0 25 50 100 200
Scale: 1" = 100'
APPROXIMATE
BORING LOCATION
IGES
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No.
Revision/Issue
Date
Geotechnical Investigation
Jordan River Drive
South Jordan, UT
Project Number 00605-001
Exploration Location Map
Drawing Notes
PLATE
A-2
09/20/04
jsh

DATE	
STARTED:	8/13/04
COMPLETED:	8/13/04
BACKFILLED:	8/13/04

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number 00605-001

IGES Rep: Dave B.
Rig Type: CME 55
Boring Type: 6" HSA

BORING NO: **B-1**

Sheet 1 of 1

LOCATION
NORTHING
EASTING
ELEVATION
STA 17+50

DEPTH (METERS)	DEPTH (FEET)	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	N	N*	SPT BLOW COUNT 10 20 30 40 50 60 70 80 90	Dry Density (pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits: Plastic Limit – Moisture Content – Liquid Limit 10 20 30 40 50 60 70 80 90
0	0				CL	Lean CLAY - dark gray, moist, stiff									
1							29	19		102.8	23.2				
	5				CL	Lean CLAY - brown, moist, medium stiff	13	9		101.9	20.8		30	11	
2							10	7		101.5	20.1				
3	10				CH	Fat CLAY - brown, moist to very moist, soft, few pinholes	5	4							
4										92.6	29.4				
	15		▽				4	3							
5															
6	20				GM	Silty GRAVEL - brown, wet, loose	20	10							
7						Bottom of Boring @ 21.5 Feet									
	25														
8															
9	30														
10															
	35														
11															
12	40														
13															

N - OBSERVED UNCORRECTED BLOW COUNT * N - UNCORRECTED, EQUIVALENT SPT BLOW COUNT FR - FIELD REFUSAL

IGES

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SAMPLE TYPE
- 2" O.D./1.38" I.D. SPLIT SPOON SAMPLER
- 3.25" O.D./2.42" I.D. U SAMPLER
- 3" O.D. THIN-WALLED SHELBY SAMPLER
- GRAB SAMPLE
- Modified California Sampler

NOTES:

WATER LEVEL
▼ - MEASURED ▽ - ESTIMATED

Plate

A - 3

DATE
STARTED: 8/13/04
COMPLETED: 8/13/04
BACKFILLED: 8/13/04

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number 00605-001

IGES Rep: Dave B.
Rig Type: CME 55
Boring Type: 6" HSA

BORING NO: **B-2**
Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION
STA 22+50

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	N	N*	SPT BLOW COUNT 10 20 30 40 50 60 70 80 90	Dry Density (pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits: Plastic Limit – Moisture Content – Liquid Limit 10 20 30 40 50 60 70 80 90
0	0				CL	Lean CLAY - dark gray, moist, stiff									
1															
2	5						22	15		106.0	17.5				
3	10					- large roots	8	6							
4					ML	SILT - grayish brown, very moist, medium stiff									
5	15						6	4							
6	20						4	3		70.1	54.0				
7					CH	Fat CLAY - brown, very moist, stiff				86.5	35.6	60	35		
8	25						12	9							
9	30		▽			- gray and brown mottling	13	9		86.8	34.8				
10															
11	35				ML	Sandy SILT - dark gray, very moist to wet, stiff	22	15		93.3	28.6				
12	40				SM	Silty SAND - dark gray, wet, medium dense	21	11							
13						Bottom of Boring @ 41.5 Feet									

N - OBSERVED UNCORRECTED BLOW COUNT
* N - UNCORRECTED, EQUIVALENT SPT BLOW COUNT

IGES

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SAMPLE TYPE
- 2" O.D./1.38" I.D. SPLIT SPOON SAMPLER
- 3.25" O.D./2.42" I.D. U SAMPLER
- 3" O.D./2.42" I.D. CALIFORNIA SAMPLER
- GRAB SAMPLE
- Modified California Sampler

NOTES:

WATER LEVEL
▼ - MEASURED ▽ - ESTIMATED

Plate A - 4

DATE	
STARTED:	8/13/04
COMPLETED:	8/13/04
BACKFILLED:	8/13/04

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number 00605-001

IGES Rep: Dave B.
Rig Type: CME 55
Boring Type: 6" HSA

BORING NO: **B-3**

Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION
STA 19+00

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	N	N*	SPT BLOW COUNT 10 20 30 40 50 60 70 80 90	Dry Density (pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits: Plastic Limit – Moisture Content – Liquid Limit 10 20 30 40 50 60 70 80 90
0	0				CL-ML	Silty CLAY - light brown, moist, soft									
1							5	4		93.5	17.6				
	5									92.8	16.2		21	4	
2							9	7							
3	10						4	3							
4															
	15		▽				4	4							
5															
6	20						5	4		99.8	25.4				
7															
	25						6	22							
8					CL	Lean CLAY - brown, wet, medium stiff									
9	30				SM	Silty SAND - dark gray, wet, medium dense	33	17							
10						Bottom of Boring @ 31.5 Feet									
11	35														
12	40														
13															

N - OBSERVED UNCORRECTED BLOW COUNT

* N - UNCORRECTED, EQUIVALENT SPT BLOW COUNT

IGES

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SAMPLE TYPE
- 2" O.D./1.38" I.D. SPLIT SPOON SAMPLER
- 3.25" O.D./2.42" I.D. U SAMPLER
- 3" O.D./2.42" I.D. CALIFORNIA SAMPLER
- GRAB SAMPLE
- Modified California Sampler

NOTES:

WATER LEVEL
▼ - MEASURED ▽ - ESTIMATED

Plate

A - 5

LOG OF BORING (A) CAL 00605-001.GPJ IGES.GDT 9/8/04

UNIFIED SOIL CLASSIFICATION SYSTEM

MAJOR DIVISIONS			USCS SYMBOL	TYPICAL DESCRIPTIONS
COARSE GRAINED SOILS (More than half of material is larger than the #200 sieve)	GRAVELS (More than half of coarse fraction is larger than the #4 sieve)	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
			GP	POORLY-GRADED GRAVELS, GRAVEL-SAND MIXTURES WITH LITTLE OR NO FINES
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVELS, GRAVEL-SILT-SAND MIXTURES
			GC	CLAYEY GRAVELS, GRAVEL-SAND-CLAY MIXTURES
	SANDS (More than half of coarse fraction is smaller than the #4 sieve)	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
			SP	POORLY-GRADED SANDS, SAND-GRAVEL MIXTURES WITH LITTLE OR NO FINES
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, SAND-GRAVEL-SILT MIXTURES
			SC	CLAYEY SANDS SAND-GRAVEL-CLAY MIXTURES
FINE GRAINED SOILS (More than half of material is smaller than the #200 sieve)	SILTS AND CLAYS (Liquid limit less than 50)		ML	INORGANIC SILTS & VERY FINE SANDS, SILTY OR CLAYEY FINE SANDS, CLAYEY SILTS WITH SLIGHT PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, GRAVELLY CLAYS, SANDY CLAYS, SILTY CLAYS, LEAN CLAYS
			OL	ORGANIC SILTS & ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS (Liquid limit greater than 50)		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SAND OR SILT
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS & ORGANIC SILTS OF MEDIUM-TO-HIGH PLASTICITY
HIGHLY ORGANIC SOILS			PT	PEAT, HUMUS, SWAMP SOILS WITH HIGH ORGANIC CONTENTS

LOG KEY SYMBOLS

- BORING SAMPLE LOCATION
- TEST-PIT SAMPLE LOCATION
- WATER LEVEL (level after completion)
- WATER LEVEL (level where first encountered)

CEMENTATION

DESCRIPTION	DESCRIPTION
WEAKELY	CRUMBLES OR BREAKS WITH HANDLING OR SLIGHT FINGER PRESSURE
MODERATELY	CRUMBLES OR BREAKS WITH CONSIDERABLE FINGER PRESSURE
STRONGLY	WILL NOT CRUMBLE OR BREAK WITH FINGER PRESSURE

OTHER TESTS KEY

C	CONSOLIDATION	SA	SIEVE ANALYSIS
AL	ATTERBURG LIMITS	DS	DIRECT SHEAR
UC	UNCONFINED COMPRESSION	T	TRIAXIAL
S	SOLUBILITY	R	RESISTIVITY
O	ORGANIC CONTENT	RV	R-VALUE
CBR	CALIFORNIA BEARING RATIO	SU	SOLUBLE SULFATES
COMP	MOISTURE/DENSITY RELATIONSHIP	PM	PERMEABILITY
CI	CALIFORNIA IMPACT	-200	% FINER THAN #200
COL	COLLAPSE POTENTIAL	Gs	SPECIFIC GRAVITY
SS	SHRINK SWELL	SL	SWELL LOAD

MODIFIERS

DESCRIPTION	%
TRACE	<5
SOME	5 - 12
WITH	>12

MOISTURE CONTENT

DESCRIPTION	FIELD TEST
DRY	ABSENCE OF MOISTURE, DUSTY, DRY TO THE TOUCH
MOIST	DAMP BUT NO VISIBLE WATER
WET	VISIBLE FREE WATER, USUALLY SOIL BELOW WATER TABLE

GENERAL NOTES

1. Lines separating strata on the logs represent approximate boundaries only. Actual transitions may be gradual.
2. No warranty is provided as to the continuity of soil conditions between individual sample locations.
3. Logs represent general soil conditions observed at the point of exploration on the date indicated.
4. In general, Unified Soil Classification designations presented on the logs were evaluated by visual methods only. Therefore, actual designations (based on laboratory tests) may vary.

STRATIFICATION

DESCRIPTION	THICKNESS
SEAM	1/16 - 1/2"
LAYER	1/2 - 12"

DESCRIPTION	THICKNESS
OCCASIONAL	ONE OR LESS PER FOOT OF THICKNESS
FREQUENT	MORE THAN ONE PER FOOT OF THICKNESS

APPARENT / RELATIVE DENSITY - COARSE-GRAINED SOIL

APPARENT DENSITY	SPT (blows/ft)	MODIFIED CA. SAMPLER (blows/ft)	CALIFORNIA SAMPLER (blows/ft)	RELATIVE DENSITY (%)	FIELD TEST
VERY LOOSE	<4	<4	<5	0 - 15	EASILY PENETRATED WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
LOOSE	4 - 10	5 - 12	5 - 15	15 - 35	DIFFICULT TO PENETRATE WITH 1/2-INCH REINFORCING ROD PUSHED BY HAND
MEDIUM DENSE	10 - 30	12 - 35	15 - 40	35 - 65	EASILY PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
DENSE	30 - 50	35 - 60	40 - 70	65 - 85	DIFFICULT TO PENETRATED A FOOT WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER
VERY DENSE	>50	>60	>70	85 - 100	PENETRATED ONLY A FEW INCHES WITH 1/2-INCH REINFORCING ROD DRIVEN WITH 5-LB HAMMER

CONSISTENCY - FINE-GRAINED SOIL

CONSISTENCY	SPT (blows/ft)	TORVANE UNTRAINED SHEAR STRENGTH (tsf)	POCKET PENETROMETER UNCONFINED COMPRESSIVE STRENGTH (tsf)	FIELD TEST
VERY SOFT	<2	<0.125	<0.25	EASILY PENETRATED SEVERAL INCHES BY THUMB. EXUDES BETWEEN THUMB AND FINGERS WHEN SQUEEZED BY HAND.
SOFT	2 - 4	0.125 - 0.25	0.25 - 0.5	EASILY PENETRATED ONE INCH BY THUMB. MOLDED BY LIGHT FINGER PRESSURE.
MEDIUM STIFF	4 - 8	0.25 - 0.5	0.5 - 1.0	PENETRATED OVER 1/2 INCH BY THUMB WITH MODERATE EFFORT. MOLDED BY STRONG FINGER PRESSURE.
STIFF	8 - 15	0.5 - 1.0	1.0 - 2.0	INDENTED ABOUT 1/2 INCH BY THUMB BUT PENETRATED ONLY WITH GREAT EFFORT.
VERY STIFF	15 - 30	1.0 - 2.0	2.0 - 4.0	READILY INDENTED BY THUMBNAIL.
HARD	>30	>2.0	>4.0	INDENTED WITH DIFFICULTY BY THUMBNAIL.

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Project Number 00605-001

Plate

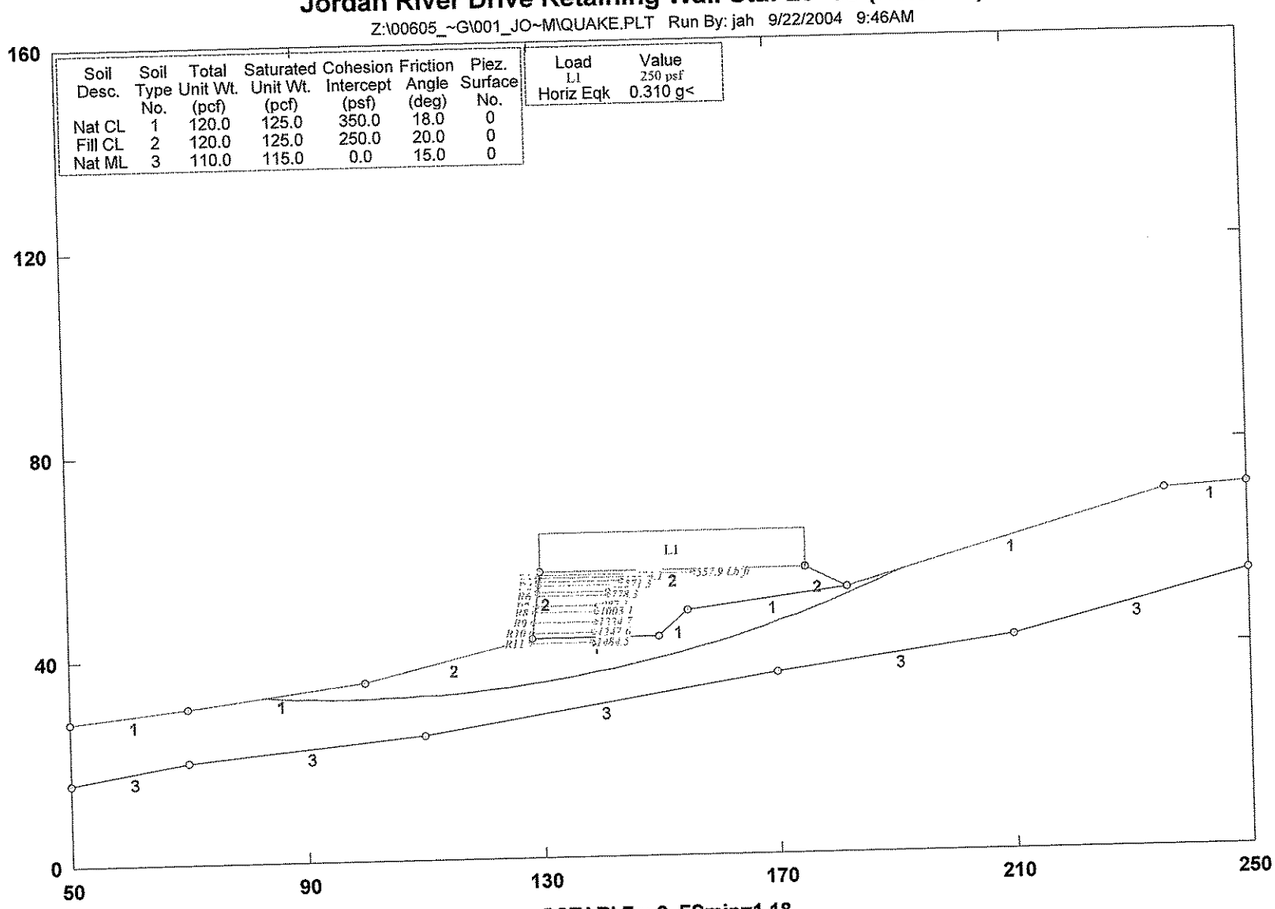
A-6

Jordan River Drive Retaining Wall Sta: 23+00 (Seismic)

Z:\00605_~G\001_JO~M\QUAKE.PLT Run By: jah 9/22/2004 9:46AM

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Nat CL	1	120.0	125.0	350.0	18.0	0
Fill CL	2	120.0	125.0	250.0	20.0	0
Nat ML	3	110.0	115.0	0.0	15.0	0

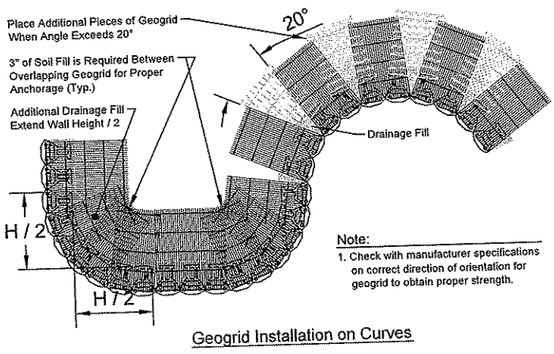
Load	Value
L1	250 psf
Horiz Eqk	0.310 g<



GSTABL7 v.2 FSmin=1.18

Factor Of Safety Is Calculated By The Modified Bishop Method

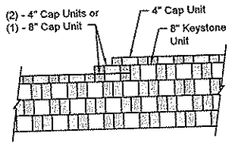
IGES



Note:

1. Check with manufacturer specifications on correct direction of orientation for geogrid to obtain proper strength.

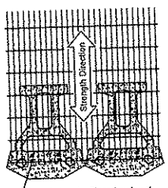
Geogrid Installation on Curves



Note:

1. Secure all cap units with Keystone Kapseal or equal.

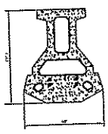
Top of Wall Steps



Geogrid is to be Placed on Level Backfill and Extended Over the Fiberglass Pins. Place Next Unit. Pull Grid Taught and Backfill. Stake as required.

Grid & Pin Connection

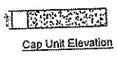
Standard Elevation



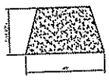
Standard Plan

Standard Unit

■ Dimensions May Vary by Region



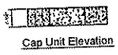
Cap Unit Elevation



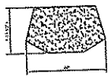
Cap Unit Plan

Universal Cap Unit Option

■ Dimensions & Availability Will Vary by Region



Cap Unit Elevation



Cap Unit Plan

3-Plane Split Cap Unit Option

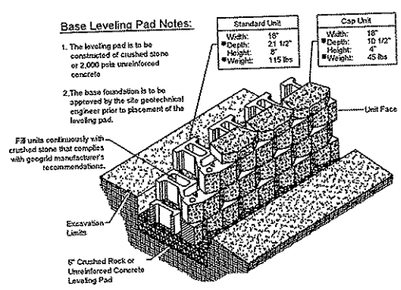
■ Dimensions & Availability Will Vary by Region

Base Leveling Pad Notes:

1. The leveling pad is to be constructed of crushed stone or 2,000 psis unreinforced concrete
2. The base foundation is to be approved by the site geotechnical engineer prior to placement of the leveling pad.

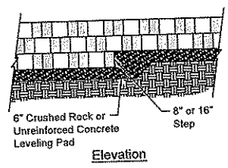
Standard Unit	
Width:	18"
■Depth:	21 1/2"
Height:	8"
■Weight:	115 lbs

Cap Unit	
Width:	18"
■Depth:	10 1/2"
Height:	4"
■Weight:	45 lbs



Standard Unit/Base Pad Isometric Section View

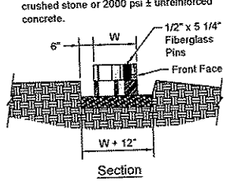
■ Dimensions & Weight May Vary by Region



Elevation

Note:

1. The leveling pad is to be constructed of crushed stone or 2000 psi ± unreinforced concrete.



Section

Leveling Pad Detail

REFERENCE
MANUFACTURER'S INSTALLATION DETAILS

CONSULTANTS

IGES

ideas for a changing world

14740 South Heritage Crest Way, Suite D
Bluffdale, Utah 84065
(801)571-8203 Fax: (801)501-0584

MARK	DATE	DESCRIPTION

ISSUE:	
PROJECT NO.:	00605-001
CAD DWG FILE	00605\001\RIVERWALK.DWG
DRAWN BY:	JAH
DESIGNED BY:	CSI/IGES
CHECKED BY:	JFW
COPYRIGHT:	IGES 2004
SHEET TITLE	

JORDAN RIVER DRIVE

RETAINING WALL

CONSTRUCTION DETAILS

C-2

APPENDIX C

Source of Material: B-1 3.0 ft.

Material Description: Lean CLAY (CL)

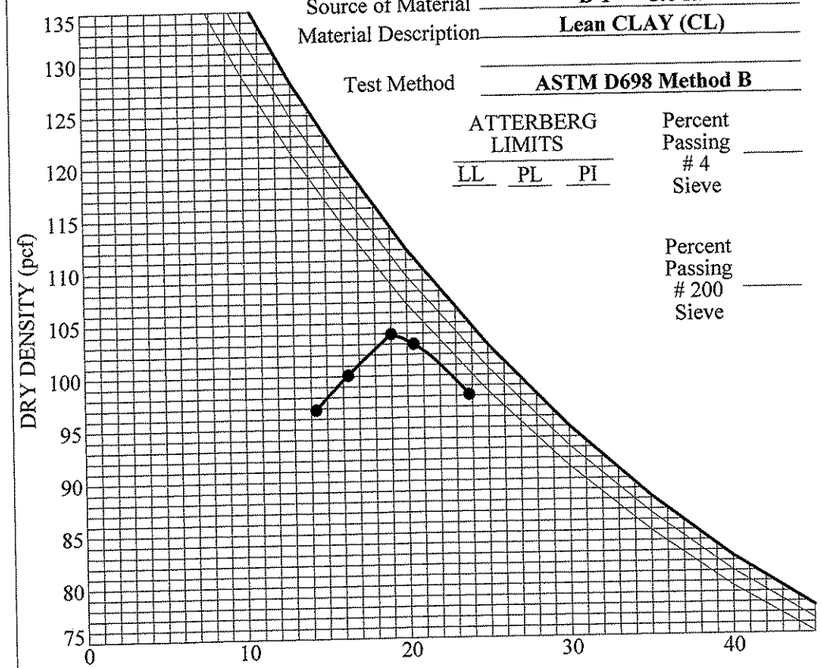
Test Method: ASTM D698 Method B

ATTERBERG LIMITS

LL PL PI

Percent Passing # 4 Sieve

Percent Passing # 200 Sieve

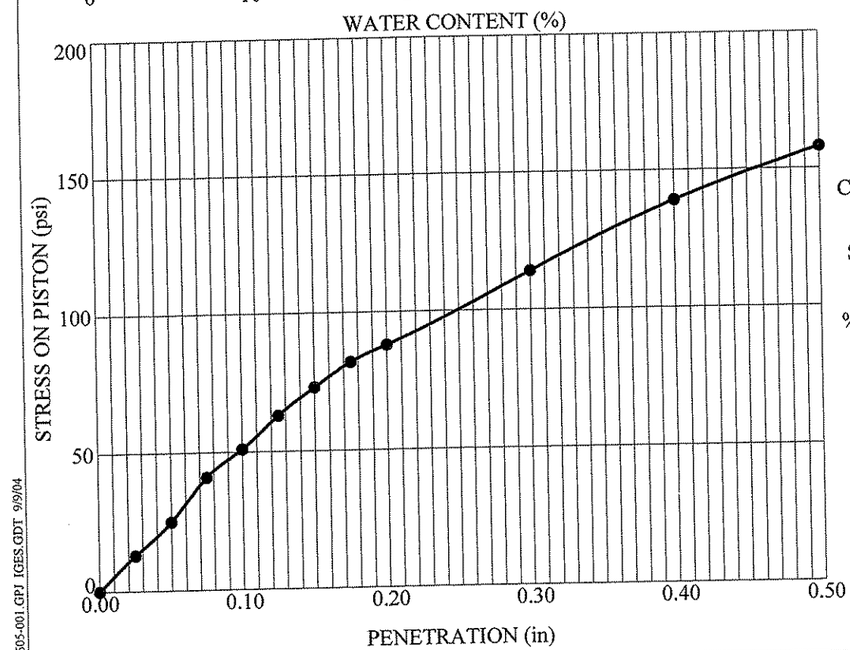


TEST RESULTS

Maximum Dry Density	103.9 (pcf)
Optimum Water Content	19.0 (%)
Percent Rock	(%)
Corrected Maximum Dry Density	(pcf)
Corrected Optimum Water Content	(%)

Curves of 100% Saturation for Specific Gravity Equal to:

2.60, 2.70, 2.80



Dry Density	104.9 (pcf)
Relative Compaction	101 (%)
Surcharge	50 (psf)
% Standard CBR	5.10
Swell	0.61 (%)

B_COMPACTION SPLIT 00605-001.GPJ IGES.GDT 9/9/04

IGES

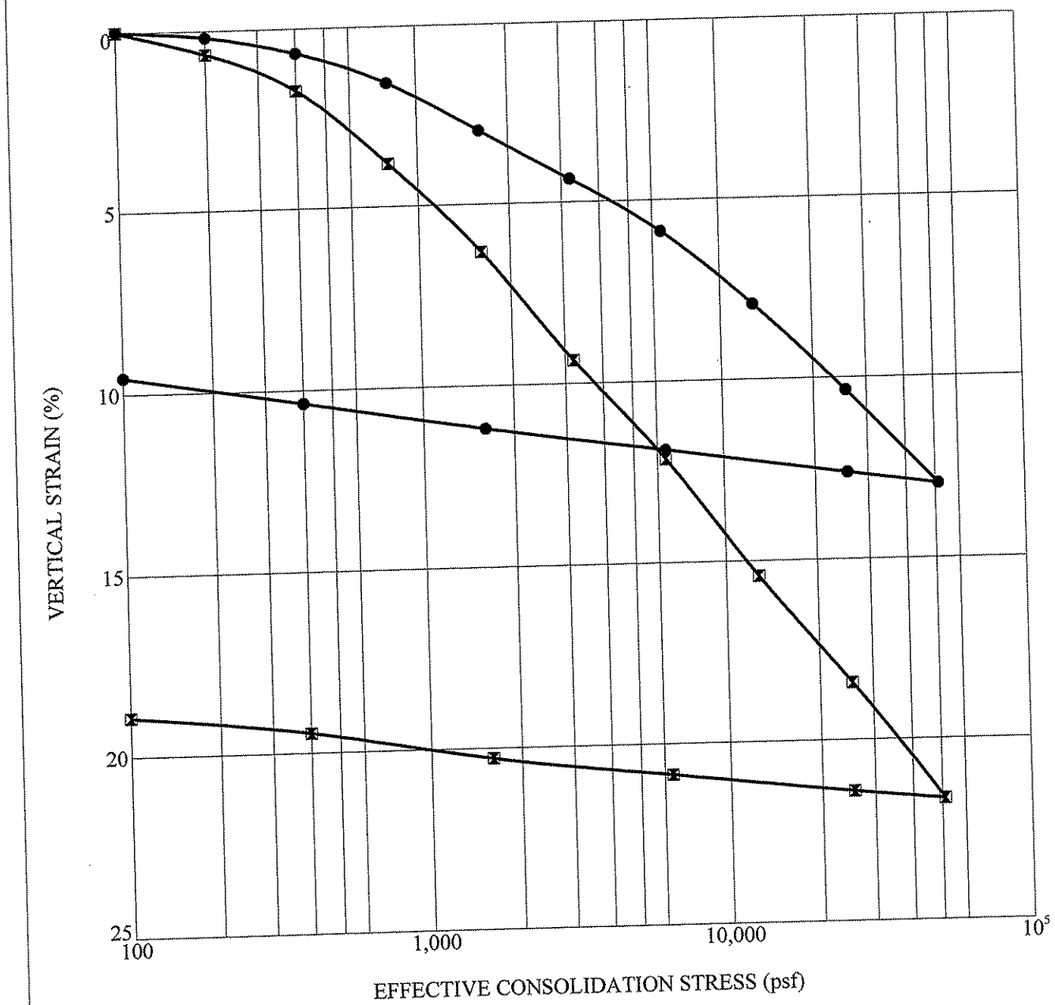
COMPACTION AND CBR TEST

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number: 00605-001

Plate

B - 4



	Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	C'_c	C'_r	OCR
●	B-1	7.0	Lean CLAY (CL)	102	20	0.086	0.012	2.3
⊠	B-3	4.5	Silty CLAY (CL-ML)	92	16	0.102	0.010	1.8

B_CONSOL 00605-001.GPJ IGES.GDT 9/24/04

IGES

1-D CONSOLIDATION TEST

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number: 00605-001

Plate

B - 2

APPENDIX B

DATE	
STARTED:	8/13/04
COMPLETED:	8/13/04
BACKFILLED:	8/13/04

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number 00605-001

IGES Rep: Dave B.
Rig Type: CME 55
Boring Type:6" HSA

BORING NO: **B-2**

Sheet 1 of 1

LOCATION
NORTHING EASTING ELEVATION
STA 22+50

DEPTH METERS	DEPTH FEET	SAMPLES	WATER LEVEL	GRAPHICAL LOG	UNIFIED SOIL CLASSIFICATION	MATERIAL DESCRIPTION	N	N*	SPT BLOW COUNT 10 20 30 40 50 60 70 80 90	Dry Density(pcf)	Moisture Content %	Percent minus 200	Liquid Limit	Plasticity Index	Moisture Content and Atterberg Limits (Plastic Limit – Moisture Content – Liquid Limit) 10 20 30 40 50 60 70 80 90
0	0				CL	Lean CLAY- dark gray, moist, stiff									
1															
	5						22	15		106.0	17.5				
2															
3	10					- large roots	8	6							
4															
	15				ML	SILT - grayish brown, very moist, medium stiff	6	4							
5															
6	20						4	3			70.1	54.0			
					CH	Fat CLAY - brown, very moist, stiff					86.5	35.6	60	35	
7															
	25						12	9							
8															
9	30		▽			- gray and brown mottling	13	9			86.8	34.8			
10															
	35				ML	Sandy SILT - dark gray, very moist to wet, stiff	22	15			93.3	28.6			
11															
12	40				SM	Silty SAND - dark gray, wet, medium dense	21	11							
13						Bottom of Boring @ 41.5 Feet									

N - OBSERVED UNCORRECTED BLOW COUNT * N - UNCORRECTED, EQUIVALENT SPT BLOW COUNT FR - FIELD REFUSAL

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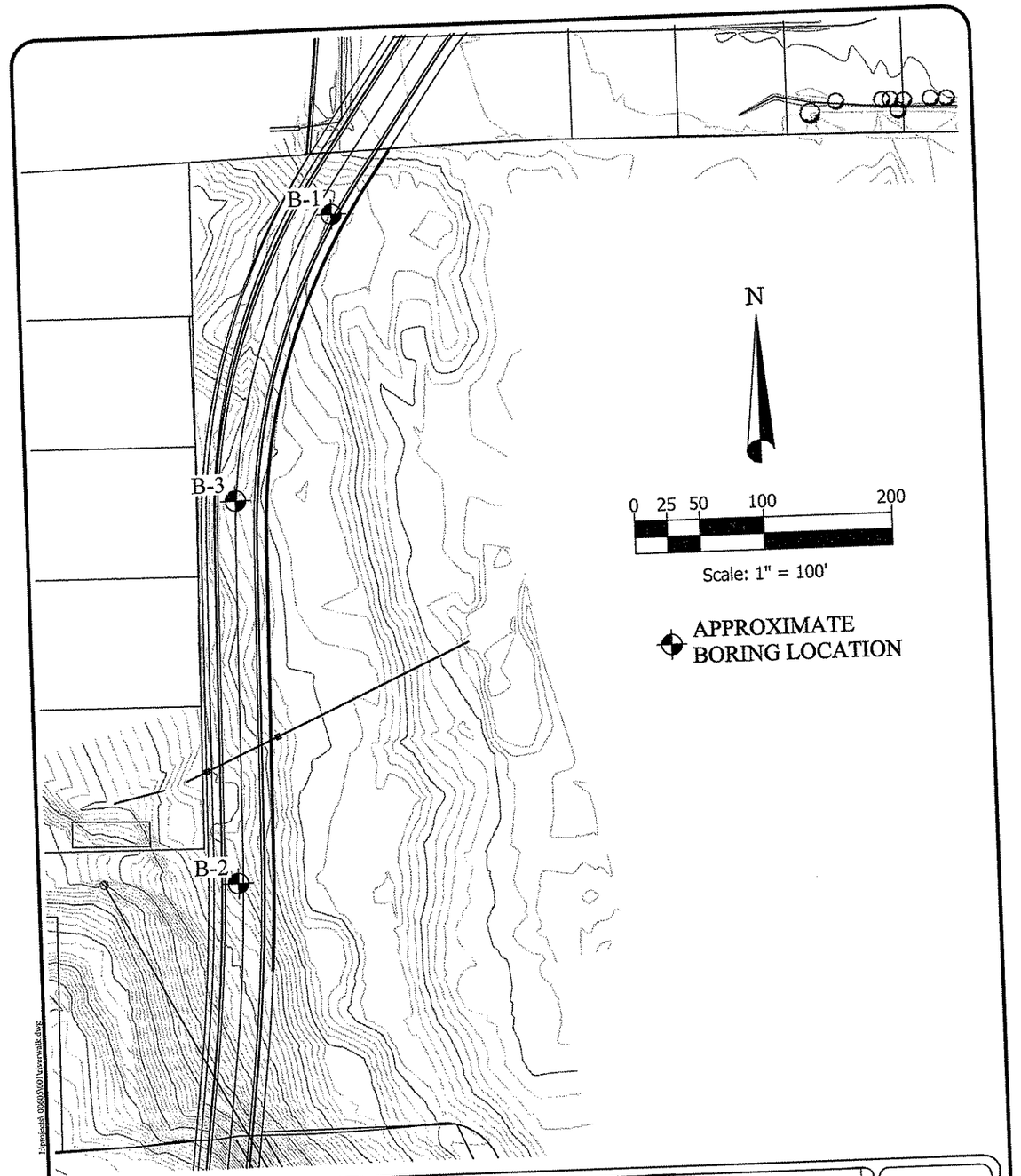
SAMPLE TYPE
- 2" O.D./1.38" I.D. SPLIT SPOON SAMPLER
- 3.25" O.D./2.42" I.D. U SAMPLER
- 3" O.D. THIN-WALLED SHELBY SAMPLER
- GRAB SAMPLE
- Modified California Sampler

NOTES:

WATER LEVEL
▼ - MEASURED ▽ - ESTIMATED

Plate A - 4

LOG OF BORING (A) 00605-001.GPJ IGES.GDT 9/24/04



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Geotechnical Investigation
Jordan River Drive
South Jordan, UT

Project Number 00605-001

Exploration Location Map

PLATE

A-2

APPENDIX A

8.0 REFERENCES CITED

Federal Emergency Management Agency [FEMA]. 1997. NEHRP Recommended Provisions for Seismic Regulations for New Buildings and Other Structures. FEMA 302, Washington, D.C.

Frankel, A., Mueller, C., Barnard, T., Perkins, D., Leyendecker, E.V., Dickman, N., Hanson, S., and Hopper, M. 1996. "National Seismic-Hazard Maps: Documentation." U.S. Geological Survey Open-File Report 96-532, June.

Hecker, S. 1993. "Quaternary Tectonics of Utah with Emphasis on Earthquake-Hazard Characterization." Utah Geological Survey Bulletin 127.

Hintze, L.F., 1980, Geologic Map of Utah: Utah Geological and Mineral Survey Map-A-1, scale 1:500,000.

International Building Code [IBC], 2003, International Code Council, Inc.

Keaton, J.R., and Currey, D.R., 1993, Earthquake hazard evaluation of the West Valley fault zone in the Salt Lake City urban area, Utah: Utah Geological Survey, Contract Report 93-7, p. 69.

Leyendecker, E.V., Frankel, A.D., and Rukstales, K.S. 2000. "Seismic Design Parameters for use with the 2000 International Building Code, 2000 International Residential Code, 1997 NEHRP Seismic Design Provisions and 1997 NEHRP Rehabilitation Guidelines." Seismic Design 3.01. February.

Personius, S.F., and Scott, W.E., 1992, Surficial geologic map of the Salt Lake City segment of the Wasatch fault zone, Davis, Salt Lake, and Utah Counties, Utah: U.S. Geological Survey Miscellaneous Investigation Series Map I-2106, scale 1:50,000.

Salt Lake County. 1989. [Map of] Surface Rupture and Liquefaction Potential Special Study Areas, Salt Lake County, Utah, Salt Lake County Public Works – Planning Division.

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7.0 CLOSURE

7.1 LIMITATIONS

The recommendations contained in this report are based on our limited field exploration, laboratory testing, and understanding of the proposed construction. The subsurface data used in the preparation of this report were obtained from the explorations made for this investigation. It is possible that variations in the soil and groundwater conditions could exist between the points explored. The nature and extent of variations may not be evident until construction occurs. If any conditions are encountered at this site that are different from those described in this report, our firm should be immediately notified so that we may make any necessary revisions to recommendations contained in this report. In addition, if the scope of the proposed construction changes from that described in this report, our firm should also be notified.

This report was prepared in accordance with the generally accepted standard of practice at the time the report was written. No warranty, expressed or implied, is made.

It is the Client's responsibility to see that all parties to the project including the Designer, Contractor, Subcontractors, etc. are made aware of this report in its entirety. The use of information contained in this report for bidding purposes should be done at the Contractor's option and risk.

7.2 ADDITIONAL SERVICES

The recommendations made in this report are based on the assumption that an adequate program of tests and observations will be made during the construction. IGES staff should be on site to verify compliance with these recommendations. These tests and observations should include, but not necessarily be limited to, the following:

- Observations and testing during site preparation, earthwork and structural fill placement.
- Consultation as may be required during construction.

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retaining wall and global stability were performed using a design horizontal acceleration of 0.31g which represents 67% of the horizontal acceleration attributed to the Maximum Considered Earthquake (MCE) for the site (Leyendecker et al, 2000). Based on our analysis a total of 11 layers of geogrid are required at the maximum height with the minimum lengths and relative elevations shown in the following table.

Geogrid Placement		
Height (ft) From bottom of wall	Overlying Course	Minimum Length
1.33	3	10.5
3.33	6	10.5
5.33	9	10.5
7.33	12	10.5
8.67	14	10.5
10.67	17	11.5
11.33	18	11.5
12.67	20	14.0
13.33	21	14.0
14.00	22	16.0
14.67	23	26.0

As the wall decreases in height the upper layers of reinforcement may be omitted; however, for walls greater than 10 feet in overall height the topmost layer should always be at least 26 feet in length. The upper layers of grid were lengthened to provide additional pullout resistance during a seismic event. It should also be noted that while the wall is stable it is possible that the topmost 2 or 3 modular block units will need to be replaced after an earthquake event.

Manufacturer's details of the design wall components and installation methods are included in the attached drawing (Plate C-2). The 12-inches of gravel required for drainage behind the wall should consist of clean drain rock gravel that complies with the geogrid reinforcement

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Owing to the nature of the retaining structure, results of field observations, prior experience in the area and laboratory testing of soils encountered in this investigation, fine-grained native soils derived from local cuts are not considered suitable for embankment backfill in the retaining wall. Imported granular soils meeting the following specifications are recommended as embankment backfill.

Recommended Backfill Parameters					
Designation	Max Particle Size	% passing #40 Sieve	% passing #200 sieve	Plasticity Index (PI)	Liquid Limit (LL)
Select Backfill	2-in	≤60	≤15	≤6	-
Semi-Select Backfill	2-in	-	≤35	≤10	≤40

Assuming that the semi-select backfill is used, soil strength values of 30 degrees and 0 psf cohesion were assumed. The in-place soil unit weight was assumed to average 120 pcf. Traffic dead and live loads of 100 and 120 psf, respectively were assumed based on recommendations by the National Concrete Masonry Association (NCMA).

As described above, the location of the groundwater is below the proposed wall elevations and hydrostatic forces were not included in the wall analysis. Should groundwater conditions encountered during construction be different from those indicated, IGES should be notified and modifications to the design be incorporated as necessary. The NCMA's design methodology for segmental retaining walls (second edition) was followed.

Site reconnaissance indicated the presence of a spring which surfaces uphill of the proposed embankment. Water from the spring flows through an unlined channel into a small unlined pond near the east fence of the Blake Hancock property; consideration should be given to lining of the channel and pond to minimize the potential for seepage losses from the pond to saturate the embankment fill. Overflow from the pond is currently transmitted beneath the proposed road

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6.4 MOISTURE PROTECTION AND SURFACE DRAINAGE

Excessive moisture should not be allowed to infiltrate the pavement subgrade soils, particularly in the vicinity of the retaining wall. Water runoff from the spring north of the roadway should be diverted to flow beyond the south end of the retaining wall or transmitted in piping at least 3 ft below the retaining wall leveling pad. A slope away from the wall should be maintained to allow free drainage from the wall.

6.5 ASPHALTIC PAVEMENT

Based on soil classifications and a laboratory obtained CBR value of 5.1, the near surface soils are expected to provide relatively good pavement support. Anticipated traffic volumes were not available at the time this report was prepared. However, based on our understanding of the project development we assumed traffic in the residential areas would consist of approximately 1,600 passenger vehicle trips per day with 2 percent trucks to account for occasional heavy equipment and over a 20 year design period. Based on the CBR value and the assumed traffic information, the recommended pavement thickness is:

Area	**Asphalt (in.)**	**Untreated Road Base (in.)**	**Granular Borrow (in)**
Roadway	3	6	12

Because of heavier loads associated with construction traffic additional (sacrificial) asphalt thickness will be required if pavement is to be installed prior to construction. As an alternative pavement thickness may be reduced to 2-in during construction and then increased to 4-inches with an overlay at the end of construction. An IGES representative should inspect all exposed roadway soils to confirm they meet a minimum CBR value of 5.1 prior to construction. Granular borrow material should possess a minimum California Bearing Ratio (CBR) value of 30, be relatively free draining with no particles greater than 4-inches in nominal diameter and a maximum fines content (material passing the No. 200 sieve) of 20 percent. Granular borrow material should be compacted to a minimum of 95 percent of the maximum dry density as

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stabilized prior to construction of pavement section or placement of embankment fill. Stabilization of the subgrade soils can be accomplished using a clean, coarse angular material worked into the soft subgrade. We recommend the material be greater than two-inches in nominal diameter, but less than six-inches. Locally available pit-run gravel may be suitable but should contain a high percentage of particles larger than two-inches and have less than seven percent fines (material passing the No. 200 Sieve). Pit-run gravel may not be as effective as a coarse, angular material in stabilizing the soft soils and will likely require more material be placed. The stabilization material should be worked (pushed) into the soft subgrade soils until a firm unyielding surface is established. Once a firm, unyielding surface is achieved, the area may be brought to final design grade using structural fill.

6.2.2 Excavation Stability

Grading plans prepared by CSI for Jordan River Drive show proposed 2H:1V cuts of up to 15 feet in height. The area containing the deepest of proposed cuts (Sta: 24+00-26+00) is located on an existing slope and was inaccessible by truck mounted drilling equipment. Prior investigations performed by IGES in the project vicinity indicate that the majority of soils within the cut region will consist of silty or sandy clays similar to Occupational Safety and Health (OSHA) type B soils. Based on OSHA guidelines for excavation safety, cuts up to 20 feet in depth with sidewalls sloped no steeper than 1H: 1V are stable for short periods. As stated previously exploration was not feasible on the slope; however, IGES created a theoretical model of the proposed cut to assess the slope stability. Using soil strength data from laboratory testing, the proposed cut slopes are suitable with safety factors of 2.1 and 1.4 for static and seismic conditions, respectively. In order to maintain the integrity of the cut slopes IGES recommends that short and long term erosion control measures be included as part of construction

6.2.3 Embankment Fill and Compaction

All fill employed for the support of pavements, should consist of structural fill. Structural fill may consist of native soils in cut areas and small fill height areas that are not adjacent to retaining walls provided that they are properly moisture conditioned, placed/scarified and compacted. Imported structural fill shall be used in all embankments that are retained by modular

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5.3 OTHER GEOLOGIC HAZARDS

Geologic hazards can be defined as naturally occurring geologic conditions or processes that could present a danger to human life and property. These hazards must be considered before development of the site. There are several hazards in addition to seismicity and faulting that may be present at the site, and which should be considered in the design of habitable structures as well as roads and other critical infrastructure. The geologic hazard considered pertinent for this site is liquefaction.

5.3.1 Liquefaction

Certain areas within Utah also possess a potential for liquefaction during seismic events. Liquefaction is a phenomenon whereby loose, saturated, granular soil deposits lose a significant portion of their shear strength due to excess pore water pressure buildup resulting from dynamic loading, such as that caused by an earthquake. Among other effects, liquefaction can result in densification of such deposits causing settlements of overlying layers after an earthquake as excess pore water pressures are dissipated. The primary factors affecting liquefaction potential of a soil deposit are: (1) level and duration of seismic ground motions; (2) soil type and consistency; and (3) depth to groundwater.

Referring to the "Liquefaction-Potential Map for a Part of Salt Lake County, Utah" published by the Utah Geological Survey the site is located within an area designated as "high" for liquefaction potential. Based on the field data collected for this site, it is our opinion that the soil deposits at the site generally have a moderate potential for liquefaction. Given the nature of construction addressed in this report, a detailed analysis of liquefaction potential is not considered necessary.

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5.0 GEOLOGIC CONDITIONS

5.1 GEOLOGIC SETTING

The site is located, at an elevation of approximately 4,310 to 4,388 feet, within the southern portion of the Salt Lake Valley. The Salt Lake Valley is a deep, sediment-filled structural basin of Cenozoic age flanked by two uplifted blocks, the Wasatch Range on the east and the Oquirrh Mountains to the west (Hintze, 1980). The northern portion of the Salt Lake Valley extends beyond the northern limits of the Oquirrh mountain range and is bordered on the west by the southeast shore of the Great Salt Lake. The Wasatch Range is the easternmost expression of pronounced Basin and Range extension in north-central Utah.

The near-surface geology of the Salt Lake Basin is dominated by sediments, which were deposited within the last 30,000 years by Lake Bonneville (Scott and others, 1983; Personius and Scott, 1992). As the lake receded, streams began to incise large deltas formed at the mouths of major canyons along the Wasatch Range, and the eroded material was deposited in shallow lakes and marshes in the basin and in a series of recessional deltas and alluvial fans. Sediments toward the center of the valley are predominately deep-water deposits of clay, silt and fine sand. However, these deep-water deposits are in places covered by a thin post-Bonneville alluvial cover. Surface sediments at the project site are mapped as upper Pleistocene lacustrine clay and silt undivided (lbpm) related to undivided deposits of the Bonneville Lake Cycle and middle Holocene to uppermost Pleistocene Stream alluvium 2 (al2) consisting of sand, silt and clay (Personius and Scott, 1992).

5.2 SEISMICITY AND FAULTING

Review of the "Surface Fault Rupture and Liquefaction Potential Special Study Areas" map dated March 31, 1989 and published by Salt Lake County Public Works - Planning Division, as well as other published maps indicate that no active faults are located through or near the property (Personius and Scott, 1992; Hecker, 1993). The site is located approximately 5 miles west of the Wasatch fault zone. The site is also located approximately 7 miles south of the West

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4.0 GENERALIZED SITE CONDITIONS

4.1 SURFACE CONDITIONS

The topography of the site varies dependant of the location along the road alignment. Just west of the proposed roadway near station 20+00 a spring was observed; water from the spring was visible at the surface in a small unlined channel and pond prior to being transmitted beneath the proposed alignment in a PVC pipe. The alignment of the proposed roadway is bounded on the east by Mulligan's Golf Course and on the west by single family residences. The proposed roadway runs north from 10600 South and continues into a planned development north of the golf course. Existing grade elevations along the road alignment range from approximately 4,310 to 4,388 (see pg 10 for other elevations) feet above mean sea level (msl).

4.2 SUBSURFACE CONDITIONS

As previously mentioned, the subsurface soil conditions were explored at the site by advancing 3 borings. The borings extended to depths of 21.5 to 41.5 feet below existing site grade. The subsurface soil conditions were logged at the time of the investigation and are included in the Boring Logs in Appendix A (Plates A-3 to A-5). The soil and moisture conditions encountered, during our investigation, are discussed below.

4.2.1 Soils

Subsurface soils at the site were comprised of layers of Clay (CH and CL), Silty CLAY (CL-ML), Silt (ML), and some Silty SAND (SM) and GRAVEL (GM) at the deepest extents of exploration. The stratification lines shown on the enclosed boring logs represent the approximate boundary between soil types. The actual in situ transition may be more gradual.

Please note that soil samples are normally discarded 30 days after submittal of the report unless this office receives a specific request to retain the samples for a longer period.

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subgrade soils. Electrochemical tests were completed to provide a preliminary assessment of the soil corrosion potential with respect to concrete and steel.

Results of the laboratory tests indicate that the on-site soils have dry unit weights ranging from 70.1 pcf to 106.0 pcf in the in-situ soils. The subsurface soils moisture content ranged from a low of 16.2% to a high of 54.0%.

Atterberg limit tests indicate that the soils plasticity index ranged from a low of 4 to a high of 35. The majority of the site soils classified as Lean CLAY (CL), Fat CLAY (CH), or Silty CLAY (CL-ML), as noted in the boring logs.

One dimensional Consolidation tests were performed on undisturbed samples throughout the site at varying depths. The results of the tests are contained in the Appendices of this report.

Results of the CBR test indicate that the near surface site soils will provide relatively good support for roadway pavements. A CBR value of 5.1 was obtained for the near surface soils.

As a preliminary indication of the soil corrosion potential, a soil soluble sulfate content of approximately 50 mg/kg, a pH of 8.2 and a electrical resistivity of 1200 ohm-cm were obtained in the laboratory for a sample of the soil taken from B-3 at a depth of 3 feet.

A direct shear and triaxial tests were performed on undisturbed samples to obtain strength parameters. The tests were performed on samples taken from B-1 at a depth of 3 feet and B-3 at a depth of 4.5 feet. The results of the test are contained in the Appendices of this report.

The results of the laboratory tests are presented on the attached Boring Logs and in the Summary of Laboratory Test Results located in the Appendices at the end of this report.

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Embankment fill for the proposed roadway will be supported by a retaining wall system on the east side of the road to limit encroachment on the golf course from Sta 17+50 - 24+00 (approximate). The retaining wall height will range from 5 to 15 feet. South Jordan City has selected a Mechanically Stabilized Earth (MSE) retaining wall with Keystone™ modular block wall facing to retain embankment fill in this section of the proposed roadway. IGES performed retaining wall design based on manufacturer supplied material properties. For settlement and bearing capacity design purposes, we have assumed embankment loads to be as high as 1.9 kips/ft^2.

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Based on soil classifications and a laboratory obtained CBR value of 5.1, the near surface soils are expected to provide relatively good pavement support. Anticipated traffic volumes were not available at the time this report was prepared. However, based on our understanding of the project development we assumed traffic in the residential areas would consist of approximately 1,600 passenger vehicle trips per day with 2 percent trucks to account for occasional heavy equipment over a 20 year design period. Based on the CBR value and the assumed traffic information, the recommended pavement thickness is:

Asphalt (in.)	Untreated Road Base (in.)	Granular Borrow (in)
3	6	12

NOTICE: The scope of services provided within this report are limited to the assessment of the subsurface conditions at the subject site. The executive summary is provided solely for purposes of overview and is not intended to replace the report of which it is part and should not be used separately from the report.

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APPENDICES

Appendix A	Plate A-1	Site Vicinity Map
	Plate A-2	Exploration Location Map
	Plates A-3 to A-5	Boring Logs
	Plate A-6	Key to Soil Symbols and Terms
Appendix B	Plate B-1	Atterberg Limit Test Results
	Plates B-2 to B-3	Consolidation Test Results
	Plate B-4	CBR and Proctor Test Results
	Plate B-5	Summary of Laboratory Test Results Table
Appendix C	Plate C-1	Retaining Wall Plan and Section View
	Plate C-2	Retaining Wall Construction Details
	Plate C-3	Global Stability Results (Static)
	Plate C-4	Global Stability Results (Seismic)

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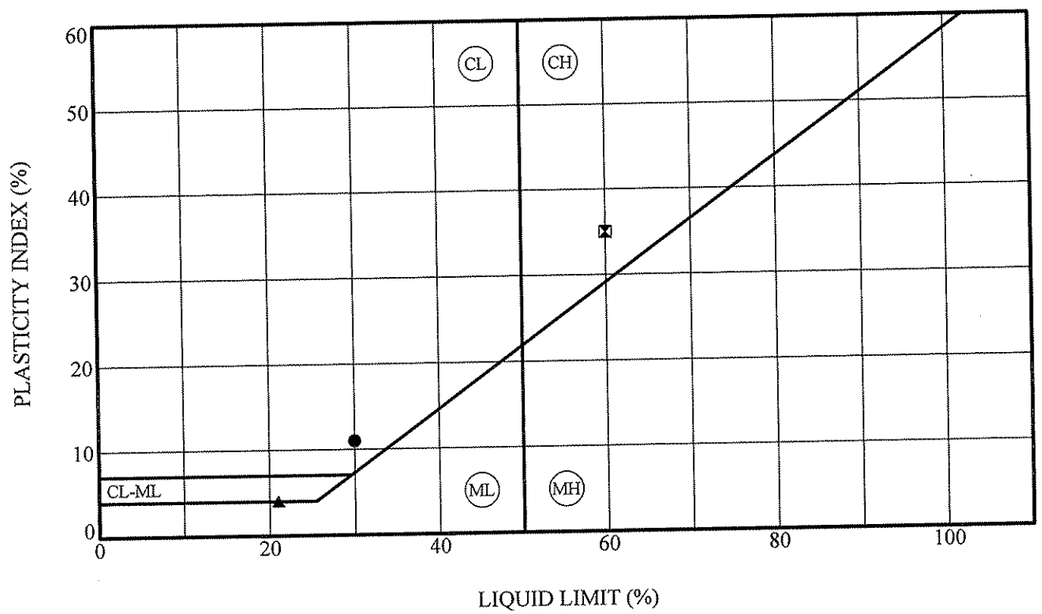
APPENDIX B



	Sample Location	Depth (ft)	LL (%)	PL (%)	PI (%)		Classification
●	**B-1**	**5.0**	**30**	**19**	**11**		**Lean CLAY (CL)**
⊠	**B-2**	**21.5**	**60**	**25**	**35**		**Fat CLAY (CH)**
▲	**B-3**	**4.5**	**21**	**17**	**4**		**Silty CLAY (CL-ML)**

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ATTERBERG LIMITS' RESULTS

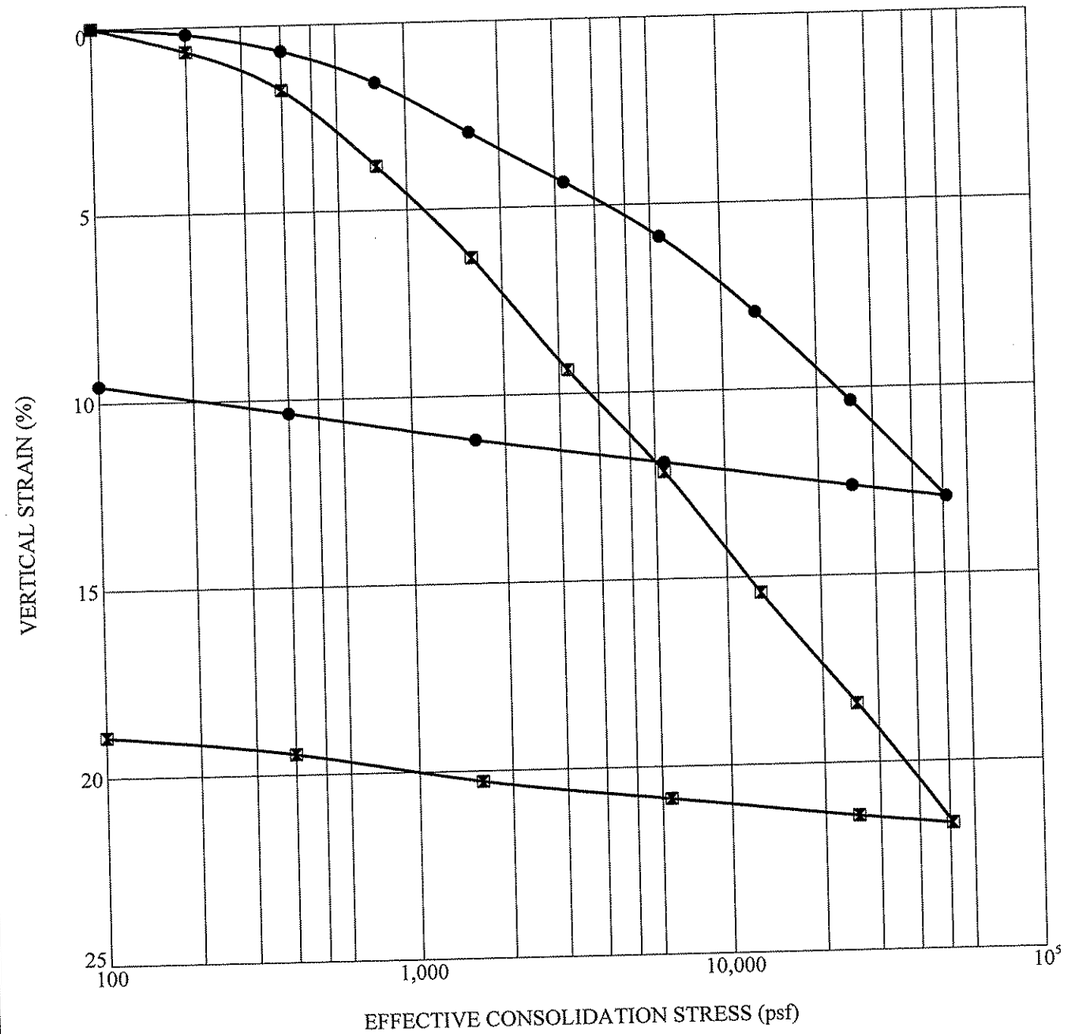
Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number: 00605-001

Plate

B - 1

B_ATTERBERG - (USCS) 00605-001.GPJ IGES.GDT 9/9/04



	Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	C'_c	C'_r	OCR
●	**B-1**	**7.0**	**Lean CLAY (CL)**	**102**	**20**	**0.086**	**0.012**	**2.3**
⊠	**B-3**	**4.5**	**Silty CLAY (CL-ML)**	**92**	**16**	**0.102**	**0.010**	**1.8**

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1-D CONSOLIDATION TEST

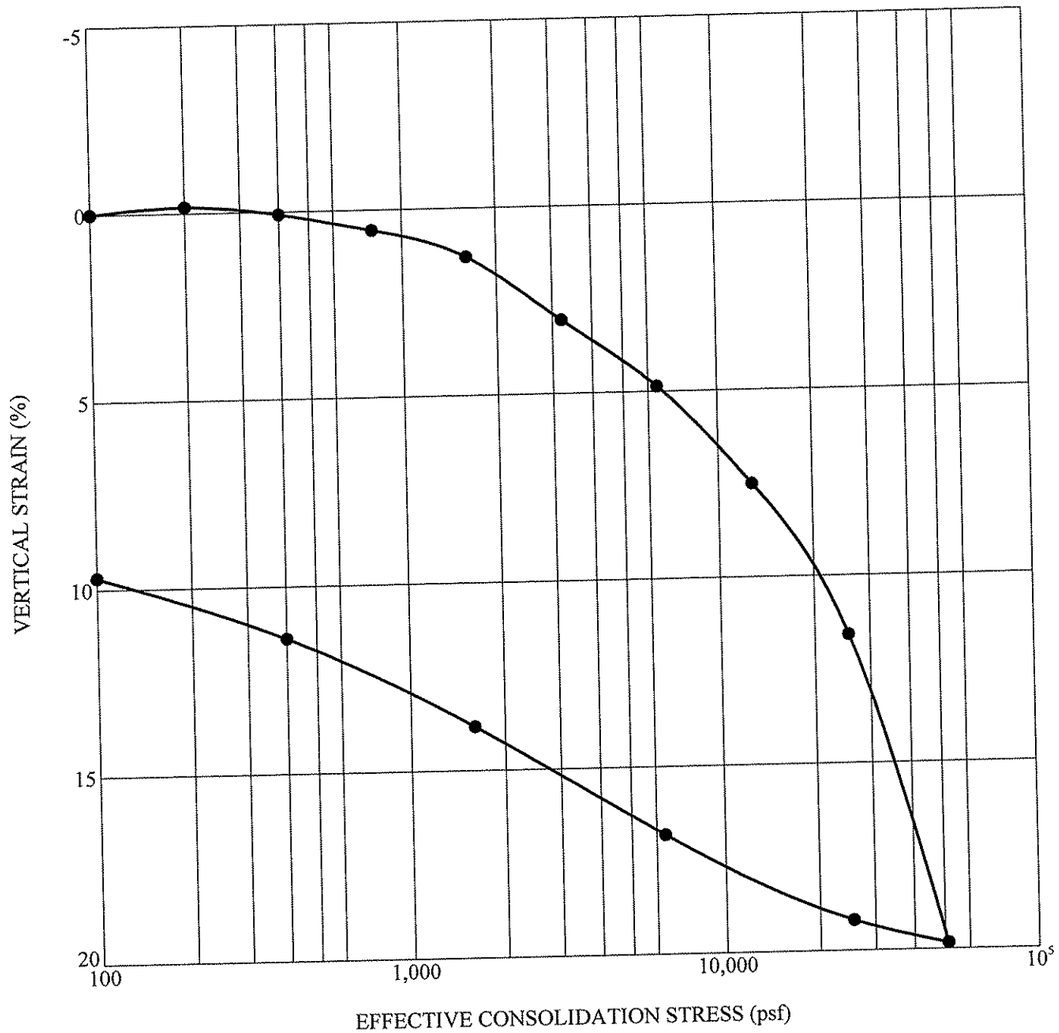
Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number: 00605-001

Plate

B - 2

B_CONSOL 00605-001.GPJ IGES.GDT 9/9/04



	Sample Location	Depth (ft)	Classification	γ_d (pcf)	MC (%)	C'_c	C'_r	OCR
●	**B-2**	**21.5**	**Fat CLAY (CH)**	**86**	**36**	**0.275**	**0.038**	**2.7**

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1-D CONSOLIDATION TEST

Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number: 00605-001

Plate

B - 3

B_CONSOL 00605-001.GPJ IGES.GDT 9/9/04

Source of Material: B-1 3.0 ft.

Material Description: Lean CLAY (CL)

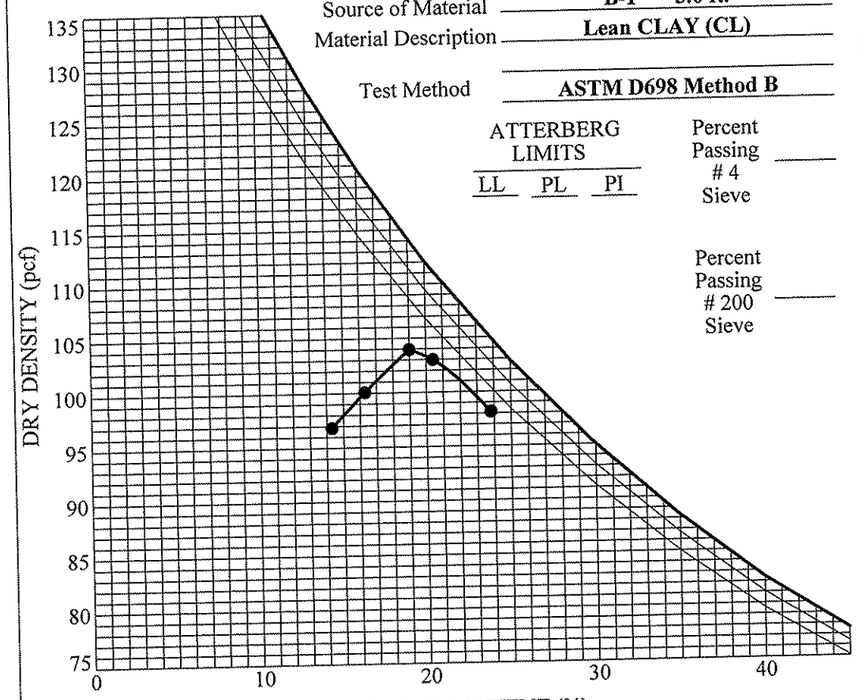
Test Method: ASTM D698 Method B

ATTERBERG LIMITS

LL PL PI

Percent Passing # 4 Sieve

Percent Passing # 200 Sieve

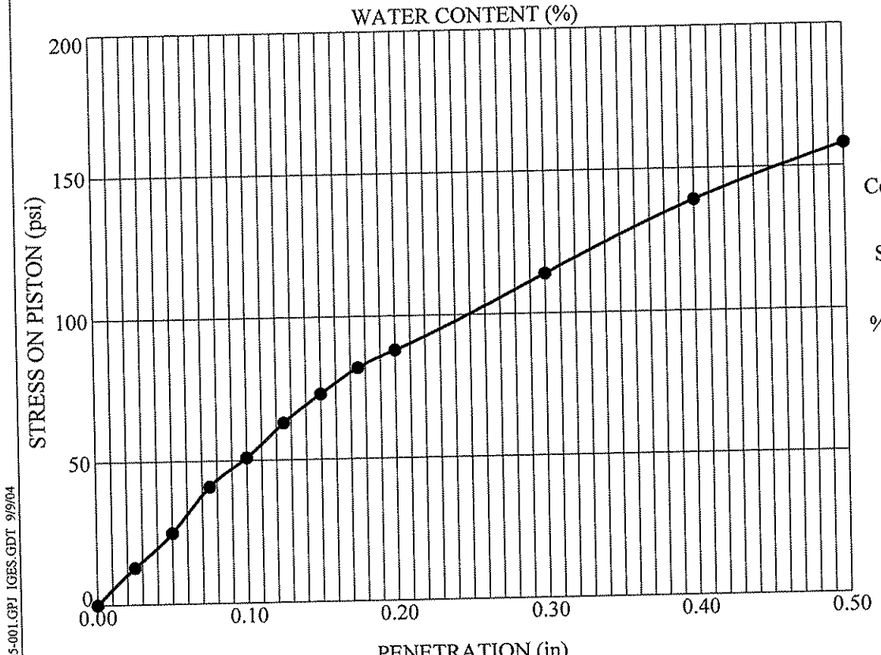


TEST RESULTS

Maximum Dry Density	103.9 (pcf)
Optimum Water Content	19.0 (%)
Percent Rock	(%)
Corrected Maximum Dry Density	(pcf)
Corrected Optimum Water Content	(%)

Curves of 100% Saturation for Specific Gravity Equal to:

2.60, 2.70, 2.80



Dry Density	104.9 (pcf)
Relative Compaction	101 (%)
Surcharge	50 (psf)
% Standard CBR	5.10
Swell	0.61 (%)

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COMPACTION AND CBR TEST

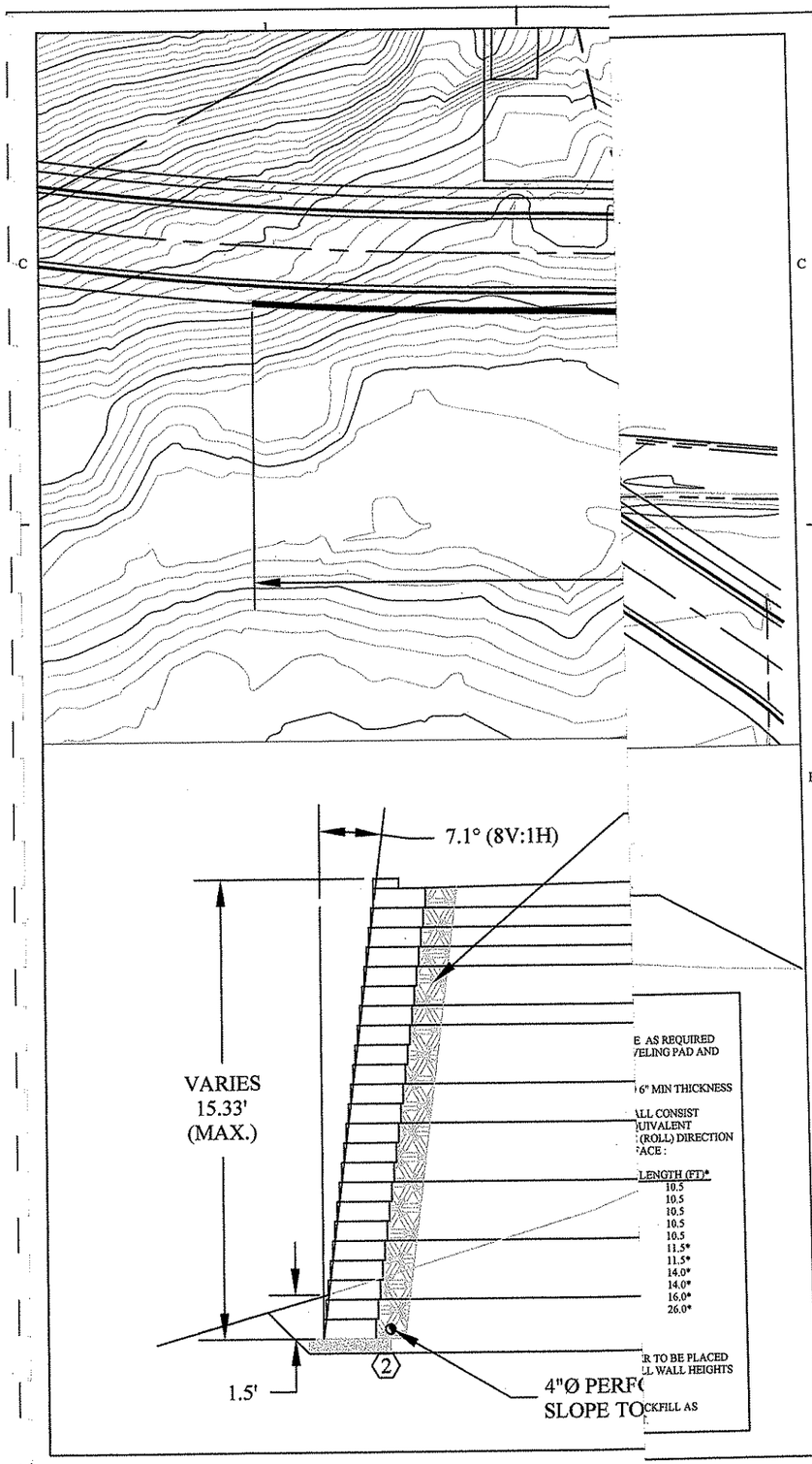
Geotechnical Investigation
Jordan River Drive
South Jordan, Utah

Project Number: 00605-001

Plate

B - 4

B_COMPACTION SPLIT 00605-001.GPJ IGES.GDT 9/9/04



CONSULTANTS
IGES
ideas for a changing world
14740 South Heritage Crest Way, Suite D
Bluffdale, Utah 84065
(801)571-6203 Fax: (801)501-0584

MARK	DATE	DESCRIPTION

ISSUE:

PROJECT NO.:	00605-001
CAD DWG FILE:	00605\001\RIVERWALK.DWG
DRAWN BY:	JAH
DESIGNED BY:	CSI/IGES
CHECKED BY:	JFW
COPYRIGHT:	IGES 2004

SHEET TITLE

JORDAN RIVER DRIVE

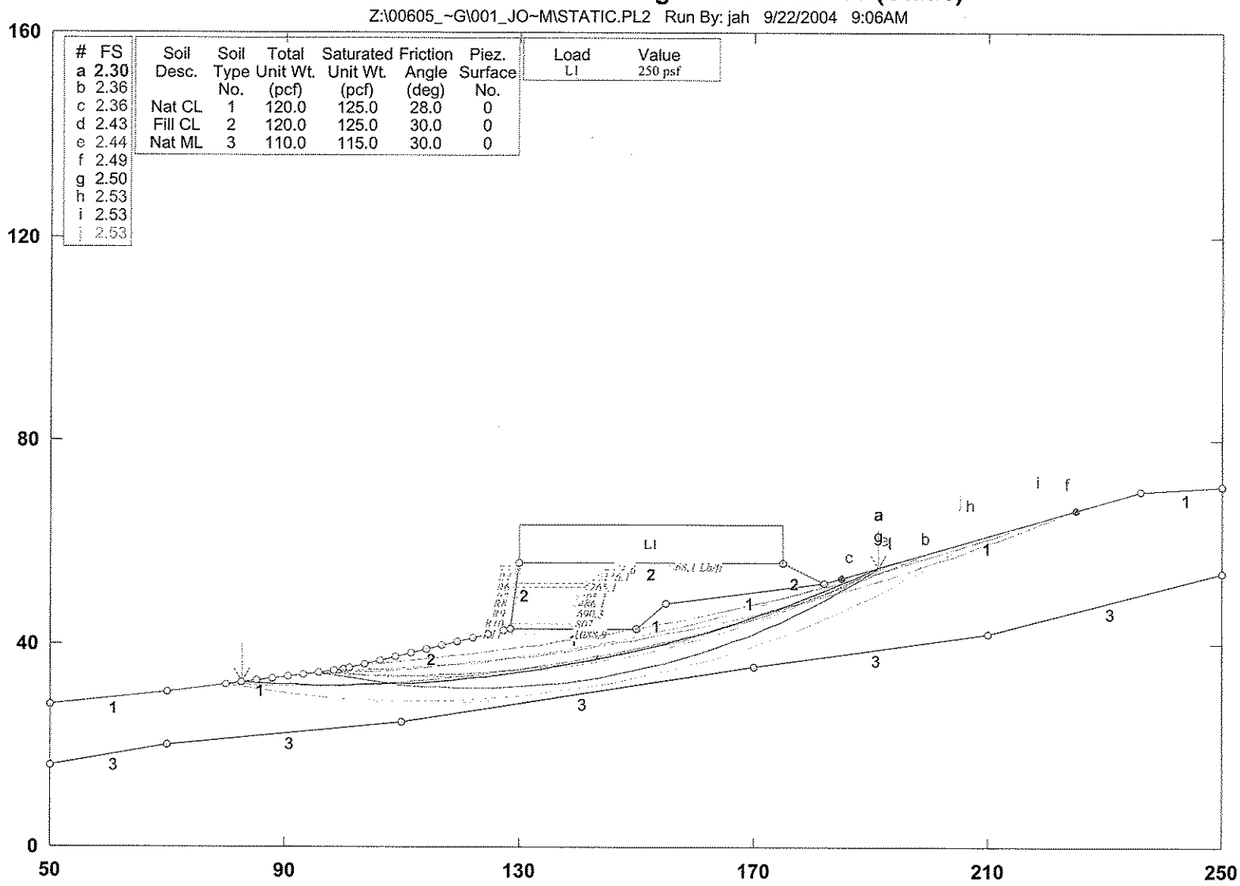
PLAN & SECTION

VIEW

C-1

Jordan River Drive Retaining Wall Sta: 23+00 (Static)

Z:\00605_~G\001_JO~M\STATIC.PL2 Run By: jah 9/22/2004 9:06AM



GSTABL7 v.2 FSmin=2.30

Safety Factors Are Calculated By The Modified Bishop Method

IGES

PLATE C-3

South Jordan City

Memorandum
Municipal Services Group

Date: May 17, 2007

To: File

From: Shane Greenwood

Subject: Charles Bouck/ Mulligan Ridge property dispute

As part of the Mulligan Golf and Games purchased by the City of South Jordan, there was a small parcel of land deeded to the City located along the east border of Charles Bouck property (905 West 10400 South). The appraisal prepared by Free and Associates dated March 24, 2004 includes this parcel of land as parcel number 27-14-276-015. Later, the appraisal prepared by Dean Barney dated May 30, 2004 indicates this same parcel number changed to 27-14-251-034. Based on this information and additional research, the City is confident that this parcel was deeded legally to the City as part of the Mulligan's Golf and Games purchase. Soon after the purchase, The Village at Riverwalk and Mulligan Ridge were in the process of developing the property along the west and north sides of Mulligan's Golf Course. Gary McDougal obtained ownership of the property previously owned by the Church of Christ. This 5 acre parcel (later known as Mulligan Ridge) is located at the north end of Baxter Drive and encompasses both sides of the roadway into The Village at Riverwalk (developed by Arbor Development). The small parcel that was deeded to the City is located along the west property line of Mulligan Ridge (McDougal). The City had no use for this parcel and therefore deeded it to Gary McDougal to be included in his Mulligan Ridge development.

As part of the Mulligan Ridge Development, precast concrete walls were required along the west property line as well as piping an existing irrigation/ tail water ditch. Gary McDougal sold Mulligan Ridge to the partnership of Got Your Back Reality and Ryan Anderson. The requirements to build the wall and install irrigation pipe was transferred to this partnership. As Ryan Anderson was preparing to build the wall, Charles Bouck (property owner along west property) expressed opposition to such stating that he owned the small parcel. For better understanding of this situation, observe the blue and yellow lines along the west side of Mulligan

Ridge on the attached exhibit A. The yellow line represents the property line as Charles Bouck sees it and the blue line represents the property line as the City/ Gary McDougal and Ryan Anderson sees it.

At this point there are three options according to John Geilmann. 1)Ryan Anderson/ Got Your Back Reality could take Charles Bouck to court and the City would defend title to the property since the City is confident they originally obtained ownership and deeded it Gary McDougal. The would cost the City some legal fees, maybe $10K or more. 2) The City would challenge the original title policy and force the title company to resolve the issue. After doing some research on the parcels included in the title policy, this controversial parcel was not included in the policy. Option 2 is out. 3) Ryan Anderson would pay Charles Bouck for the small parcel and the City would credit Ryan that amount with his future building fees. Ryan Anderson has negotiated with Charles Bouck an amount of $20K for the parcel.

Based on a meeting with Rob Wall (ACM) and John Geilmann (City Attorney), it was decided that the City would choose option 3. Ryan Anderson also prefers because it should be a quicker and less complicated process. This decision was relayed to Ryan Anderson along with a copy of a 'Release and Covenant not to Sue' agreement for Charles and Cynthia Bouck to sign as part of the parcel purchase.

The City will prepare and execute an agreement for Ryan Anderson to sign crediting $20K worth of building permit fees in lieu of Ryan purchasing the parcel from Charles Bouck. Ryan Anderson will obtain signatures on the 'Release and Covenant not to Sue' agreement and deed from Charles and Cynthia Bouck with compensation of $20K. Once these transactions are complete, Ryan will build the required wall and irrigation piping.

Exhibit A

RIVERWALK SUBDIVISION WITH FIRM MAP UPDATES

N
W E
S

Yearly Flood Zone
100 Year Flood Zone
500 Year Flood Zone

1 inch equals 200 feet

0 50 100 200 300 400 500 Feet

FIRM MAP LOMR REVISION
23 MAY 2008
AERIAL IMAGERY
OCTOBER 2007

SOUTH JORDAN

17.04.150: PERMITS AND PLANS REQUIRED:

No building, sign, structure, wall or collector street fence or fence over six feet (6') tall requiring a perm shall be constructed, reconstructed, remodeled, relocated or altered without first obtaining required per or approvals from the city. No grading or change in land use shall be commenced without first obtaining approval from the city. Applications for permits shall be accompanied by necessary construction plans, exterior elevation plans and site plans drawn to scale. Plans shall include actual dimensions of the lot to built upon, the size and setbacks of existing and proposed buildings and structures, adjacent buildings an structures and other information as required by this title and as deemed necessary by the building, fire, engineering and community development departments. Where required, conditional use permits, site plans and/or plats must be approved prior to permit issuance. (2003 Code § 17.04.150)

Shane Greenwood

From: Todd Heitman
Sent: Friday, March 17, 2006 1:51 PM
To: 'Kevin Neff (E-mail)'; 'Kelly Woods (E-mail)'; 'Mike Maddox (E-mail)'
Cc: Jed Bell; Shane Greenwood
Subject: Riverwalk Subdivision

Gentlemen,

In an effort to keep communication clear through the testing process of the Riverwalk waterline, I am going to send e-mails periodically to convey some of my observations in the field. If you have any concerns or questions, please let me know immediately so we can discuss them while they are fresh on our minds.

There have been some concerns come up recently with leaks on the waterline. Since beginning the filling process on Monday, March 13, 5 leaks have been discovered.

-One at a joint on the 16 inch line where plastic pipe wrap was wedged between the gasket and pipe.

-Two from a 3/4 inch services that were backfilled incorrectly and in turn pulled the pipe in to a position causing it to leak and broke a corp. stop.

-Another on the 16 inch line. It appears to have come from an excavator bucket hitting it while installing a 3/4 inch service on the 8" line it paralleled.

-The fifth leak is being investigated currently and has not surfaced yet.

The City incurs several additional costs when excessive leaks are found on new waterlines. Some or all of those expenses may be passed on to the owner. Please take whatever precautions are necessary to avoid any further damage to the waterline. In addition, please do not backfill any repair made to the waterline until it is inspected by The City. Also keep in mind, as mentioned in the preconstruction meeting and in South Jordan City standard notes, any changes in the design must be approved in writing by the City Engineer.

Feel free to call me anytime with any questions or concerns.

Sincerely,

Todd Heitman
South Jordan City Inspector
801-330-2998

Shane Greenwood

From: Shane Greenwood
Sent: Thursday, January 19, 2006 2:20 PM
To: 'drent2@hotmail.com'
Subject: The Village at Riverwalk

Chris,

A few months ago, I sent you a copy of the development bond estimate, Engineering Review Fee, and Storm Drain Facility Fee for The Village at Riverwalk development (including McDougal portion) which none have been paid to my knowledge. As the project has already started and progressing we must have the fees paid and development bond submitted as soon as possible. Let me know if you have any questions.

Thank you for your time and consideration,

Shane Greenwood, P.E.
Senior Engineer
South Jordan City

Phone: (801) 254-3742
FAX: (801) 253-5235

WHEN RECORDED RETURN TO:
Michael A. Stout
Peterson Reed Warlaumont & Stout
800 Boston Building
9 Exchange Place
Salt Lake City, Utah 84111

RECEIVED
MAR - 9 2006
South Jordan City
Recorders Office

Tax I.D. No. 27-11-481-026-0000

NOTICE OF MECHANIC'S LIEN

Notice is here given Ferguson Enterprises, Incorporated, 255 West Cottage Avenue, Sandy, Utah 84070, 1.801.539.3700 (Claimant) claims a lien pursuant to Utah Code Ann. §§ 38-1-1, *et seq.*, as follows:

1. Claimant provided equipment and/or materials upon and in connection with the improvement of certain real property in Salt Lake County, Utah, known as Village at Riverwalk Estates, including all lots, buildings and common space, and more particularly described as:

BEG N 0¬04'29" E 98.24 FT & S 89¬44'17" E 2005.28 FT & N 22¬38'54" W 110.83 FT FR S 1/4 COR OF SEC 11, T 3S, R 1W, SLM; N 0¬28'10" W 695.31 FT; N 8¬24'59" W 389.91 FT; N 89¬31'50" E 16.32 FT; S 55¬22'54" E 194.64 FT; S 8¬23'17" E 30.88 FT; S 55¬22'54" E 123.13 FT; SE'LY ALG A 351 FT RADIUS CURVE TO R 145.51 FT; S 31¬37'46" E 1061.22 FT; S'LY ALG A 316 FT RADIUS CURVE TO R 139.56 FT; S 6¬19'29" E 569.16 FT; S 89¬43'10" W 11.03 FT; N 87¬45'24" W 65.32 FT; N 87¬56'44" W 150 FT; N 87¬36'23" W 73.09 FT; S 89¬49'44" W 47.95 FT; N 87¬32'40" W 49.14 FT; N 88¬41'06" W 99.83 FT; N 88¬47'31" W 107.39 FT; N 88¬45'37" W 252.61 FT; N 88¬26'22" W 236.52 FT; N 89¬15'58" W 140.87 FT; N 88¬55'57" W 69.25 FT; N 89¬06'34" W 43.87 FT; S 89¬15'03" W 74.17 FT; S 88¬17'43" W 122.49 FT; N 6¬00'46" E 2.86 FT; SW'LY ALG A 60 FT RADIUS CURVE TO L 22.66 FT; S'LY ALG A 286 FT RADIUS CURVE TO L 165.24 FT; S 0¬42'23" W 346.22 FT; S'LY ALG A 514 FT RADIUS CURVE TO R 137.61 FT; S 16¬02'44" W 74.50 FT; S'LY ALG A 486 FT RADIUS CURVE TO L 35.02 FT; N 88¬01'19" E 204.72 FT; S 60¬01'17" E 25.56 FT; S 23¬47'01" E 555.53 FT; S 84¬37'04" W 283.25 FT; N 5¬42'39" E 128.07 FT; N 89¬27'14" W 317.12 FT; N 3¬30'59" W 405.39 FT; N 88¬01'19" E 62.18 FT; N 0¬42'34" E 180.80 FT; S 89¬17'26" E 111.85 FT; NE'LY ALG A 486 FT RADIUS CURVE TO L 65.91 FT; N 0¬42'23" E 346.22 FT; N'LY ALG A 314 FT RADIUS CURVE TO R 226.34 FT; NE'LY ALG A 60 FT RADIUS CURVE TO L 35.16 FT; N'LY ALG A 50 FT RADIUS CURVE TO R 17.37 FT; N 6¬00'46" E 37.45 FT; N 89¬17'36" W 309.93 FT; N 0¬42'23" E 127 FT; N 89¬17'37" W 4.78 FT; N 0¬10'59" E 256.59 FT; S 89¬17'37" E 9.51 FT; N 4¬08'44" W 133.06 FT; N 9¬02'05" W 176.44 FT; N 87¬59'03" E 134.03 FT; S 27¬51'17" E 5.02 FT; S 89¬09'37" E 750.70 FT TO BEG. INCLUDING PARCEL A, LOTS 1 THRU 52, THREE OPEN SPACES AND ALL OF UNITS 1, 2 & 3 IN BUILDINGS 1 THRU 24. (BEING THE COMMON AREA AND PRIVATE STREETS WITHIN THE VILLAGE AT RIVERWALK PUD). 49.73 AC.

2. To the best of Claimant's knowledge, the owners or reputed owners of the real property and improvements are Arbor Gardner, L.C., Got Your Back Reality, L.L.C. and the City of South Jordan.

3. The equipment and/or materials for which demand and claim is made were provided to Earth Movers, L.L.C. 4682 South 150 West, Murray, Utah 84107.

4. The Claimant first furnished equipment or materials on September 8, 2005, and last furnished equipment and/or materials on January 26, 2006.

5. The amount of Claimant's lien, excluding interest, costs and attorney's fees is $159,103.12.

PROTECTION AGAINST LIENS AND CIVIL ACTION. Notice is hereby provided in accordance with Section 38-11-108 of the Utah Code that under Utah law an "owner" may be protected against liens being maintained against an "owner-occupied residence" and from other civil action being maintained to recover monies owed for "qualified services" performed or provided by suppliers and subcontractors as a part of this contract, if and only if the following conditions are satisfied:

(1) the owner entered into a written contract with an original contractor, a factory built housing retailer, or a real estate developer;

(2) the original contractor was properly licensed or exempt from licensure under Title 58, Chapter 55, Utah Construction Trades Licensing Act at the time the contract was executed; and

(3) the owner paid in full the original contractor, factory built housing retailer, or real estate developer or their successors or assigns in accordance with the written contract and any written or oral amendments to the contract.

DATED this 8th day of March, 2006.

Ferguson Enterprises, Incorporated

By: Michael A. Stout
Its: Attorney

STATE OF UTAH)
:ss
COUNTY OF SALT LAKE)

In Salt Lake County, State of Utah, on this 8th day of March 2006, before me, the undersigned notary, personally appeared Michael A. Stout, who being duly sworn did state he is the attorney for Ferguson Enterprises, Incorporated, claimant in the foregoing Notice of Mechanic's Lien; he has read the notice and knows the contents and the notice is true of his own knowledge; and the foregoing was signed by him on behalf of Ferguson Enterprises, Incorporated and he acknowledges it was executed voluntarily for its stated purpose.

Yvonne M. Schenk
Notary Public

NOTARY PUBLIC
YVONNE M. SCHENK
1230 KENSINGTON AVENUE
SALT LAKE CITY, UT 84105
MY COMMISSION EXPIRES
OCTOBER 29, 2006
STATE OF UTAH

Shane Greenwood

From: Chris Drent [drent2@hotmail.com]
Sent: Thursday, January 19, 2006 3:16 PM
To: Shane Greenwood
Cc: Cory Gust
Subject: Re: The Village at Riverwalk

Shane
I spoke with John as he said that he and Rick should have everything figured out with in the next week or so.

Thanks
Chris
----- Original Message -----
From: "Shane Greenwood" <SGreenwood@sjc.utah.gov>
To: <drent2@hotmail.com>
Sent: Thursday, January 19, 2006 2:19 PM
Subject: The Village at Riverwalk

Chris,

A few months ago, I sent you a copy of the development bond estimate, Engineering Review Fee, and Storm Drain Facility Fee for The Village at Riverwalk development (including McDougal portion) which none have been paid to my knowledge. As the project has already started and progressing we must have the fees paid and development bond submitted as soon as possible. Let me know if you have any questions.

Thank you for your time and consideration,

Shane Greenwood, P.E.
Senior Engineer
South Jordan City

Phone: (801) 254-3742
FAX: (801) 253-5235

DISCLAIMER

The information contained in this email is intended for the sole use of the addressee and is not for general publication. The information contained in this email may not be the most current and is subject to change by legislative action, plan review, and/or engineering standards and requirements. If you need to rely on this information, you should contact the City of South Jordan, by coming into city hall and requesting a copy of the information through a GRAMA request form. This email information shall not be considered as legally binding on the City of South Jordan. If necessary, you should seek independent legal counsel or opinions on these matters.

Shane Greenwood

From: Ricky A. Horst
Sent: Thursday, January 19, 2006 1:48 PM
To: Shane Greenwood
Subject: RE: The Village at Riverwalk

We have waived the requirement to dedicate water shares. Public Services has worked with him on a credit for certain water and stromwater fees. We will be waiving park impact fees due to his donation of open space land.

-----Original Message-----
From: Shane Greenwood
Sent: Thursday, January 19, 2006 11:29 AM
To: Ricky A. Horst
Subject: The Village at Riverwalk

Rick,

It is my understanding from John Gust that the fees and development improvement bond for The Village at Riverwalk is still being worked out between Arbors and the City. Is this correct?

Thank you for your time and consideration,

Shane Greenwood, P.E.
Senior Engineer
South Jordan City

Phone: (801) 254-3742
FAX: (801) 253-5235

CERTIFICATE OF SERVICE

I hereby certify that I mailed a true and correct copy of the foregoing NOTICE OF MECHANIC'S LIEN, via certified mail, this 8th day of March 2006 to the following:

Got Your Back Reality, L.L.C.
11576 South State Street, Suite 102B
Draper, Utah 84020

Certified No. 7004 0550 0000 1732 4965

Arbor Gardner LC
45 West Sego Lily Drive #301
Sandy, Utah 84070

Certified No. 7004 0550 0000 1732 4972

South Jordan City Recorder/ Manager
1600 West Towne Center Drive
South Jordan, Utah 84095

Certified No. 7004 0550 0000 1732 4989

RJones

When recorded return to:
South Jordan City
1600 West Towne Center Drive
South Jordan, UT 84095

Parcel No. 27-11-476-026

GRANT OF EASEMENT FOR WATER LINES

Salt Lake County

W. VAN PALMER and SHARON H. PALMER residing in Salt Lake County, Utah GRANTOR, hereby grant, convey and warrant to SOUTH JORDAN CITY, A Utah Municipal corporation, GRANTEE, for good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, a permanent easement and access right-of-way for the construction, repair, maintenance, inspection, replacement or removal of water pipelines for the transportation of water through, across, over and under the described premises, together with all rights of ingress and egress along said easement necessary or convenient for the full and complete use, occupation and enjoyment of the easement hereby granted and all rights and privileges incident thereto, including the right to cut and remove timber, trees, brush, overhanging branches and other obstructions which may injure or interfere with the Grantee's use, occupation and enjoyment of this easement, the right to go upon so much of Grantor's property as is reasonably necessary to complete the construction of pipelines, and the right to place dirt, materials and equipment upon Grantor's property near or adjacent to the easement. Any existing pipelines damaged, during installation of water line, shall be restored to present condition by Grantee. Compensation has been given for property restoration from Grantee to Grantor. The easement for water line does not grant permission for a through road or black top. The easement is more particularly described as the following property in Salt Lake County, Utah:

SEE ATTACHED EXHIBIT "A"

This easement shall be binding on the Grantor and Grantee and their respective successors and assigns.

WITNESS the hand of said Grantor this 31 day of January, 2006.

By W. Van Palmer
W. VAN PALMER

By Sharon H. Palmer
SHARON H. PALMER

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

On the 31 day of January, 2006, personally appeared before me W. VAN PALMER and SHARON H. PALMER who acknowledged to me that they signed the foregoing instrument.

Laurien Day
Notary Public

My Commission Expires: 3-3-08

Residing In: SL County

NOTARY PUBLIC
LAURIEN DAY
1600 West Towne Center Dr
South Jordan, UT 84095
COMMISSION EXPIRES
March 3, 2008
STATE OF UTAH

EXHIBIT A

EASEMENT

Salt Lake County

A strip of land 20.00 feet in width, 10.00 feet on each side of the following described centerline description:

Beginning at a point which lies 30.00 feet North 31° 56' 38" East and 39.97 feet North 1° 21' 47" East from the Northwest Corner of Lot 29, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, Page 116, said point lies North 0° 04' 29" East 98.24 feet and South 89° 44' 17" East 946.31 feet and South 2.95 feet from the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian and running thence North 89° 28' 54" West 99.68 feet to the point of terminus.

Contains 1,994 sq. ft. more or less.

The boundary lines of said easement shall be prolonged and / or shortened to begin and end on, and conform to, the grantor's property lines.

(Note: Basis of Bearing is North 0° 28' 14" East between a found brass cap street monument at the intersection of 10270 South 1000 West and the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian.)

When recorded return to:
South Jordan City
1600 West Towne Center Drive
South Jordan, UT 84095

Parcel No. 27-11-476-026

GRANT OF EASEMENT FOR WATER LINES

Salt Lake County

W. VAN PALMER and SHARON H. PALMER residing in Salt Lake County, Utah GRANTOR, hereby grant, convey and warrant to SOUTH JORDAN CITY, A Utah Municipal corporation, GRANTEE, for good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, a permanent easement and access right-of-way for the construction, repair, maintenance, inspection, replacement or removal of water pipelines for the transportation of water through, across, over and under the described premises, together with all rights of ingress and egress along said easement necessary or convenient for the full and complete use, occupation and enjoyment of the easement hereby granted and all rights and privileges incident thereto, including the right to cut and remove timber, trees, brush, overhanging branches and other obstructions which may injure or interfere with the Grantee's use, occupation and enjoyment of this easement, the right to go upon so much of Grantor's property as is reasonably necessary to complete the construction of pipelines, and the right to place dirt, materials and equipment upon Grantor's property near or adjacent to the easement. Any existing pipelines damaged, during installation of water line, shall be restored to present condition by Grantee. Compensation has been given for property restoration from Grantee to Grantor. The easement for water line does not grant permission for a through road or black top. The easement is more particularly described as the following property in Salt Lake County, Utah:

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WITNESS the hand of said Grantor this 31 day of January, 2006.

By W. Van Palmer
W. VAN PALMER

By Sharon H. Palmer
SHARON H. PALMER

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

On the 31 day of January, 2006, personally appeared before me W. VAN PALMER and SHARON H. PALMER who acknowledged to me that they signed the foregoing instrument.

Laurien Day
Notary Public

My Commission Expires: 3-3-08

Residing In: SL County

NOTARY PUBLIC
LAURIEN DAY
1600 West Towne Center Dr
South Jordan, UT 84095
COMMISSION EXPIRES
March 3, 2008
STATE OF UTAH

EXHIBIT A

EASEMENT

Salt Lake County

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Beginning at a point which lies 30.00 feet North 31° 56' 38" East and 39.97 feet North 1° 21' 47" East from the Northwest Corner of Lot 29, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, Page 116, said point lies North 0° 04' 29" East 98.24 feet and South 89° 44' 17" East 946.31 feet and South 2.95 feet from the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian and running thence North 89° 28' 54" West 99.68 feet to the point of terminus.

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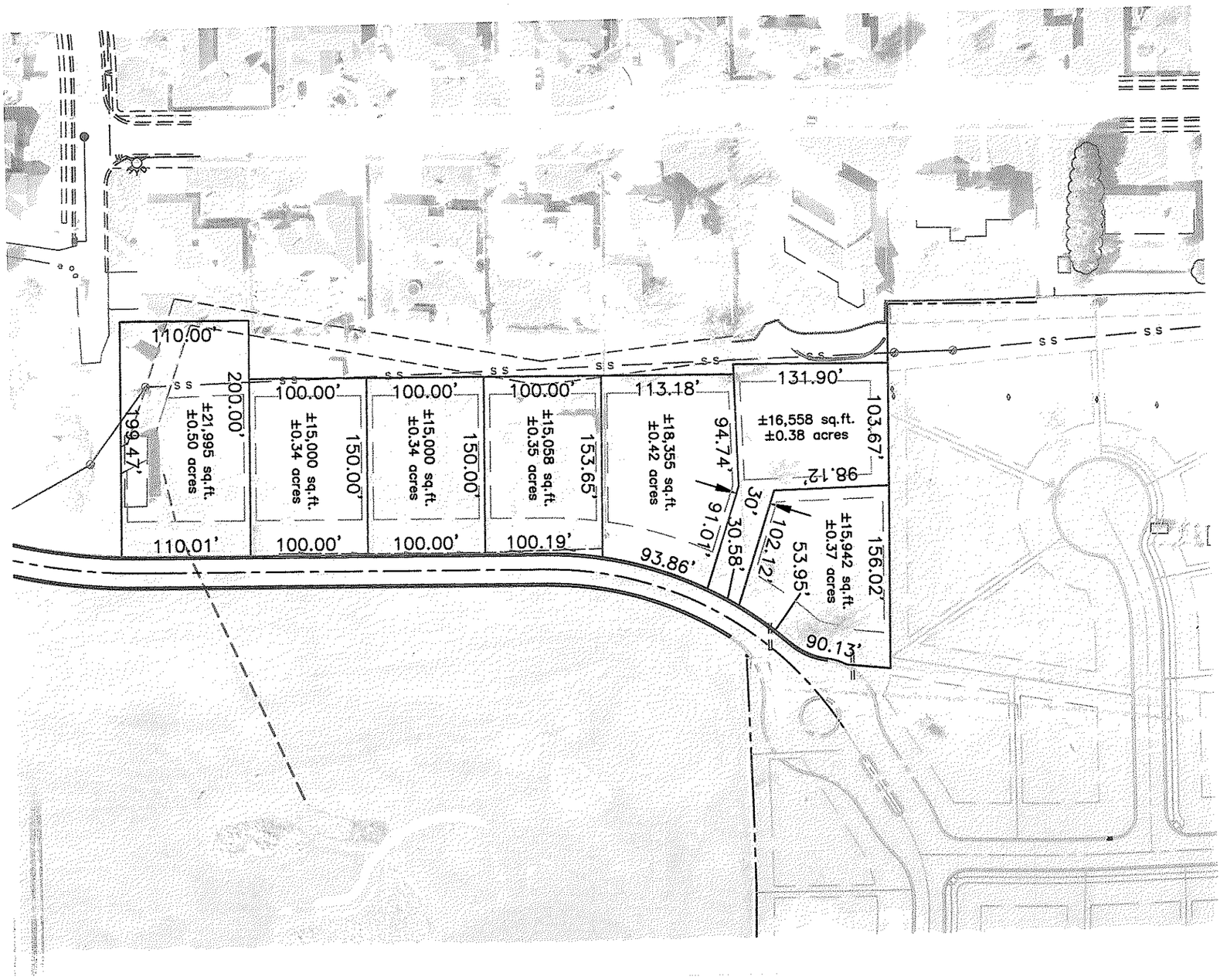


110.00'
200.00'
199.47'
±21,995 sq.ft.
±0.50 acres
110.01'
100.00'
±15,000 sq.ft.
±0.34 acres
150.00'
100.00'
100.00'
±15,000 sq.ft.
±0.34 acres
150.00'
100.00'
100.00'
±15,058 sq.ft.
±0.35 acres
153.65'
100.19'
113.18'
±18,355 sq.ft.
±0.42 acres
94.74'
91.01'
93.86'
30'
30.58'
131.90'
±16,558 sq.ft.
±0.38 acres
103.67'
98.12'
102.12'
53.95'
±15,942 sq.ft.
±0.37 acres
156.02'
90.13'
S S

January 12, 2006

Mr. W. Van Palmer
890 W. Palmer Vista Drive
South Jordan, UT 84095

Dear Mr. Palmer:

As I mentioned to you earlier, the City has contacted the South Valley Sewer District and they have agreed to let the City overlap easements for maintenance purposes. This means that the City now needs to encumber 5 ft. less for the needed waterline easement on your property. The City evaluated land values of surrounding properties and the average land value equaled $2.00 sq. ft. When obtaining an easement 50 percent ($1 sq. ft.). of fee value is paid for utility line easements.

The City would like to offer you $1,994 (1,994 sq. ft. x $1.00), and if you are agreeable and the City does not need to have a formal appraisal done, we will add $1,500 (the cost of an appraisal). Thus, for your notarized signature on the Easement (enclosed), the City would offer you $3,494.

Please let me know if you have any questions or comments.

Sincerely,

C. Ponzurick

Candy Ponzurick
Administrative Project Manager

Enclosure

Mayor William Kent Money
Council Member David W. Colton
Council Member Ann Gayheart
Council Member Bradley G. Marlor
Council Member Mary Wenner
Council Member Leona Winger

City Manager Ricky A. Horst
Assistant City Manager I. Robert Wall
Director of Operations Don Bruey
Director of Engineering/City Engineer Brad Klavano
Director of Strategic Planning & Budgets Cliff Strachan

SOUTH JORDAN
UTAH
PUBLIC SERVICES
1600 West Towne Center Drive/ South Jordan, UT 84095/ Telephone (801) 254-3742 / Fax (801) 253-5235
e-mail: info@sjc.utah.gov, www..sjc.utah.gov

When recorded return to:
South Jordan City
1600 West Towne Center Drive
South Jordan, UT 84095

Parcel No. 27-11-476-026

GRANT OF EASEMENT FOR WATER LINES

Salt Lake County

W. VAN PALMER and SHARON H. PALMER residing in Salt Lake County, Utah GRANTOR, hereby grant, convey and warrant to SOUTH JORDAN CITY, A Utah Municipal corporation, GRANTEE, for good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, a permanent easement and access right-of-way for the construction, repair, maintenance, inspection, replacement or removal of water pipelines for the transportation of water through, across, over and under the described premises, together with all rights of ingress and egress along said easement necessary or convenient for the full and complete use, occupation and enjoyment of the easement hereby granted and all rights and privileges incident thereto, including the right to cut and remove timber, trees, brush, overhanging branches and other obstructions which may injure or interfere with the Grantee's use, occupation and enjoyment of this easement, the right to go upon so much of Grantor's property as is reasonably necessary to complete the construction of pipelines, and the right to place dirt, materials and equipment upon Grantor's property near or adjacent to the easement. The easement is more particularly described as the following property in Salt Lake County, Utah:

SEE ATTACHED EXHIBIT "A"

This easement shall be binding on the Grantor and Grantee and their respective successors and assigns.

WITNESS the hand of said Grantor this _____ day of January, 2006.

By_____
W. VAN PALMER

By_____
SHARON H. PALMER

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

On the _____ day of January, 2006, personally appeared before me W. VAN PALMER and SHARON H. PALMER who acknowledged to me that they signed the foregoing instrument.

_____
Notary Public

My Commission Expires:

Residing In:

EASEMENT

Salt Lake County

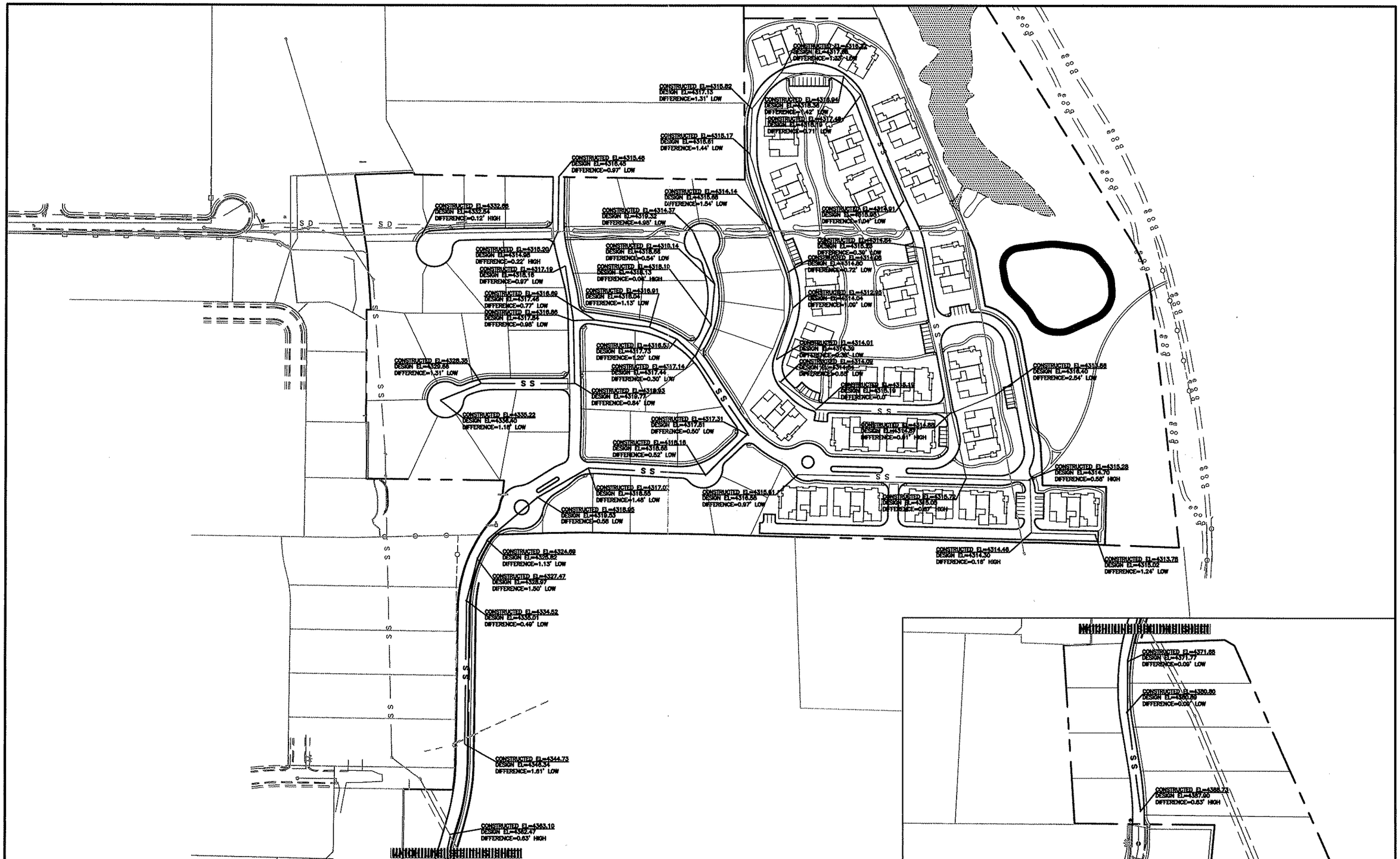
A strip of land 20.00 feet in width, 10.00 feet on each side of the following described centerline description:

Beginning at a point which lies 30.00 feet North 31° 56' 38" East and 39.97 feet North 1° 21' 47" East from the Northwest Corner of Lot 29, Ridgecrest Estates, a subdivision on file in the Salt Lake County Recorders Office in Book 84-8, Page 116, said point lies North 0° 04' 29" East 98.24 feet and South 89° 44' 17" East 946.31 feet and South 2.95 feet from the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian and running thence North 89° 28' 54" West 99.68 feet to the point of terminus.

Contains 1,994 sq. ft. more or less.

The boundary lines of said easement shall be prolonged and / or shortened to begin and end on, and conform to, the grantor's property lines.

(Note: Basis of Bearing is North 0° 28' 14" East between a found brass cap street monument at the intersection of 10270 South 1000 West and the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian.)



NO.	REVISIONS	BY	DATE

DRAWN _____ DATE

CHECKED _____ PROJECT ENGINEER DATE

APPROVED _____ PROJECT MANAGER DATE

This drawing is the property of CIVIL SCIENCE and is not to be reproduced, modified or used for any other project or extension of this project except by agreement with said company.

CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)766-7200, FAX (801)766-7201

THE VILLAGE AT RIVERWALK

PROJECT NO.: 1

SHEET NO.

FILE NAME: SCALE:

9478424

When recorded return to :
South Jordan City
1600 West Towne Center Drive
South Jordan, UT 84095

9478424
08/31/2005 04:46 PM $14.0
Book - 9182 Pg - 4549-4551
GARY W. OTT
RECORDER, SALT LAKE COUNTY, UT
SURETY TITLE
BY: SBM, DEPUTY - WI 3 P.

GRANT OF EASEMENT FOR WATER LINES

JERRY J. OHRN and KARI L. OHRN residing in Salt Lake County, Utah GRANTOR, hereby grant, convey and warrant to SOUTH JORDAN CITY, a Utah Municipal corporation, GRANTEE, for good and valuable consideration, the receipt and adequacy of which is hereby acknowledged, a permanent easement and access right-of-way for the construction, repair, maintenance, inspection, replacement or removal of water pipelines for the transportation of water through, across, over and under the described premises, together with all rights of ingress and egress along said easement necessary or convenient for the full and complete use, occupation and enjoyment of the easement hereby granted and all rights and privileges incident thereto, including the right to cut and remove timber, trees, brush, overhanging branches and other obstructions which may injure or interfere with the Grantee's use, occupation and enjoyment of this easement, the right to go upon so much of Grantor's property as is reasonably necessary to complete the construction of pipelines, and the right to place dirt, materials and equipment upon Grantor's property near or adjacent to the easement. The easement is more particularly described as the following property in Salt Lake County, Utah:

SEE ATTACHED EXHIBIT "A"

This easement shall be binding on the Grantor and Grantee and their respective successors and assigns.

WITNESS the hand of said Grantor this 29th day of August, 2005.

By _____
JERRY J. OHRN

By _____
KARI L. OHRN

STATE OF UTAH)
: ss
COUNTY OF SALT LAKE)

Easement

Salt Lake County

A strip of land 20.00 feet in width, 10.00 feet on each side of the following described centerline description:

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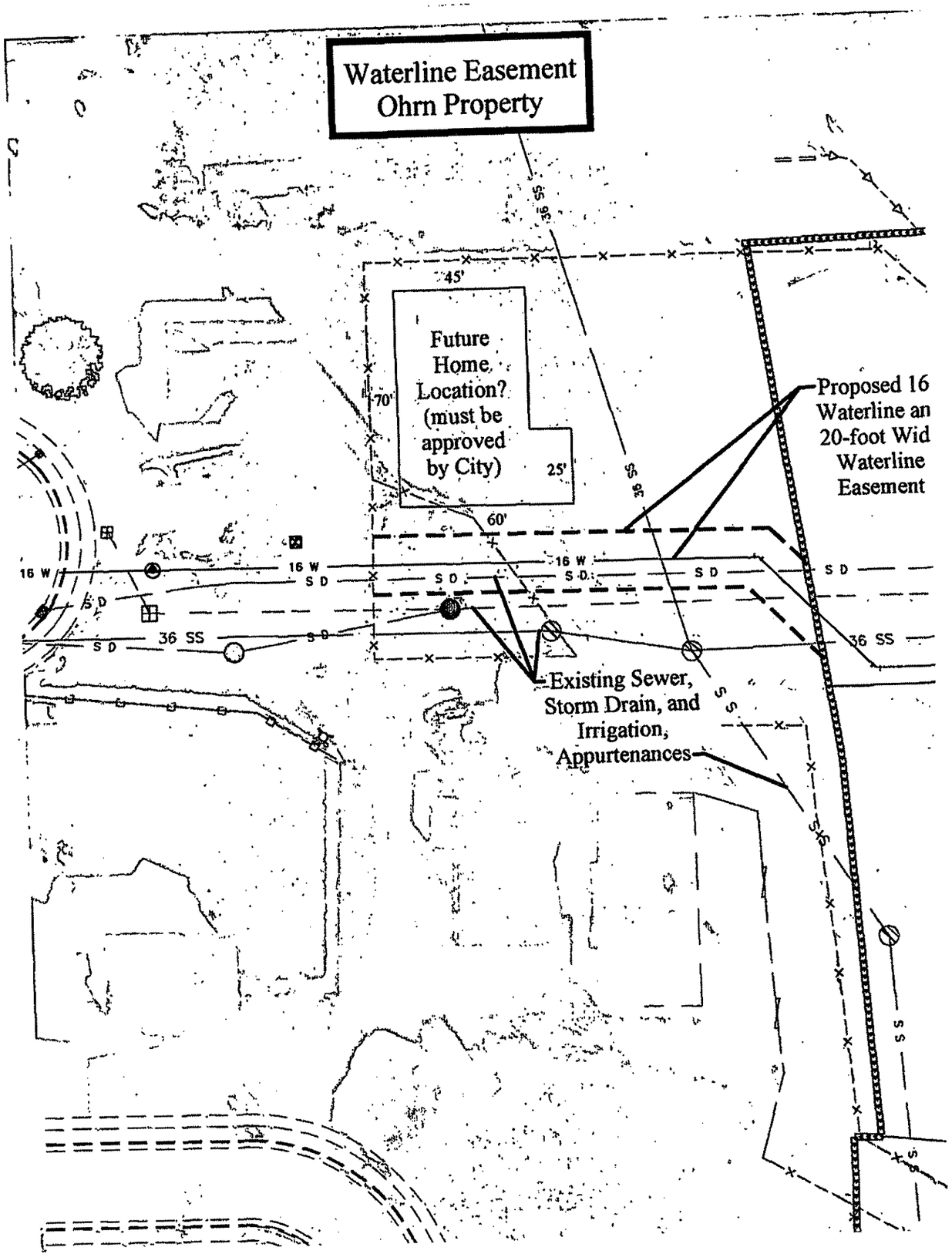
Contains 3,140 sq. ft. more or less.

The boundary lines of said easement shall be prolonged and / or shortened to begin and end on, and conform to, the grantor's property lines.

(Note: Basis of Bearing is North 00E28' 14" East between a found brass cap street monument at the intersection of 10270 South and 1000 West and the South Quarter Corner of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian)


Waterline Easement
Ohrn Property
Future
Home
Location?
(must be
approved
by City)
45'
70'
25'
60'
Proposed 16
Waterline an
20-foot Wid
Waterline
Easement
Existing Sewer,
Storm Drain, and
Irrigation,
Appurtenances
16 W
S D
36 SS

Easement

Salt Lake County

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16 W
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16 W
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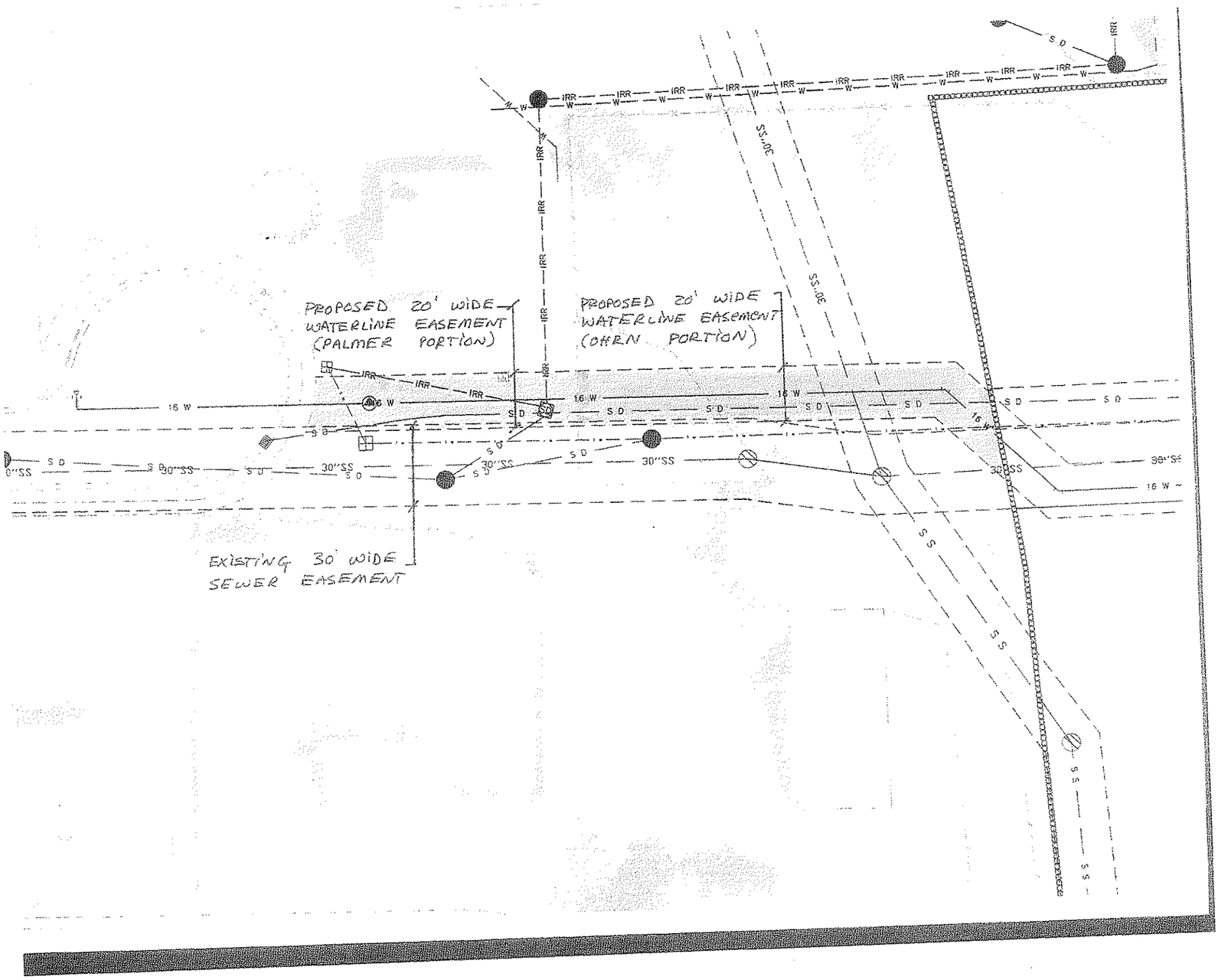
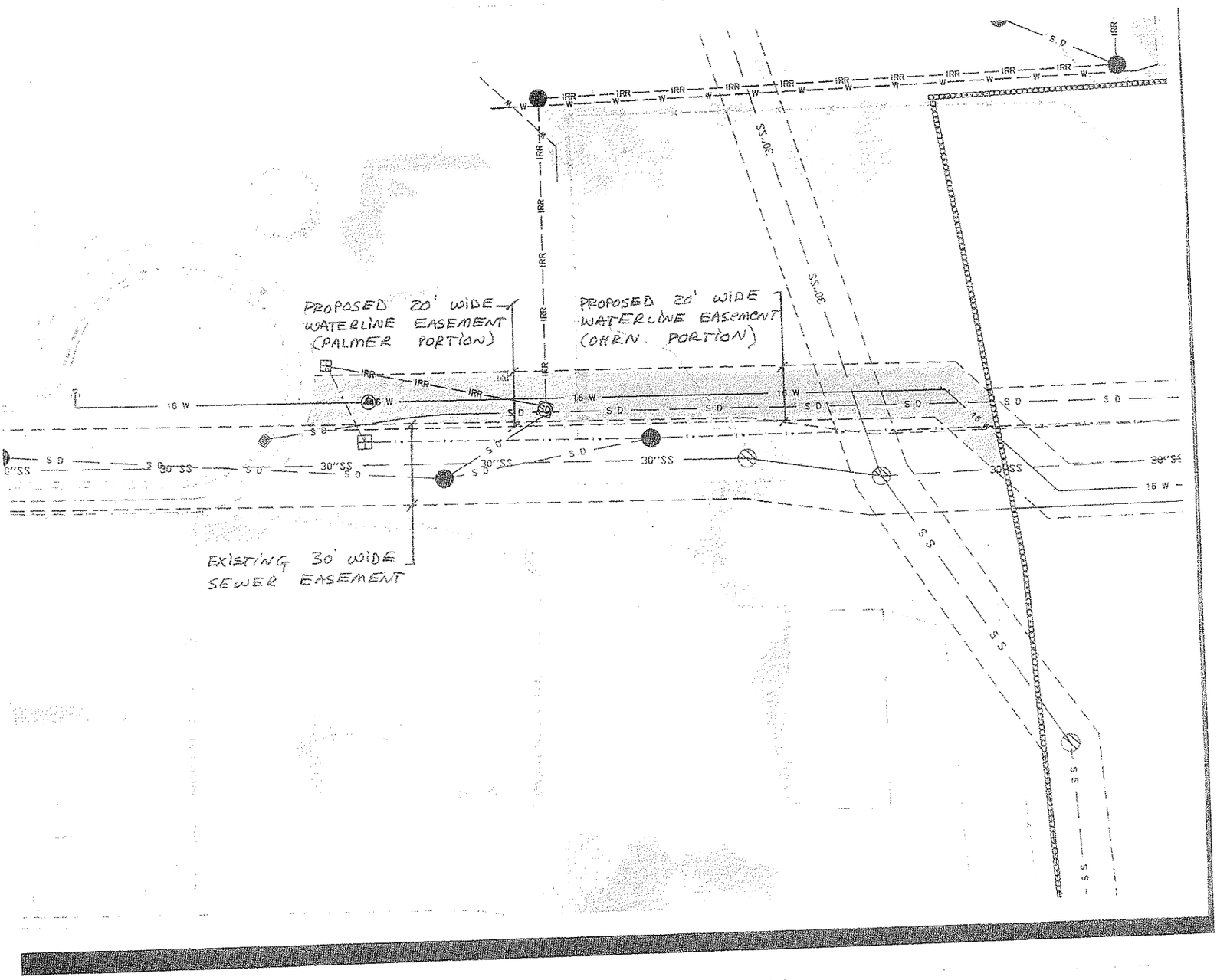

PROPOSED 20' WIDE WATERLINE EASEMENT (PALMER PORTION)
PROPOSED 20' WIDE WATERLINE EASEMENT (OHRN PORTION)
EXISTING 30' WIDE SEWER EASEMENT
16" W
30"SS
S D
IRR
S S


PROPOSED 20' WIDE WATERLINE EASEMENT (PALMER PORTION)
PROPOSED 20' WIDE WATERLINE EASEMENT (OHRN PORTION)
EXISTING 30' WIDE SEWER EASEMENT
IRR
W
S D
16 W
30"SS
S S

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

NO	REVISIONS	BY	DATE

DRAWN GSB 7/8/05 DATE
CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER
APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

THE VILLAGE AT RIVERWALK

PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. PP-17
FILE NAME: PP-17
SCALE: AS SHOWN

27-11

When Recorded Return to:
Mr. W.S. Mickelsen, Manager
Salt Lake County Sewerage
Improvement District No. 1
P.O. Box 908
Draper, UT 84020

Leo Palmer Family Partnership
Page 1 of 2
Revised 12-27-89

6035599
03/07/95 12:52 PM**NO FEE*
NANCY WORKMAN
RECORDER, SALT LAKE COUNTY, UTAH
SL CO SEWERAGE IMP. DIST. #1
REC BY:B GRAY ,DEPUTY - WI

6035599

EASEMENT

A portion of the Southeast Quarter of Section 11, Township 3 South, Range 1 West, Salt Lake Base and Meridian, U.S. Survey. Sewer extension along lane at approximately 10200 South.

For the sum of One Dollar ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the undersigned GRANTOR(S) hereby grant, convey, sell, and set over unto the Salt Lake County Sewerage Improvement District No. 1, a body politic of the State of Utah, hereinafter referred to as Grantee, its successors and assigns, a perpetual right-of-way and easement to lay, maintain, operate, repair, inspect, protect, install, remove and replace sewer pipelines, manholes, laterals and other sewer collection and transmission structures and facilities, hereinafter called Facilities, insofar as they lie within the property of the GRANTOR(S), said right-of-way and easement, being situate in Salt Lake County, State of Utah over and through a parcel of the GRANTOR(S)' land lying within a strip adjacent to and lying north of the south line of the GRANTOR(S)' property, more particularly described as follows:

Beginning at the southwest corner of the GRANTOR(S)' property, said point lying on the west line of said Southeast Quarter of Section 11, and lying North 90 feet and East 2638.9 feet, more or less, from the Southwest corner of Section 11, and running thence along the property lines of said GRANTOR(S)' property for the next two courses: North, along said section line, 20 feet; thence East 750 feet, more or less, to the southwest corner of said property; thence S. 89°03'09" E., parallel to and Northerly 18.6 feet from the centerline of the proposed sewerline, 195.0 feet, more or less to the east line of said property; and running thence along the property lines of said property for the next five courses:
S. 1°07' E. 28.0 feet, more or less, to an angle point on the east line of said property; thence S. 31°41'45" W. 30 feet, to a south property corner; thence N. 58°18'15" W. 32 feet; thence N. 84°11'00" W. 99.32 feet; thence N. 89°18'00" W. ~~303.75~~ 803.75 feet, more or less, to the point of beginning.
Contains: 0.577 acres

TO HAVE AND TO HOLD the same unto the said GRANTEE, its successors and assigns, so long as such Facilities shall be maintained, with the right of ingress and egress in said GRANTEE, its officers, employees, representatives, agents, and assigns to enter upon the above-described property with such equipment as is

~ 27-11-476-016 SESE & SW SW Sect 12, 3S1W Sect 11, 3S1W

necessary to install, maintain, operate, repair, inspect, protect, remove and replace said Facilities.

During construction periods, GRANTEE and its agents may use such portions of a 40-foot wide strip of land in GRANTOR(S)' property in County Parcel Number 27-11-451-010 adjacent and contiguous to and along the northerly boundary of the perpetual right-of-way as may be reasonably necessary in connection with the construction or repair of said Facilities. The contractor performing the work shall restore all property through which the work traverses, to as near its original condition as is reasonably possible. GRANTOR(S) shall have the right to use said premises except for the purpose for which this right-of-way and easement is granted to the said GRANTEE, provided such use shall not interfere with the Facilities or with the collection and conveyance of sewage through said Facilities, or any other rights granted to the GRANTEE hereunder.

GRANTOR(S) shall not build or construct or permit to be built or constructed over or across said perpetual right-of-way, any building or other improvement nor change the contour thereof without the written consent of GRANTEE. This right-of-way and easement grant shall be binding upon and inure to the benefit of the successors and assigns of the GRANTOR(S) and the successors and assigns of the GRANTEE, and may be assigned in whole or in part by the GRANTEE.

IN WITNESS WHEREOF, the GRANTOR(S) have executed their right-of-way and easement this 17th day of 17-94, 1994.

County Parcel Number	Acreage	GRANTOR(S)
27-11-451-011	0.577	LEO D. PALMER FAMILY PARTNERSHIP

By: W. Van Palmer

Title: Trust Executor

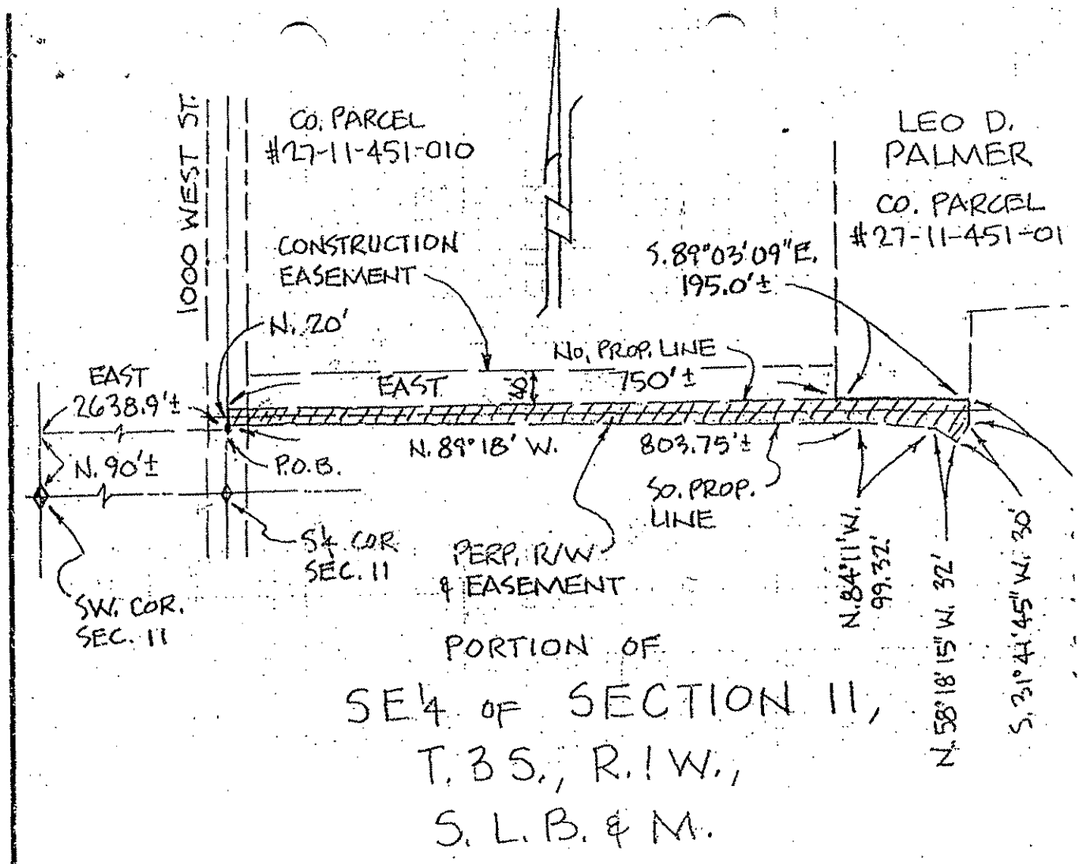
STATE OF UTAH)
:ss
COUNTY OF SALT LAKE)

On the 17th day of February, 1994, personally appeared before me, W. Van Palmer, the signer(s) of the above instrument, who duly acknowledged to me they executed the same.

Notary Public

My Commission Ex
Residing in:
EASE1

NOTARY PUBLIC
James G. McWhorter
949 East 12400 South #100
Draper, Utah 84020
My Commission Expires
November 22, 1997
STATE OF UTAH



PORTION OF
SE¼ OF SECTION 11,
T. 3 S., R. 1 W.,
S. L. B. & M.

FOR
SALT LAKE COUNTY
SEWERAGE IMPROVEMENT
DISTRICT NO. 1

SEWER LINE ALONG
APPROX. 10200 SOUTH

SCALE: 1" = 200'

TEMPLETON, LINKE & ASSOCIATES
CONSULTING ENGINEERS

Drawn: JMcK	Date: 9/87	Figure No. A

REV. 12/89

4741550

See 11 - 3S1W

11

When Recorded Return to
Mr. Woodrow S. Mickelsen, Manager
Salt Lake County Sewerage
Improvement District No. 1
874 East 12400 South
Draper, Utah 84020

No Fee

Naomi Hulse
Page 1 of 2
Section 394

4741550
01 MARCH 89 11:34 AM
KATIE L. DIXON
RECORDER, SALT LAKE COUNTY, UTAH
SL CO SEWERAGE IMP DIST NO. 1
REC BY: REBECCA GRAY , DEPUTY

EASEMENT

A portion of the Northwest Quarter of Section 11, Township 3, Range 1 East, Salt Lake Base and Meridian. Sewer along approximately 10200 South.

For the sum of One Dollar ($1.00) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the undersigned GRANTOR(S) hereby grant, convey, sell, and set over unto the Salt Lake County Sewerage Improvement District No. 1, a body politic of the State of Utah, hereinafter referred to as GRANTEE, its successors and assigns, a perpetual right-of-way and easement to lay, maintain, operate, repair, inspect, protect, install, remove and replace sewer pipelines, manholes, laterals and other sewer collection and transmission facilities, hereinafter called Facilities, insofar as it lies within the property of the GRANTOR(S), said right-of-way and easement, situate in Salt Lake County, State of Utah over and through a parcel of the GRANTOR(S) land lying within a strip twenty (20) feet wide, said strip extending ten (10) feet east of and lying parallel and adjacent to a line of reference and projection thereof, more particularly described as follows:

Page 2

Beginning at the point of intersection of the west line of GRANTOR(S) property and the District's sewer line, said point lying North 74.8 feet and East 945.5 feet, more or less, from the South Quarter Corner of said Section 11; and running thence S. 89°03'09" E. along said sewer line 106.5 feet, more or less, to a District Outfall Sewer line. Contains: 0.049± acres.

TO HAVE AND TO HOLD the same unto said GRANTEE, its successors and assigns, so long as such Facilities shall be maintained, with the right of ingress and egress in said Grantee, its officers, employees, representatives, agents, and assigns to enter upon the above described property with such equipment as is necessary to install, maintain, operate, repair, inspect, protect, remove and replace said Facilities. During construction periods, GRANTEE and its agents may use such portion of GRANTOR(S) property along and adjacent to said right-of-way as may be reasonably necessary in connection with the construction or repair of said Facilities. The contractor performing the work shall restore all property through which the work traverses, to as near it original condition as is reasonably possible. GRANTOR(S) shall have the right to use said premises except for the purpose for which this right- of-way and easement is granted to the said GRANTEE, provided such use shall not interfere with the Facilities or with the collection and conveyance of sewage through said Facilities, or any other rights granted to the GRANTEE hereunder.

BOOK 6107 PAGE 505

GRANTOR(S) shall not build or construct or permit to be built or constructed over or across said right-of-way, any building or other improvement except surface improvements such as driveways, walks, curbs, gutters, irrigation systems, or shallow rooted plantings, nor change the contour thereof, without the written consent of GRANTEE. This right-of-way and easement grant shall be binding upon and inure to the benefit of the successors and assigns of the GRANTOR(S) and the successors and assigns of the GRANTEE, and may be assigned in whole or in part by GRANTEE.

IN WITNESS WHEREOF, the GRANTOR(S) has (have) executed this right-of-way and easement this 27th day of ~~Friday~~ February, 1988.

County Parcel	Acreage	GRANTOR(S)
27-11-451-013	0.049± (106.5± l.f.)	By: Naomi B. Hulse Naomi Hulse

STATE OF UTAH)
: ss
COUNTY OF)

On the 27th day of February 1988, personally appeared before me, Naomi B. Hulse, the signer(s) of the above instrument, who duly acknowledged to me they executed the same.

Stephen Carlquist
Notary Public

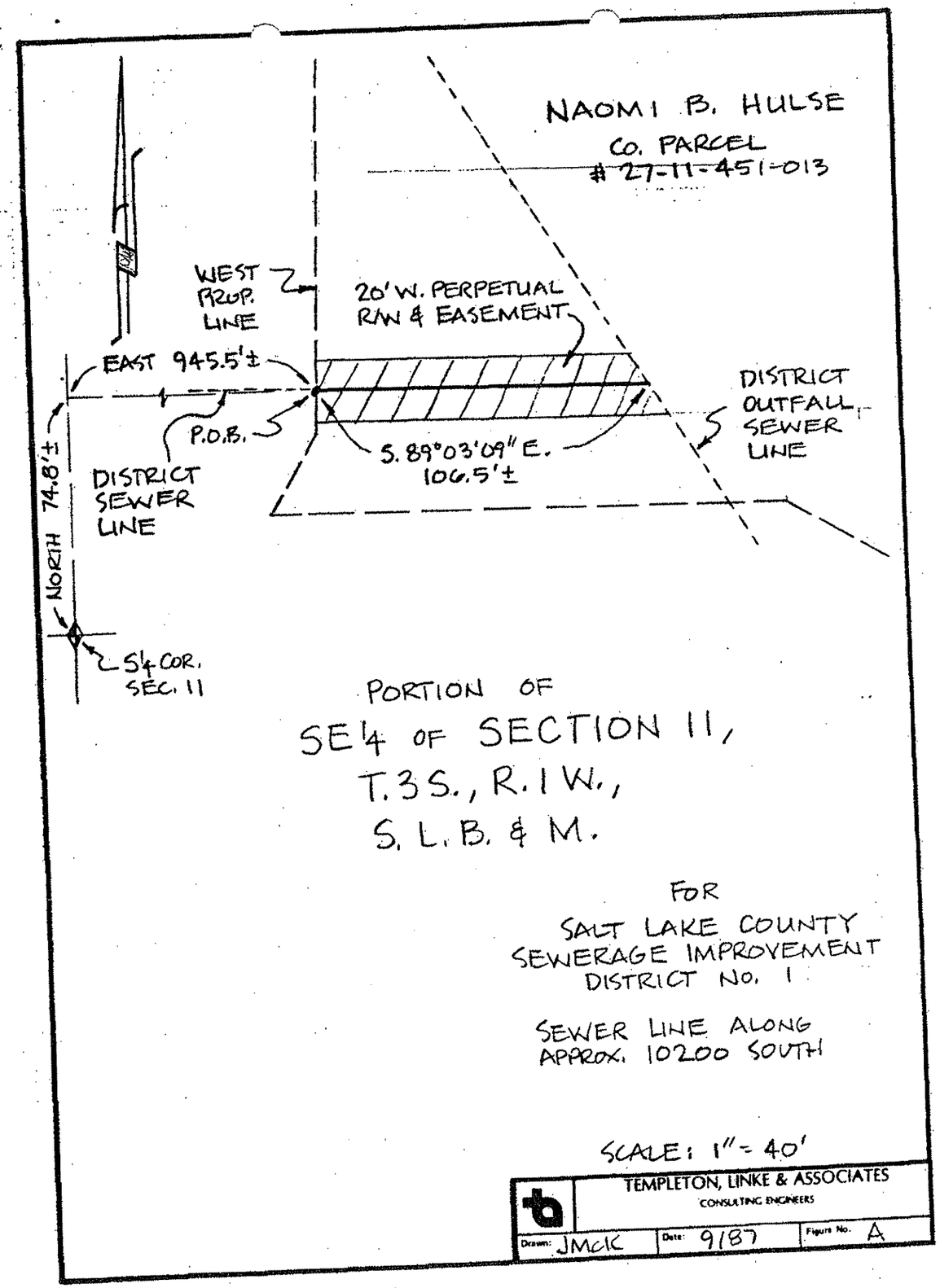
NOTARY PUBLIC
My Commission Expires September 29, 1992
STEPHEN CARLQUIST
3770 Hillside Lane
Salt Lake City, UT 84109
STATE OF UTAH

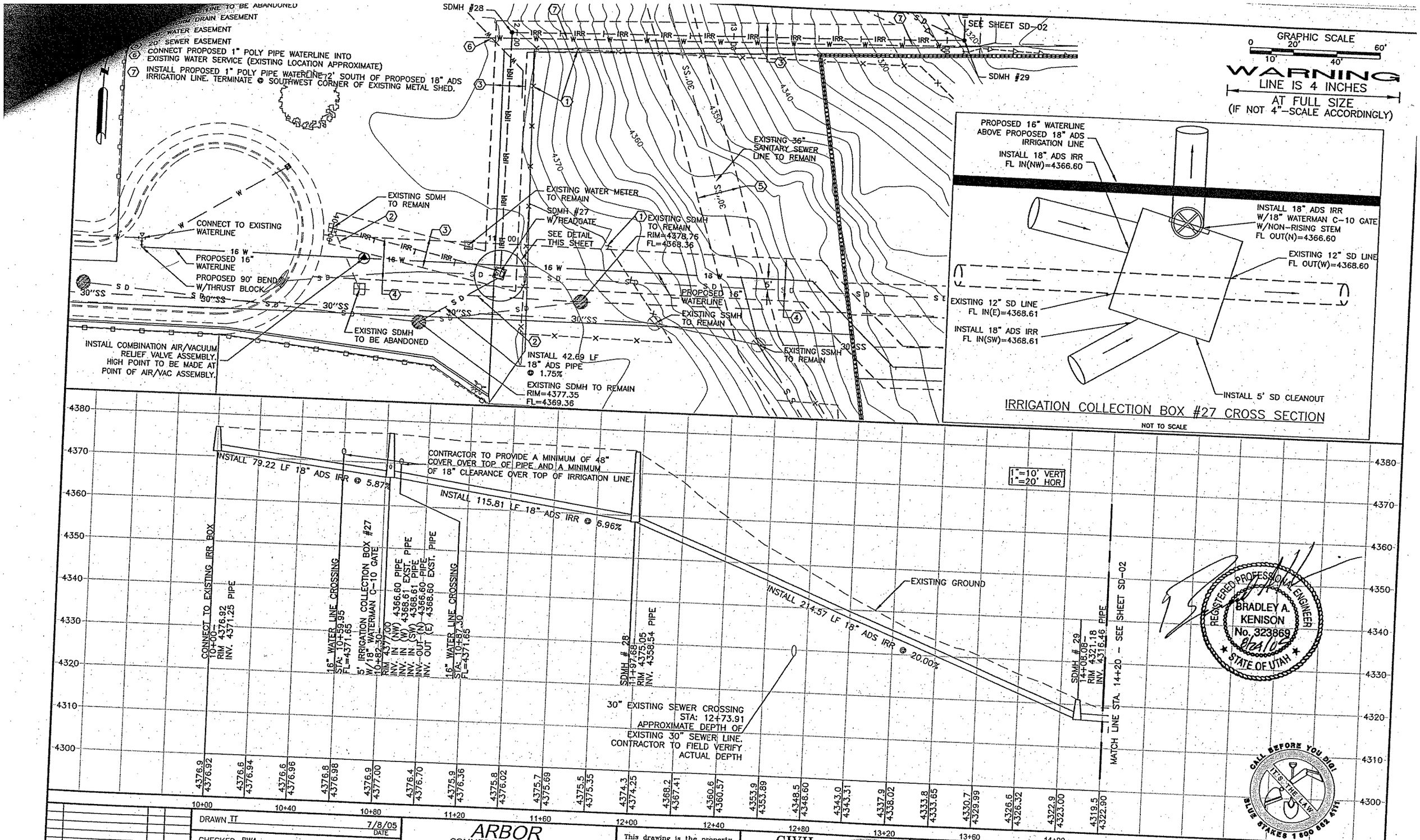
Residing in:

My Commission Expires:

E3-21

BOOK 6107 PAGE 506


NAOMI B. HULSE
CO. PARCEL
27-11-451-013
WEST PROP. LINE
20' W. PERPETUAL R/W & EASEMENT
EAST 945.5'±
P.O.B.
S. 89°03'09" E.
106.5'±
DISTRICT OUTFALL SEWER LINE
DISTRICT SEWER LINE
NORTH 74.8'±
S¼ COR. SEC. 11
PORTION OF
SE¼ OF SECTION 11,
T.3S., R.1W.,
S.L.B. & M.
FOR
SALT LAKE COUNTY
SEWERAGE IMPROVEMENT
DISTRICT NO. 1
SEWER LINE ALONG
APPROX. 10200 SOUTH
SCALE: 1" = 40'
TEMPLETON, LINKE & ASSOCIATES
CONSULTING ENGINEERS
Drawn: JMcK
Date: 9/87
Figure No. A



NO	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE

CHECKED RWA 7/8/05 DATE
PROJECT ENGINEER

APPROVED BAK 7/8/05 DATE
PROJECT MANAGER

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

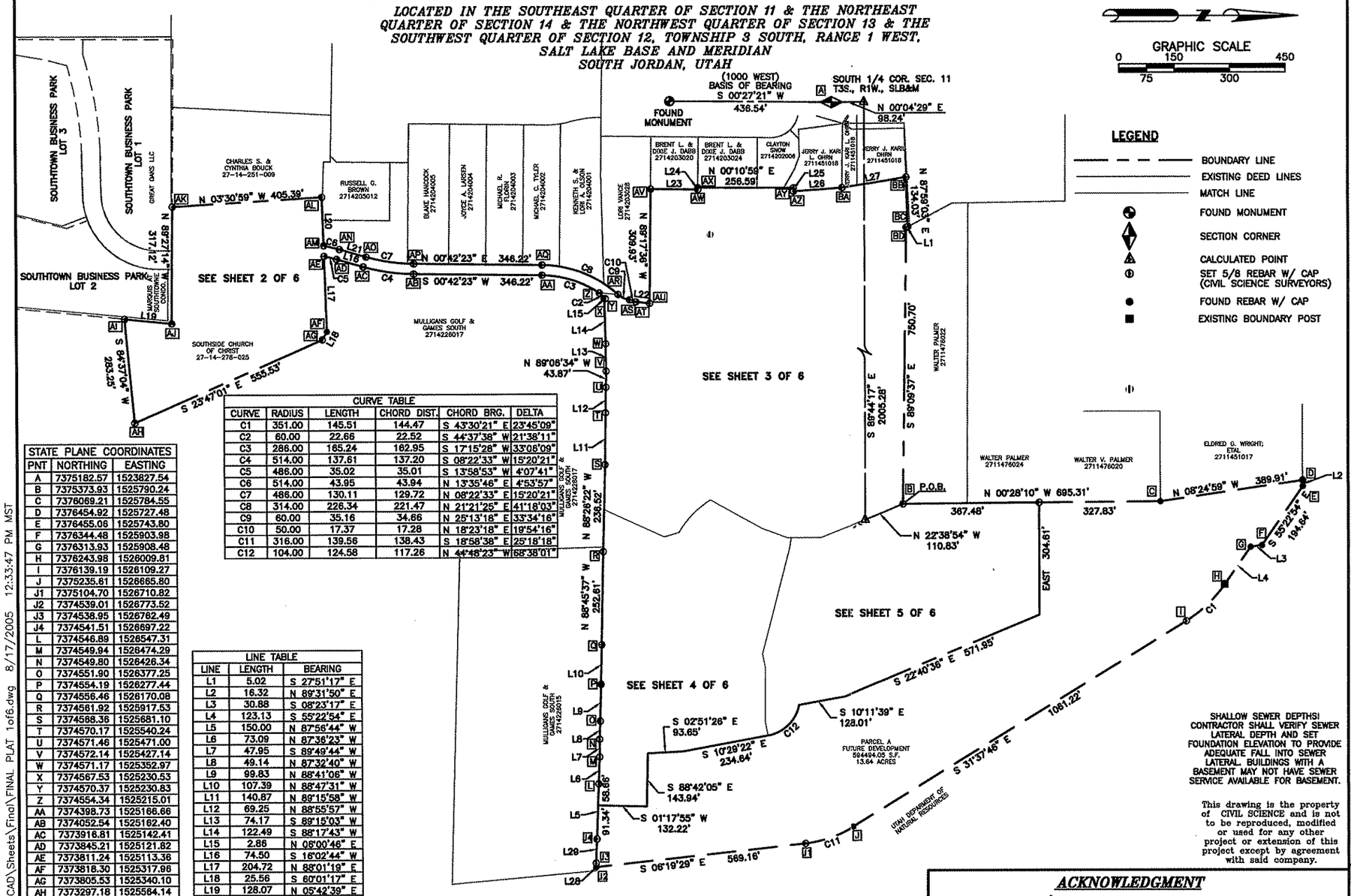
THE VILLAGE AT RIVERWALK

OFFSITE STORM DRAIN PLAN & PROFILE SHEET

PROJECT NO.: 04122
SHEET NO. SD-01
FILE NAME: SD-01
SCALE: AS SHOWN

THE VILLAGE AT RIVERWALK

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11 & THE NORTHEAST QUARTER OF SECTION 14 & THE NORTHWEST QUARTER OF SECTION 13 & THE SOUTHWEST QUARTER OF SECTION 12, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN
SOUTH JORDAN, UTAH



LEGEND

- BOUNDARY LINE
- EXISTING DEED LINES
- MATCH LINE
- FOUND MONUMENT
- SECTION CORNER
- CALCULATED POINT
- SET 5/8 REBAR W/ CAP (CIVIL SCIENCE SURVEYORS)
- FOUND REBAR W/ CAP
- EXISTING BOUNDARY POST

CURVE TABLE					
CURVE	RADIUS	LENGTH	CHORD DIST.	CHORD BRG.	DELTA
C1	351.00	145.51	144.47	S 43°30'21" E	23°45'09"
C2	60.00	22.66	22.52	S 44°37'38" W	21°38'11"
C3	286.00	165.24	162.95	S 17°15'28" W	33°08'09"
C4	514.00	137.61	137.20	S 08°22'33" W	15°20'21"
C5	486.00	35.02	35.01	S 13°58'53" W	4°07'41"
C6	514.00	43.95	43.94	N 13°35'46" E	4°53'57"
C7	486.00	130.11	129.72	N 08°22'33" E	15°20'21"
C8	314.00	226.34	221.47	N 21°21'25" E	41°18'03"
C9	60.00	35.16	34.66	N 25°13'18" E	33°34'16"
C10	50.00	17.37	17.28	N 18°23'18" E	19°54'16"
C11	316.00	139.56	138.43	S 18°58'38" E	25°18'18"
C12	104.00	124.58	117.26	N 44°48'23" W	68°38'01"

STATE PLANE COORDINATES		
PNT	NORTHING	EASTING
A	7375182.57	1523827.54
B	7375373.93	1525790.24
C	7376069.21	1525784.55
D	7376454.92	1525727.48
E	7376455.08	1525743.80
F	7376344.48	1525903.98
G	7376313.93	1525908.48
H	7376243.98	1526009.81
I	7376139.19	1526109.27
J	7375235.61	1526665.80
J1	7375104.70	1526710.82
J2	7374539.01	1526773.52
J3	7374538.95	1526762.49
J4	7374541.51	1526697.22
L	7374546.89	1526547.31
M	7374549.94	1526474.29
N	7374549.80	1526426.34
O	7374551.90	1526377.25
P	7374554.19	1526277.44
Q	7374556.46	1526170.08
R	7374561.92	1525917.53
S	7374568.36	1525681.10
T	7374570.17	1525540.24
U	7374571.46	1525471.00
V	7374572.14	1525427.14
W	7374571.17	1525352.97
X	7374567.53	1525230.53
Y	7374570.37	1525230.83
Z	7374554.34	1525215.01
AA	7374398.73	1525166.66
AB	7374052.54	1525162.40
AC	7373916.81	1525142.41
AD	7373845.21	1525121.82
AE	7373811.24	1525113.36
AF	7373818.30	1525317.98
AG	7373805.53	1525340.10
AH	7373297.18	1525564.14
AI	7373270.61	1525282.14
AJ	7373398.04	1525294.88
AK	7373401.07	1524977.77
AL	7373805.69	1524952.91
AM	7373810.24	1525084.58
AN	7373852.95	1525094.91
AO	7373924.55	1525115.50
AP	7374052.89	1525134.40
AQ	7374398.08	1525138.67

LINE TABLE		
LINE	LENGTH	BEARING
L1	5.02	S 27°51'17" E
L2	16.32	N 89°31'50" E
L3	30.88	S 08°23'17" E
L4	123.13	S 55°22'54" E
L5	150.00	N 87°56'44" W
L6	73.09	N 87°36'23" W
L7	47.95	S 89°49'44" W
L8	49.14	N 87°32'40" W
L9	99.83	N 88°41'06" W
L10	107.39	N 88°47'31" W
L11	140.87	N 89°15'58" W
L12	69.25	N 88°55'57" W
L13	74.17	S 89°15'03" W
L14	122.49	S 88°17'43" W
L15	2.86	N 06°00'46" E
L16	74.50	S 16°02'44" W
L17	204.72	N 88°01'19" E
L18	25.56	S 60°01'17" E
L19	128.07	N 05°42'39" E
L20	131.75	N 88°01'19" E
L21	74.50	N 16°02'44" E
L22	37.45	N 06°00'46" E
L23	127.00	N 00°42'23" E
L24	4.78	N 89°17'37" W
L25	9.51	S 89°17'37" E
L26	133.06	N 04°08'44" W
L27	176.44	N 09°02'05" W
L28	11.03	S 89°43'10" W
L29	65.32	N 87°45'24" W

STATE PLANE COORDINATES		
PNT	NORTHING	EASTING
AR	7374605.34	1525219.32
AS	7374636.70	1525234.09
AT	7374653.10	1525239.54
AU	7374690.34	1525243.46
AV	7374694.16	1524933.56
AW	7374821.15	1524935.12

STATE PLANE COORDINATES		
PNT	NORTHING	EASTING
AX	7374821.21	1524930.34
AY	7375077.80	1524931.16
AZ	7375077.68	1524940.66
BA	7375210.40	1524931.04
BB	7375384.65	1524903.34
BC	7375389.36	1525037.29
BD	7375384.93	1525039.63

SHALLOW SEWER DEPTHS! CONTRACTOR SHALL VERIFY SEWER LATERAL DEPTH AND SET FOUNDATION ELEVATION TO PROVIDE ADEQUATE FALL INTO SEWER LATERAL. BUILDINGS WITH A BASEMENT MAY NOT HAVE SEWER SERVICE AVAILABLE FOR BASEMENT.

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CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

SURVEYOR'S CERTIFICATE

I, DODD M. GREER, DO HEREBY CERTIFY THAT I AM A REGISTERED LAND SURVEYOR AND THAT I HOLD CERTIFICATE NO. 153771 AS PRESCRIBED UNDER THE LAWS OF THE STATE OF UTAH. I FURTHER CERTIFY THAT BY AUTHORITY OF THE OWNERS, I HAVE MADE A SURVEY OF THE TRACT OF LAND SHOWN ON THIS PLAT AND DESCRIBED HEREON, AND HAVE SUBDIVIDED SAID TRACT OF LAND INTO LOTS, STREETS, AND EASEMENTS AND HEREAFTER TO BE KNOWN AS:

THE VILLAGE AT RIVERWALK

AND THAT THE SAME HAS BEEN CORRECTLY SURVEYED AND STAKED ON THE GROUND AS SHOWN ON THIS PLAT.

SURVEYOR _____ DATE _____

BOUNDARY DESCRIPTION

BEGINNING AT A POINT WHICH IS N0°04'29"E 98.24 FEET AND S89°44'17"E 2005.28 FEET AND N22°38'54"W 110.83 FEET FROM THE SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN;

RUNNING THENCE N00°28'10"W 695.31 FEET; THENCE N08°24'59"W 389.91 FEET; THENCE N89°31'50"E 16.32 FEET TO A POINT ON THE WEST LINE OF THE JORDAN RIVER PARKWAY AS SURVEYED BY FLOYD LYLE PAGE (LS NO.4614) OF THE UTAH DEPARTMENT OF TRANSPORTATION (SALT LAKE COUNTY SURVEYORS OFFICE RECORD OF SURVEY (S89-07-0333); THENCE SOUTHERLY ALONG THE WEST LINE OF SAID RIVER PARKWAY THE FOLLOWING SIX (6) COURSES AND DISTANCES: (1) S55°22'54"E 194.64 FEET; (2) S08°23'17"E 30.88 FEET; (3) S55°22'54"E 123.13 FEET TO A POINT OF CURVATURE; (4) THENCE SOUTHEASTERLY 145.51 FEET ALONG THE ARC OF A 351.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS S43°30'21"E 144.47 FEET) TO A POINT OF TANGENCY; (5) S31°37'46"E 1061.22 FEET TO A POINT OF CURVATURE; (6) SOUTHERLY 139.56 FEET ALONG THE ARC OF A 316.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS S18°58'38"E 138.43 FEET) TO A POINT OF TANGENCY; THENCE S06°19'29"E 569.16 FEET TO A POINT ON AN EXISTING OLD ESTABLISHED FENCE LINE; THENCE WESTERLY ALONG SAID OLD ESTABLISHED FENCE LINE THE FOLLOWING TEN (10) COURSES AND DISTANCES: (1) S89°43'10"W 11.03 FEET; (2) N87°45'24"W 65.32 FEET; (3) N87°56'44"W 150.00 FEET; (4) N87°36'23"W 73.09 FEET; (5) S89°49'44"W 47.95 FEET; (6) N87°32'40"W 49.14 FEET; (7) N88°41'06"W 99.83 FEET; (8) N88°47'31" WEST 107.39 FEET; (9) N88°45'37"W 252.61 FEET; (10) N88°26'22"W 236.52 FEET; THENCE N89°15'58"W 140.87 FEET; THENCE N88°55'57"W 69.25 FEET; THENCE N89°06'34"W 43.87 FEET; THENCE S89°15'03"W 74.17 FEET; THENCE S88°17'43"W 122.49 FEET; THENCE N06°00'46"E 2.86 FEET; THENCE SOUTHWESTERLY 22.66 FEET ALONG THE ARC OF A 60.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS S44°37'38"W 22.52 FEET); THENCE SOUTHERLY 165.24 FEET ALONG THE ARC OF A 286.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS S17°15'28"W 162.95 FEET); THENCE S00°42'23"W 346.22 FEET; THENCE SOUTHERLY 137.61 FEET ALONG THE ARC OF A 514.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS S08°22'33"W 137.20 FEET); THENCE S16°02'44"W 74.50 FEET; THENCE SOUTHERLY 35.02 FEET ALONG THE ARC OF A 486.00 FOOT RADIUS CURVE TO THE LEFT (CHORD BEARS S13°58'53"W 35.01 FEET); THENCE N88°01'19"E 204.72 FEET; THENCE S60°01'17"E 25.56 FEET; THENCE S23°47'01"E 555.53 FEET; THENCE S84°37'04"W 283.25 FEET; THENCE N05°42'39"E 128.07 FEET; THENCE N89°27'14"W 317.12 FEET; THENCE N03°30'59"W 405.39 FEET; THENCE N88°01'19"E 131.75 FEET; THENCE NORTHERLY 43.95 FEET ALONG THE ARC OF A 514.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS N13°35'46"E 43.94 FEET); THENCE N16°02'44"E 74.50 FEET; THENCE 130.11 FEET ALONG THE ARC OF A 486.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS N08°22'33"E 129.72 FEET); THENCE N00°42'23"E 346.22 FEET; THENCE NORTHERLY 226.34 FEET ALONG THE ARC OF 314.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS N21°21'25"E 221.47 FEET); THENCE NORTHEASTERLY 35.16 FEET ALONG THE ARC OF A 60.00 RADIUS CURVE TO THE LEFT (CHORD BEARS N25°13'18"E 34.66 FEET); THENCE NORTHERLY 17.37 FEET ALONG THE ARC OF A 50.00 RADIUS CURVE TO THE RIGHT (CHORD BEARS N18°23'18"E 17.28 FEET); THENCE N06°00'46"E 37.45 FEET; THENCE N89°17'36"W 309.93 FEET; THENCE N00°42'23"E 127.00 FEET; THENCE N89°17'37"W 4.78 FEET; THENCE N00°10'59"E 256.59 FEET; THENCE S89°17'37"E 9.51 FEET; THENCE N04°08'44"W 133.06 FEET; THENCE N09°02'05"W 176.44 FEET; THENCE N87°59'03"E 134.03 FEET; THENCE S27°51'17"E 5.02 FEET; THENCE S89°09'37"E 750.70 FEET TO THE POINT OF BEGINNING.

CONTAINS 49.35 ACRES.

OWNER'S DEDICATION

KNOW ALL MEN BY THESE PRESENTS THAT WE, ALL OF THE UNDERSIGNED OWNER(S) OF ALL THE PROPERTY DESCRIBED IN THE SURVEYORS CETIFICATE HEREON AND SHOWN ON THIS MAP, HAVE CAUSED THE SAME TO BE SUBDIVIDED INTO LOTS, STREETS, EASEMENTS AND DO HEREBY DEDICATE THE STREETS AND PUBLIC UTILITY EASEMENTS INDICATED HEREON FOR PERTETUAL USE OF THE PUBLIC. THE OPEN SPACE PARCELS ARE DEDICATED FOR THE PERPETUAL USE OF THE PUBLIC.

DATED THIS _____ DAY OF _____ A.D., 20__

ARBOR GARDNER L.C. _____ WELLS FARGO BANK NA _____

ACKNOWLEDGMENT

STATE OF UTAH }
COUNTY OF SALT LAKE } S.S.

ON THIS _____ DAY OF _____ A.D., 20__, PERSONALLY APPEARED BEFORE ME, THE UNDERSIGNED NOTARY PUBLIC, IN AND FOR SAID COUNTY OF SALT LAKE IN SAID STATE OF UTAH, THE SIGNER ( ) OF THE ABOVE OWNER'S DEDICATION,____IN NUMBER, WHO DULY ACKNOWLEDGED TO ME THAT _____ SIGNED IT FREELY AND VOLUNTARILY AND FOR THE USES AND PURPOSES THEREIN MENTIONED.

MY COMMISSION EXPIRES _____ _____ NOTARY PUBLIC RESIDING IN SALT LAKE COUNTY

JUNE 30, 2005

THE VILLAGE AT RIVERWALK

A PLANNED RESIDENTIAL DEVELOPMENT

LOCATED IN THE SOUTHEAST QUARTER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN
SOUTH JORDAN, UTAH
SCALE: 1' = 150'

SHEET 1 OF 6

SOUTH VALLEY SEWER DISTRICT

APPROVED THIS _____DAY OF _____ A.D., _____

DIRECTOR, SOUTH VALLEY SEWER DISTRICT

BOARD OF HEALTH

APPROVED THIS _____DAY OF _____ A.D., _____

DIRECTOR, S.L. CO. BOARD OF HEALTH

PLANNING COMMISSION

APPROVED THIS _____DAY OF _____ A.D., _____ BY THE SOUTH JORDAN CITY PLANNING COMMISSION.

PLANNING COMMISSION CHAIRMAN

CITY ENGINEER

I HEREBY CERTIFY THAT THIS OFFICE HAS EXAMINED THIS PLAT AND IT IS CORRECT IN ACCORDANCE WITH THE INFORMATION ON FILE IN THIS OFFICE

CITY ENGINEER

CITY ATTORNEY

APPROVED AS TO FORM THIS _____ DAY OF_____ A.D., _____

SOUTH JORDON CITY ATTORNEY

CITY APPROVAL

PRESENTED TO THE BOARD OF SOUTH JORDON CITY COMMISSIONERS THIS____DAY OF_____ A.D.,____ AT WHICH TIME THIS SUBDIVISION WAS APPROVED AND ACCEPTED.

ATTEST: SOUTH JORDAN CLERK MAYOR, SOUTH JORDAN, UTAH

RECORDED

STATE OF UTAH, COUNTY OF SALT LAKE, RECORDED AND FILED AT THE REQUEST OF _____

DATE_____ TIME_____ BOOK_____ PAGE_____

FEE$ _____ SALT LAKE COUNTY RECORDER

(e) Notwithstanding anything to the contrary contained herein, this Agreement shall not be deemed or construed to make the parties partners or joint ventures, or to render either party liable for any of the debts or obligations of the other.

(f) This Agreement and the transactions contemplated herein will be construed in accordance with and governed by the laws of the State of Utah.

IN WITNESS WHEREOF, the parties have executed this Agreement by and through their respective duly authorized representatives as of the Effective Date.

"City"

CITY OF SOUTH JORDAN

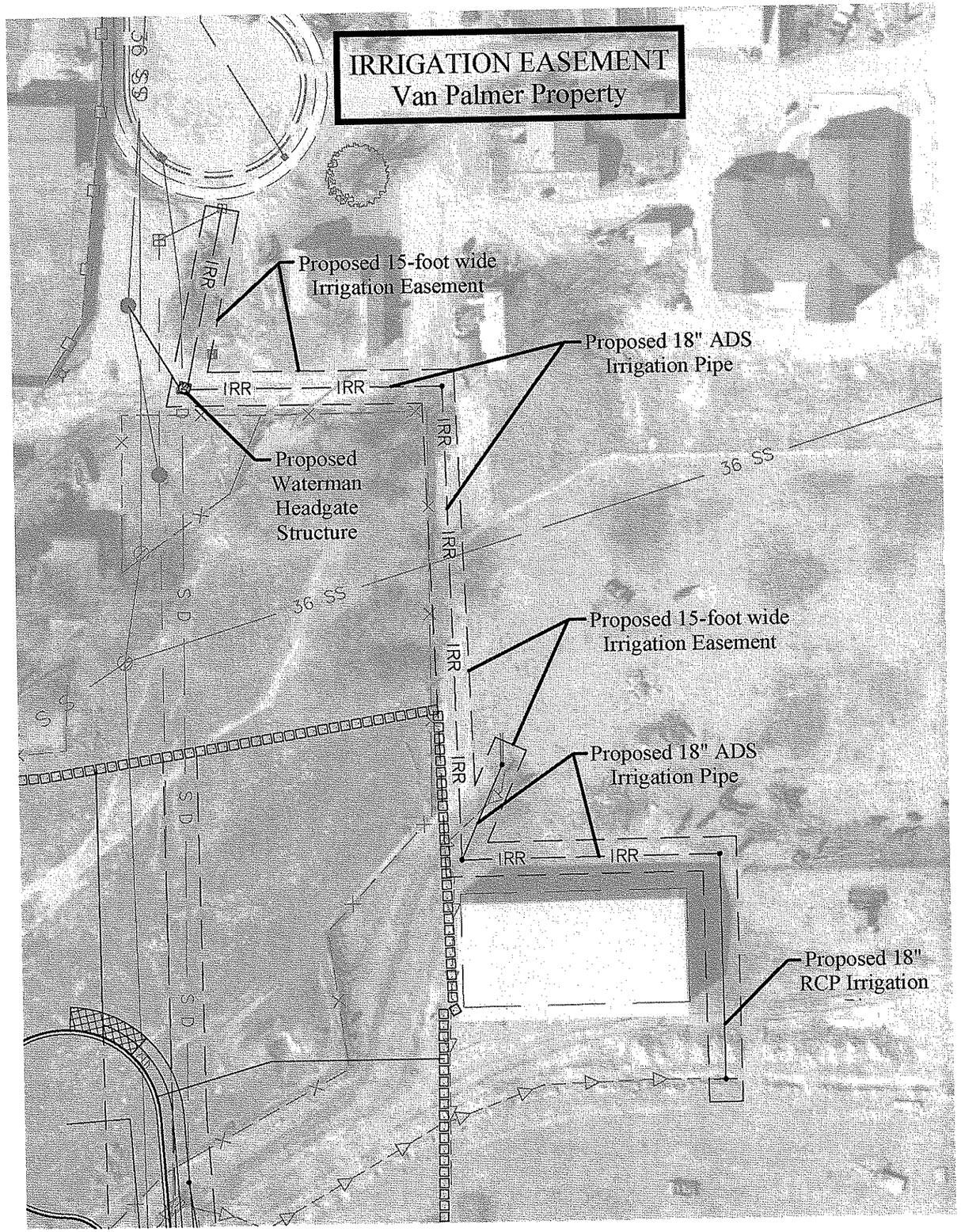
By: _____
Ricky A. Horst
City Manager

"Developer"

Arbor/Gardner L.L.C.

By: _____

Its: _____


IRRIGATION EASEMENT
Van Palmer Property
Proposed 15-foot wide
Irrigation Easement
Proposed 18" ADS
Irrigation Pipe
Proposed
Waterman
Headgate
Structure
Proposed 15-foot wide
Irrigation Easement
Proposed 18" ADS
Irrigation Pipe
Proposed 18"
RCP Irrigation
IRR
36 SS
SD

The Village At RiverWalk

Engineers Quantity Estimate - Final

No.	Item Description	Unit Description	Estimated Quantity	Engineers Estimate Unit Price	Engineers Estimate Total Price	Single Family Estimated Quantity	Mansion Homes Estimated Quantity
Bid Schedule A - Arbor Development Section							
A-1	Asphalt Pavement Mix	TON	4250	$ -	$ -	2100	2150
A-2	Install Cross Gutter	LF	885	$ -	$ -	210	675
A-3	Install Pedestrian Access Ramp	EACH	31	$ -	$ -	12	19
A-4	Install 5' Concrete Sidewalk	LF	10800	$ -	$ -	4100	6700
A-5	Install 2.0' High Back Curb and Gutter	LF	12400	$ -	$ -	7600	4800
A-6	Install 2.0' Sloped Curb and Gutter	LF	800	$ -	$ -	0	800
A-7	Install 2.0' Reverse Slope Curb and Gutter	LF	4150	$ -	$ -	0	4150
A-8	Roadbase Beneath Roadway (Assumed at 6" thick)	TON	8050	$ -	$ -	3950	4100
A-9	Roadbase Beneath Curb & Gutter (Assumed at 6" thick)	TON	1250	$ -	$ -	550	700
A-10	Roadbase Beneath Sidewalks (Assumed at 4" thick)	TON	1300	$ -	$ -	500	800
A-11	Subbase Beneath Roadway (Assumed at 6" thick)	TON	7900	$ -	$ -	3900	4000
A-12	Install Stamped Concrete	SY	525	$ -	$ -	475	50
A-13	Open Channel Water Feature	LF	1200	$ -	$ -	900	300
A-14	24" RCP Water Feature Culvert	LF	420	$ -	$ -	120	300
A-15	6' Decorative PreCast Masonry Fence	LF	3400	$ -	$ -	3000	400
A-16	Wrougt Iron and Brick Fence	LF	1650	$ -	$ -	600	1050
A-17	6' Vinyl Fence	LF	650	$ -	$ -	650	0
A-18	3 Rail Vinyl Fence	LF	825	$ -	$ -	825	0
A-19	6' No Climb Fence	LF	1150	$ -	$ -	0	1150
A-20	Install 18" RCP Class III Storm Drain	LF	1200	$ -	$ -	650	550
A-21	Install 24" RCP Class III Storm Drain	LF	1950	$ -	$ -	1400	550
A-22	Install 30" RCP Class III Storm Drain	LF	875	$ -	$ -	0	875
A-23	Install 42" RCP Class III Storm Drain	LF	1475	$ -	$ -	1475	0
A-24	Install 5' Storm Drain Manhole	EACH	27	$ -	$ -	17	10
A-25	Re-construct Storm Drainage Box (SE corner of Lori V. Property)	EACH	0	$ -	$ -	0	0
A-26	Install Storm Drain Catch Basin	EACH	18	$ -	$ -	7	11
A-27	Install Double Storm Drain Catch Basin	EACH	10	$ -	$ -	7	3
A-28	Install End Sections - 18"	EACH	1	$ -	$ -	0	1
A-29	Install End Sections - 24"	EACH	16	$ -	$ -	8	8
A-30	Install End Sections - 30"	EACH	1	$ -	$ -	0	1
A-31	Install End Sections - 42"	EACH	1	$ -	$ -	0	1
A-32	Detention Basin Excavation (approx. 163,000 cu.ft.)	LUMP	0	$ -	$ -	0	0
A-33	Detention Basin Landscaping / Irrigation (approx. 2.25 acres)	LUMP	0	$ -	$ -	0	0
A-34	Install 8" Sewerline	LF	5900	$ -	$ -	2800	3100
A-35	Install 4' Sewer Manhole	EACH	21	$ -	$ -	16	5
A-36	Install 5' Sewer Manhole	EACH	18	$ -	$ -	13	5
A-37	Tie-into existing 30" Sewer Main with 6' sewer manhole	EACH	1	$ -	$ -	0	1
A-38	Tie-into existing sewer manhole	EACH	3	$ -	$ -	2	1
A-39	8" Waterline	LF	6950	$ -	$ -	3850	3100
A-40	16" Waterline	LF	2200	$ -	$ -	1350	850
A-41	8" Water Valves	EACH	25	$ -	$ -	18	7
A-42	16" Water Valves	EACH	2	$ -	$ -	0	2
A-43	Hydrant with Assembly Connections	EACH	16	$ -	$ -	9	7
A-44	Blow-Off with Assembly Connections	EACH	3	$ -	$ -	2	1
A-45	Jordan Creek Drive Retaining Wall	SF	5950	$ -	$ -	5950	0
A-46	Jordan Creek Drive Landscaping / Trees, etc.	LUMP	1	$ -	$ -	1	0
A-47	Entrance Feature Landscaping, etc.	LUMP	1	$ -	$ -	1	0
A-48	Street Light Pole	EACH	40	$ -	$ -	18	22
A-49	Street Sign	EACH	10	$ -	$ -	6	4
A-50	Stop Sign	EACH	11	$ -	$ -	6	5
A-51	Open Space Irrigation System	LUMP	1	$ -	$ -	0	1
A-52	Open Space/Common Area Landscaping	LUMP	1	$ -	$ -	0	1
TOTAL SCHEDULE A					$ -		

145 lb/ft³ Asphalt = 4250
250
~~4500~~ Ton

62,869 ft³
248276 ft²

x*y*.5

Subbase 7900 ton
475
8375

~~120 lb/ft³~~

123,162 cf
4562 cy

136 lb/ft³

Roadbase 6" 8050
1250
500
75
9875

145220 ft³

294440.00 sf

x*y*.5 = 145220

10x10x.5 = 50

Roadbase 4" 1300
60
1360

20000 ft³

60000 sf

The Village At RiverWalk

Engineers Quantity Estimate - Final

Single Family	Mansion Homes
Estimated Quantity	Estimated Quantity

Bid Schedule B - McDougal Development Section

No.	Item Description	Unit Description	Estimated Quantity	Engineers Estimate Unit Price	Engineers Estimate Total Price
B-1	Asphalt Pavement Mix	TON	250	$ -	$ -
B-2	Install 5' Concrete Sidewalk	LF	450	$ -	$ -
B-3	Install 2.0' High Back Curb and Gutter	LF	1050	$ -	$ -
B-4	Install 2.5' High Back Curb and Gutter (entrance)	LF	180	$ -	$ -
B-5	Roadbase Beneath Roadway (Assumed at 6" thick)	TON	500	$ -	$ -
B-6	Roadbase Beneath Curb & Gutter (Assumed at 6" thick)	TON	75	$ -	$ -
B-7	Roadbase Beneath Sidewalk (Assumed at 4" thick)	TON	60	$ -	$ -
B-8	Subbase Beneath Roadway (Assumed at 6" thick)	TON	475	$ -	$ -
B-9	6' Decorative PreCast Masonry Fence	LF	300	$ -	$ -
B-10	6' High Black Coated Chain Link Fence	LF	1800	$ -	$ -
B-11	Install 8" Sewerline	LF	475	$ -	$ -
B-12	Install 5' Sewer Manhole	EACH	3	$ -	$ -
B-13	Tie-into existing 30" Sewer Main with 6' sewer manhole	EACH	1	$ -	$ -
B-14	8" Waterline	LF	450	$ -	$ -
B-15	Hydrant with Assembly Connections	EACH	1	$ -	$ -
B-16	Entrance Gate / Landscaping, etc.	LUMP	1	$ -	$ -
B-17	Street Light Pole	EACH	2	$ -	$ -
B-18	Install 5' Storm Drain Manhole	EACH	1	$ -	$ -
B-19	Install Storm Drain Catch Basin	EACH	2	$ -	$ -
B-20	Install End Sections - 18" ADS	EACH	1	$ -	$ -
TOTAL SCHEDULE B					$ -

Parkstrip -
320
320
320
640
340
1940 x 5' 9700#

1440 x 7' = 10080

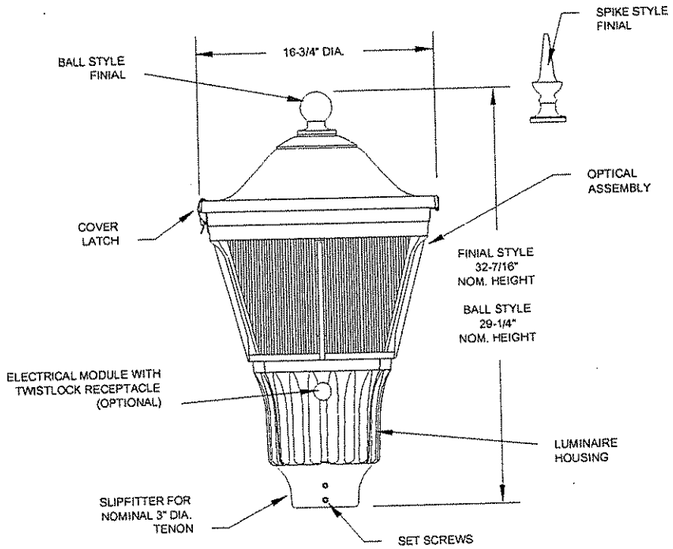
19780#

Bid Schedule B - Van Palmer Offsite Section

No.	Item Description	Unit Description	Estimated Quantity	Engineers Estimate Unit Price	Engineers Estimate Total Price
C-1	18" ADS Irrigation Pipe	LF	700	$ -	$ -
C-2	1" Poly Waterline Service	LF	275	$ -	$ -
C-3	Install 18" RCP Class V Storm Drain	LF	100	$ -	$ -
C-4	18" Waterman Headgate (no-rising stem)	EACH	1	$ -	$ -
C-5	5' Collection Box W/ Headgate	EACH	1	$ -	$ -
C-6	Install 4' Storm Drain Manhole	EACH	1	$ -	$ -
C-7	Install 5' Storm Drain Manhole	EACH	4	$ -	$ -
TOTAL SCHEDULE C					$ -
TOTAL SCHEDULE A, B, & C					$ -

Utility Postop® Series Luminaire

Maximum weight - 47 lbs
Maximum effective projected area - 1.38 sq. ft.



ORDERING INFORMATION

EXAMPLE: *PTU 070HP 12 B G3 B*

PTU 070HP 12 B

BALLAST TYPE
(MOGUL BASE)
050HP = 50W HPS
070HP = 70W HPS
100HP = 100W HPS
15AHP = 150W 55V HPS
175MH = 175W MH
100MV = 100W MV
175MV = 175W MV
250MV = 250W MV
(G3 ONLY)

BALLAST TYPE
(MEDIUM BASE)
50DHP = 50W HPS
70DHP = 70W HPS
10DHP = 100W HPS
15DHP = 150W 55V HPS
70DMH = 70W MH (NOT AVAIL. W/ 480V)
10DMH = 100W MH (NOT AVAIL. W/ 480V)
15DMH = 150W MH (NOT AVAIL W/ 480V)
17DMH = 175W MH

VOLTAGE
12 = 120 VOLT
20 = 208 VOLT
24 = 240 VOLT
27 = 277 VOLT
34 = 347 VOLT (C.U.L.)
48 = 480 VOLT
MT = MULTITAP (120, 208, 240, 277 VOLT)

COLOR
B = BLACK
Z = BRONZE
N = GREEN
A = AS SPEC.

OPTICS
G3 = ASYMMETRIC GLASS REFRACTOR
A3 = ASYMMETRIC ACRYLIC REFRACTOR (not avail. w/250MV)
A5 = SYMMETRIC ACRYLIC REFRACTOR (not avail. w/250MV)
P3 = ASYMMETRIC POLYCARBONATE REFRACTOR (not avail. w/250MV)
P5 = SYMMETRIC POLYCARBONATE REFRACTOR (not avail. w/250MV)

FINIAL TYPE
B = BALL STYLE
S = SPIKE STYLE

OPTIONS
C = IES CUTOFF
P = PROTECTED STARTER FOR HPS UNITS ONLY
H = NEMA TWISTLOCK PHOTOCONTROL RECEPTACLE (DOES NOT INCLUDE PHOTOCONTROL)
T = BOTH NEMA TWISTLOCK RECEPTACLE AND PROTECTED STARTER TOGETHER (HPS UNITS ONLY)

ACCESSORIES
LAMP = SHIP APPROPRIATE LAMP AS A LINE ITEM. SEE LAMP SHEET

Specifications

GENERAL DESCRIPTION
The Utility Post Top is designed for ease of maintenance with the plug-in electrical module common to each of the luminaires in Holophane's utility Luminaire Series. A precision optical system maximizes post spacings while maintaining uniform illumination.

OPTICAL SYSTEM
The optical system consists of a precisely molded refractor operating in conjunction with a formed anodized aluminum reflector located in the top cover. Positive pressure from three coiled springs backing the reflector and gaskets at the top and bottom of the refractor create a sealed optical compartment. Refractors designed to provide an I. E. S. Type III distribution are available molded from thermal resistant borosilicate glass and acrylic or polycarbonate plastic. Type V refractors are available in acrylic or polycarbonate only. An IES cutoff option is available.

LUMINAIRE HOUSING
The luminaire housing, cast of aluminum, cradles the refractor and provides an enclosure for the plug-in electrical module. The nickel plated lamp grip socket and the three station incoming line terminal block are pre-wired to a five conductor receptacle for ease in connecting the electrical module. A slipfitter will accept a 3" high by 2-7/8" to 3-1/8" O.D. pole tenon.

LUMINAIRE HOUSING / DOOR
Cast of aluminum, the housing / door is removable without the use of tools and is retained by a stainless steel aircraft cable. For units with an E.E.I.-N.E.M.A. twist lock photocell receptacle, the door contains an acrylic "window" to allow light to reach the cell.

ELECTRICAL MODULE
The ballast components are mounted on a steel plate that is removable without the use of tools. A matching five conductor plug connects to the receptacle in the luminaire housing to complete the wiring. Where a starting aid is required, it is provided with a separate plug-in connector and can be replaced without the use of tools. For photoelectric operation, the electrical module is provided with an E.E.I.-N.E.M.A. twist lock photocell receptacle.

TOP COVER
The cover, cast of aluminum, is attached to the top ring of the luminaire housing by a painted stainless steel piano hinge and latched by an overcenter positive action stainless steel latch which allows tool-less entry to the lamp chamber for relamping. Both pointed and ball finials are available.

BALLASTS
(Refer to Ballast Data Sheet for specific operation characteristics)
50 watt 120 volt High Pressure Sodium (HPS) ballasts are High Power Factor Reactor type. All other HPS ballast are High Power Factor Autotransformer type.
175 watt Metal Halide (MH) ballasts are Peak Lead Autotransformer type. 70 and 100 watt MH units are available only with High Power Factor High Reactance type ballast.
All Mercury Vapor (MV) ballasts are High Power Factor Constant Wattage Autotransformer (CWA) type.

FINISH
The luminaire is finished with polyester powder paint applied after a seven stage pretreatment precess to insure maximum durability.

ARCHITECTURAL OUTDOOR ORDER #:

TYPE:

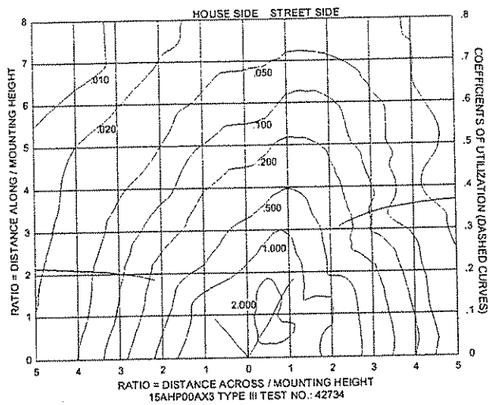
DRAWING NO: US-2583

THIS DRAWING, WHEN APPROVED, SHALL BECOME THE COMPLETE SPECIFICATION FOR THE MATERIAL TO BE FURNISHED BY HOLOPHANE ON THE ORDER NOTED ABOVE. A UNIT OF SIMILAR DESIGN MAY BE SUPPLIED, BUT ONLY AFTER APPROVAL BY THE CUSTOMER IN WRITING. ON POLE ORDERS AN ANCHOR BOLT TEMPLATE PRINT WILL BE SUPPLIED WITH EACH ANCHOR BOLT ORDER TO MATCH THE POLE PROVIDED.

THIS PRINT IS THE PROPERTY OF HOLOPHANE AND IS LOANED SUBJECT TO RETURN UPON DEMAND AND UPON EXPRESS CONDITION THAT IT WILL NOT BE USED DIRECTLY OR INDIRECTLY IN ANY WAY DETRIMENTAL TO OUR INTRESTS, AND ONLY IN CONNECTION WITH MATERIAL FURNISHED BY HOLOPHANE.

HOLOPHANE
LEADER IN LIGHTING SOLUTIONS
Holophane
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

SCALE: N/A
DRAWN: RAF
APP'D:
DATE: 12-12-01



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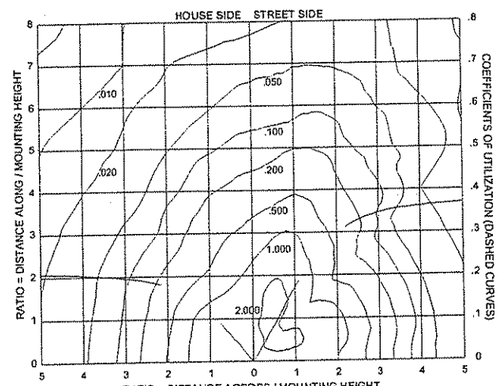

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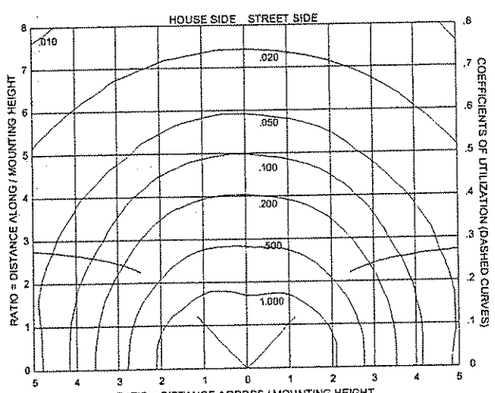

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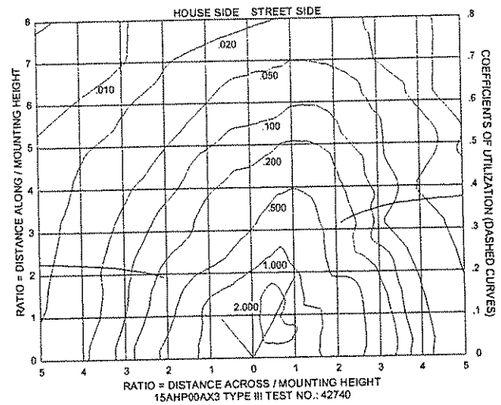
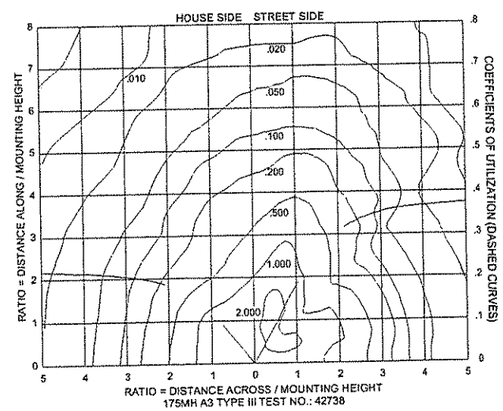
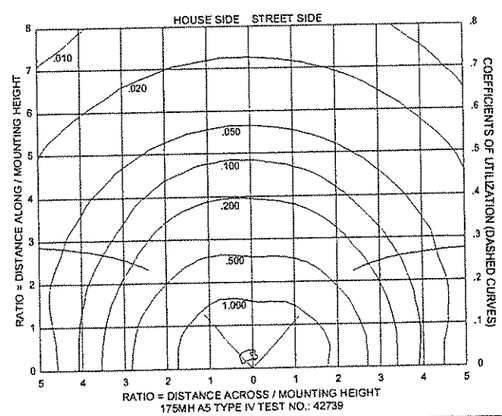


15AHP00AX3 TYPE III TEST NO.: 42740



175MH A3 TYPE III TEST NO.: 42738



175MH A5 TYPE IV TEST NO.: 42739

HOLOPHANE
LEADER IN LIGHTING SOLUTIONS

Holophane
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

TYPICAL PHOTOMETRIC DATA (ISOFOOTCANDLE CHARTS AND COEFFICIENT OF UTILIZATION CURVES)

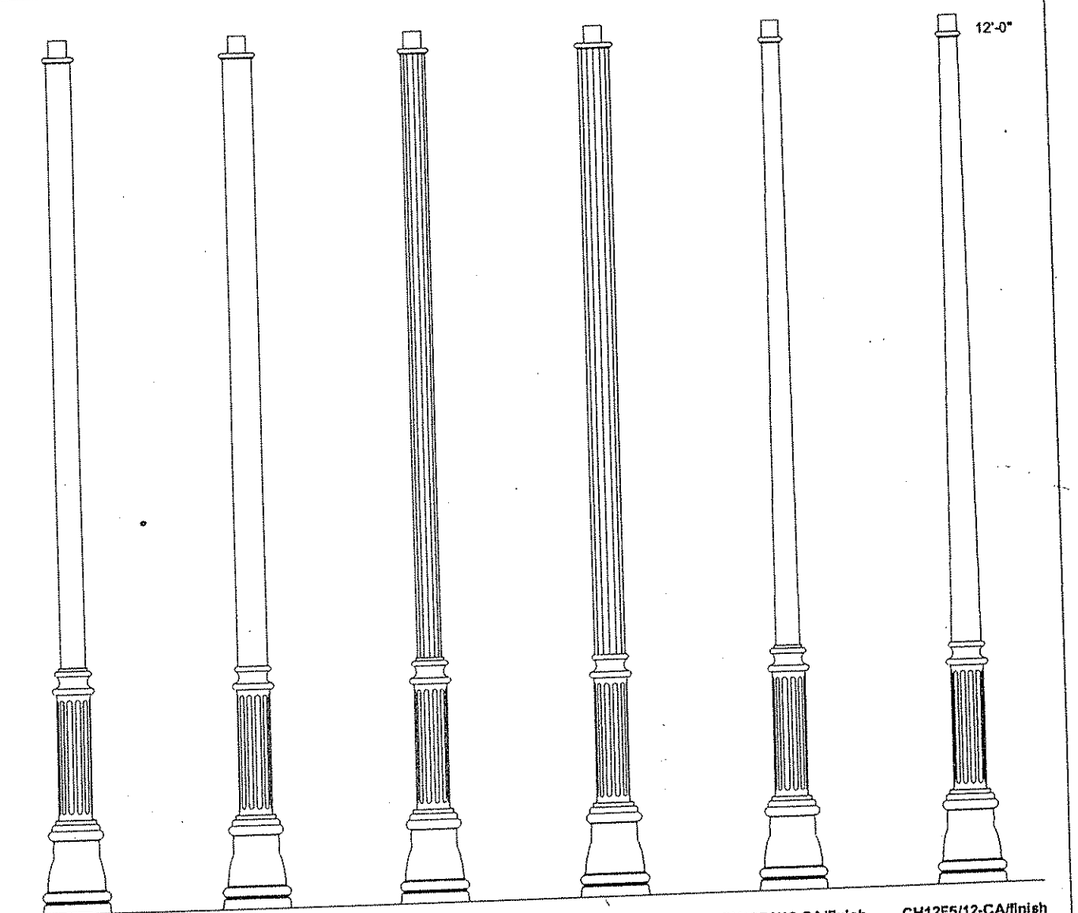
Isofootcandle data is based on a 15 foot mounting height. To determine values for mounting heights other than 15 feet, multiply the values for mounting heights following factors:

10' - 2.25	12' - 1.56	14' - 1.15
16' - 0.88	18' - 0.69	20' - 0.56
22' - 0.46	24' - 0.39	

Cast Aluminum Posts
extruded shafts

CHARLESTON Series

12" dia. base



CH12S4/12-CA/finish
4" dia. smooth shaft
8', 10', 12', 14'

CH12S5/12-CA/finish
5" dia. smooth shaft
8', 10', 12', 14'

CH12F4/12-CA/finish
4" dia. fluted shaft
8', 10', 12', 14'

CH12F5/12-CA/finish
5" dia. fluted shaft
8', 10', 12', 14'

CH12T4/12-CA/finish
3" - 4" dia. tapered shaft
8', 10', 12', 14'

CH12F5/12-CA/finish
3" - 5" dia. tapered shaft
8', 10', 12', 14'

SPECIFICATIONS

DESCRIPTION The lighting post shall be all aluminum, one-piece construction, with a classic fluted base design. The shaft shall be _____.(insert shaft options from back page) The post shall be Holophanes' catalog number CHXXXX/12-CA/finish.

MATERIALS The base shall be heavy wall, cast aluminum produced from certified ASTM 356.1 ingot per ASTM B-179-95a or ASTM B26- 95. The straight shafts shall be extruded from aluminum, ASTM 6061 alloy, heat treated to a T6 temper. The tapered shaft shall be extruded from aluminum, ASTM 6063 alloy, spun to a tapered shape, then heat treated to a T6 temper. All hardware shall be tamper resistant stainless steel. Anchor bolts to be completely hot dip galvanized.

CONSTRUCTION The shaft shall be double welded to the base casting and shipped as one piece for maximum structural integrity. The shaft shall be circumferentially welded inside the base casting at the top of the access door, and externally where the shaft exits the base. All exposed welds below 8' shall be ground smooth.

All welding shall be per ANSI/AWS D1.2-90. All welders shall be certified per Section 5 of ANSI/AWS D1.2-90.

DIMENSIONS The post shall be X'- XX" in height with an 11.5" diameter base. The shaft diameter shall be XX". (see back page) At the top of the post, an integral 3" O.D. tenon with a transitional donut shall be provided for luminaire mounting.

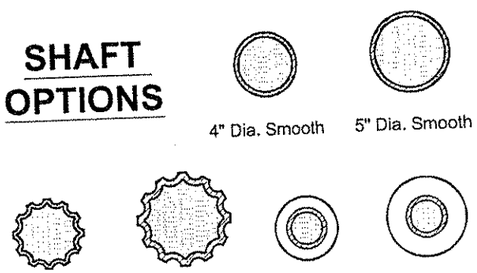
INSTALLATION The post shall be provided with four, hot dip galvanized L-type anchor bolts to be installed on an 8" diameter-bolt circle. A door shall be provided in the base for anchorage and wiring access. A grounding screw shall be provided inside the base opposite the door.

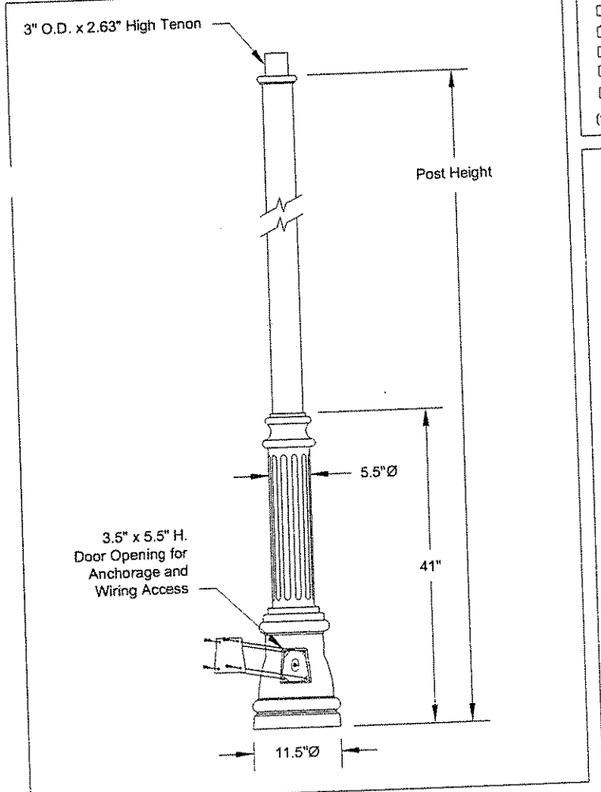
For finish specifications and color options, see "Finish" section in catalog.

HOLOPHANE® *An Acuity Brands Company*
LEADER IN LIGHTING SOLUTIONS
214 OAKWOOD AVENUE - NEWARK, OHIO 43055

CHARLESTON Series
Cast Aluminum Posts

SHAFT OPTIONS





ORDERING GUIDE

sample catalog number

CH12S4/12	-	CA/BK	-	WPRT
Post	-	material / finish	-	options
CHARLESTON 12' Smooth 4" shaft 12" dia. base		Cast Aluminum Black		Weatherproof Receptacle at Top (of post)

Post (check appropriate boxes, add height in blank)

Catalog #	Shaft type	Heights
☐ CH_ _S4/12	4" dia. smooth	8', 10', 12', 14'
☒ CH_ _S5/12	5" dia. smooth	10', 12', 14', 16'
☐ CH_ _F4/12	4" dia. fluted	8', 10', 12', 14'
☐ CH_ _F5/12	5" dia. tapered	10', 12', 14', 16'
☐ CH_ _T4/12	3" - 4" dia. tapered	8', 10', 12', 14'
☐ CH_ _T5/12	3" - 5" dia. tapered	10', 12', 14', 16'

Material/Finish

Catalog Suffix	Description
☒ -CA/BK	Cast Aluminum/Black (std.)
☐ -CA/DG	Cast Aluminum/Dark Green
☐ -CA/DB	Cast Aluminum/Dark Bronze
☐ -CA/PP	Cast Aluminum/Prime Painted
☐ -CA/CC	Cast Aluminum/Custom Color

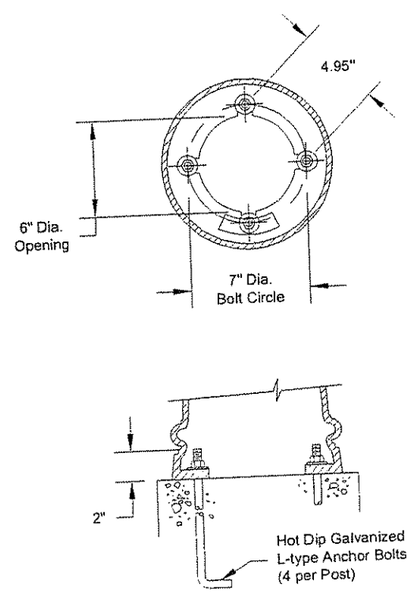
(for complete finish and color options, see "**Finish**" section in catalog)

Optional Equipment

Catalog Suffix	Description
☐ - _____	Receptacles (see Accessories section)
☐ - _____	Banner Arms (see Accessories section)
☐ - _____	Flag Pole Holders (see Accessories section)
☐ - _____	Custom Logos (see Accessories section)
☐ - _____	Signage (see Signage section)

(for optional equipment not found in catalog, consult factory)

ANCHORAGE GUIDE



HOLOPHANE® An Acuity Brands Company
LEADER IN LIGHTING SOLUTIONS 214 OAKWOOD AVENUE - NEWARK, OHIO 43055

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870 (801)538-6146

NOI

Notice of Intent (NOI) for Storm Water Discharges Associated with **Construction Activity** Under the UPDES General Permit No. UTR104838

Submission of this Notice of Intent constitutes notice that the party(s) identified in Section I of this form intends to be authorized by UPDES General Permit No. UTR104838 issued for storm water discharges associated with construction activity in the State of Utah. Becoming a permittee obligates such discharger to comply with the terms and conditions of the permit. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. OPERATOR INFORMATION

Name (Main operator): arbor residential Phone: 801 561-8594

Address: 45w 10,000s #301 Status of Owner/Operator: P - Private

City: Sandy State: UT Zip: 84070

Contact Person: Mike Maddox Phone: 801 652-6916

Name (1st Co-permittee): _____ Phone: _____

Address: _____ Status of Owner/Operator: _____

City: _____ State: ____ Zip: _____

Contact Person: _____ Phone: _____

Name (2nd Co-permittee): _____ Phone: _____

Address: _____ Status of Owner/Operator: _____

City: _____ State: ____ Zip: _____

Contact Person: _____ Phone: _____

Name (3rd Co-permittee): _____ Phone: _____

Address: _____ Status of Owner/Operator: _____

City: _____ State: ____ Zip: _____

Contact Person: _____ Phone: _____

Please copy this form if you have more co-permittees than what is allowed on this form.

II. FACILITY SITE / LOCATION INFORMATION

Is the facility located on Indian Lands? (Y or N) N

Name: The Village at Riverwalk Development

Project No. (if any): _____

Address: Approximately 700w. 10200s. County: SALT LAKE

City: SOUTH JORDAN State: UT Zip: 84094

Latitude: _____ Longitude: _____

III. SITE ACTIVITY INFORMATION

Municipal Separate Storm Sewer System (MS4) Operator Name:_____

Receiving Water Body: _____

How far to the nearest water body? _____

List the Number of any other UPDES permits at the site:_____ _____

IV. TYPE OF CONSTRUCTION (Check all that apply)

1. X Residential 2. ___Commercial 3.___Industrial 4. X Road 5.___ Bridge 6. X Utility 7. ___ Contouring, Landscaping

8. ___ Other (Please list) _____

V. MANAGEMENT PRACTICES

Identify proposed Best Management Practices (BMPs) to reduce pollutants in storm water discharges: (Check all that apply)

1. X Silt Fences 2.___Sediment Pond 3.___Seeding/Preservation of Vegetation 4.___ Mulching/Geotextiles 5X Check Dams 6.__ Structural Controls (Berms, Ditches, etc.)

7. ___ Other (Please list)_____

VI. ADDITIONAL INFORMATION REQUIRED

Project Start Date: Completion Date: Estimated Area to be Disturbed

10/07/05 10/07/06 (in Acres): 36

A storm water pollution prevention plan has been prepared for this site and is to the best of my knowledge in Compliance with State and/or Local Sediment and Erosion Plans and Requirements.

(Y or N) Y (A pollution prevention plan is required to be on hand before submittal of the NOI)

VII. CERTIFICATION: I certify under penalty of law that I have read and understand the *Part I.B.* eligibility requirements for coverage under the general permit for storm water discharges from construction activities.

I further certify that to the best of my knowledge, all discharges and BMPs that have been scheduled and detailed in a pollution prevention plan will satisfy requirements of *Part I.B.* , and *Part III.* of this permit.

I understand that continued coverage under this storm water general permit is contingent upon maintaining eligibility as provided fo*Pint I.B.*

I also certify under penalty of law that this document and all attachments were prepared under the direction or supervision of those who have place their signature below, in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Signature: Certification provided online by Mike Maddox, Project Manager, mikemaddoxbeingpeace@hotmail.com 10/05/05

Amount of Permit Fee Enclosed: $ 100

INSTRUCTIONS

Notice Of Intent (NOI) For Covered Under the UPDES General Permit
Storm Water Discharges From Construction Activities

Who Must File A Notice Of Intent (NOI) Form

State law at UAC R317-8-3.8 prohibits point source discharges of storm water from construction activities to a water body(ies) of the State without a Utah Pollutant Discharge Elimination System (UPDES) permit. The operator of a construction activity that has such a storm water discharge must submit a NOI to obtain coverage under the UPDES Storm Water General Permit. If you have questions about whether you need a permit under the UPDES Storm Water program, or if you need information as to whether a particular program is administered by EPA or a state agency, contact the storm water coordinator at (801) 538-6146.

Where To File NOI Form

NOIs, with fee payment(s), must be sent to the following address:

Department of Environmental Quality
Division of Water Quality
P.O. Box 144870
Salt Lake City, UT 84114-4870

Completing The NOI Form

You must type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions on this form please call the storm water coordinator at (801) 538-6146.

Beginning of Coverage

Storm Water General Permits cover a facility quickly avoiding delays, therefore coverage is immediate after NOI with submission of the permit fee. The permittee should be aware that though you may not have a permit in hand, if you have sent in a completed NOI with the permit fee you are covered by the conditions in the permit and will be expected to comply with these conditions. If you wish, contact the Division of Water Quality at (801) 538-6146 to receive a generic copy of the permit. After we receive the NOI and the permit fee we will send you an official copy of the permit with your permit number.

Permit Fees (*MAKE CHECKS PAYABLE TO: DIVISION OF WATER QUALITY*)

Construction projects are prorated from the time they begin disturbing ground until the time the disturbed surface is stabilized, and the permit is terminated by the permittee with a submittal of a Notice of Termination (NOT) form. Fees are prorated at $8.34 per month of coverage needed, except a $50 minimum and a $500.00 maximum. **EXAMPLE: if you need 5 months of coverage: 5 x $8.34 = $41.70, then you will need to submit the $50 minimum, if 18 months of coverage is needed: 18 x $8.34 = $150.12, your total fee will be $150.12.** The $500.00 maximum will provide permit coverage for five years and then expire at the end of the five year period. State or local political subdivisions are exempt from the permit fee. The fee must be received with the NOI before permit coverage is given.

General

Facilities within Salt Lake City or Salt Lake County must contact the city or county and notify them of the new permit status for the facility.

SECTION I - FACILITY OPERATOR INFORMATION

Give the legal name(s) of the person(s), firm(s), public organization(s), or any other entity(ies) that conducts the construction operation at the facility or site described in this application. The name of the operator(s) may be the developer, the owner, the general contractor, the design firm, the excavation contractor and/or others (e.g. anyone that fits the definition of operator). An operator is anyone that has control over site/project specifications and/or control of day to day operational activities. Do not use a colloquial name. Enter the complete address and telephone number of the operator(s).

Enter the appropriate letter to indicate the legal status of the operator of the facility.
F = Federal **M** = Public (other than Fed or State) **S** = State **P** = Private

SECTION II - FACILITY/SITE LOCATION INFORMATION

Enter the facility's or site's official or legal name and project number (if any) and complete street address, including city, state and ZIP code. If the facility or site lacks a street address, indicate the latitude and longitude of the facility to the nearest 15 seconds of the approximate center of the site.

Indicate whether the facility is located on Indian Lands.

If the facility is located on Indian Lands EPA form 3510-6 should be used and submitted to EPA Region VIII except for facilities on the Navajo Reservation or on the Goshute Reservation which should submit EPA form 3510-6 to Region IX.

SECTION III - SITE ACTIVITY INFORMATION

If the storm water discharges to a municipal separate storm sewer system (MS4), enter the name of the operator of the MS4 (e.g., municipality name, county name) and the receiving water of the discharge from the MS4 if it is known. (A MS4 is defined as a conveyance or system of conveyances (including roads with drainage systems, municipal streets, catch basins, curbs, gutters, ditches, man-made channels, or storm drains) that is owned or operated by a state, city, town, county, district, association or other public body which is designed or used for collecting or conveying storm water).

SECTION IV - TYPE OF CONSTRUCTION

Check each type of construction that applies to this application.

SECTION V - MANAGEMENT PRACTICES

Check each type of management practices that will be used to control storm water runoff at the job site.

SECTION VI - ADDITIONAL INFORMATION REQUIRED

Enter the project start date and the estimated completion date for the entire development plan.

Provide an estimate of the total number of acres of the site on which soil will be disturbed (round to the nearest acre).

Indicate whether the storm water pollution prevention plan for the site is in compliance with approved state and/or local sediment and erosion plans, permits, or storm water management plans.

SECTION VII - CERTIFICATION

State statutes provide for severe penalties for submitting false information on this application form. State regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (I) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor; or

For a municipality, state, Federal, or other public facility: by either a principal executive officer or ranking elected official.

POLLUTION PREVENTION PLAN

A storm water pollution prevention plan (SWP3) is required to be in hand before the NOI can be submitted. It is important to know SWP3 requirements (contained in the permit) even during the design portion of the project. A copy of the permit can be obtained from the Division of Water Quality. Guidance material for developing a SWP3 can be obtained from EPA (NTIS) or copied from EPA material at the Division of Water Quality.

NOTICE OF TERMINATION (NOT)

A completed Notice of Termination (NOT) form is required to terminate your permit at the end of construction. Please complete the NOT form, including the project's assigned permit number, and return it to the Division of Water Quality. Please contact the storm water coordinator at (801) 538-6146 for any questions or for a copy of the NOT form.

10/30/97

STATE OF UTAH, DEPARTMENT OF ENVIRONMENTAL QUALITY, DIVISION OF WATER QUALITY
288 North 1460 West, P.O. Box 144870, Salt Lake City, Utah 84114-4870

NOT

Notice of Termination (NOT) for Storm Water Discharges Associated with **Construction Activity** Under the UPDES General Permit No. UTR104838 **SEE REVERSE FOR INSTRUCTIONS**

Submission of this Notice of Termination constitutes notice that the operator identified in Section II of this form is no longer authorized to discharge storm water associated with industrial activity under the UPDES program. ALL NECESSARY INFORMATION MUST BE PROVIDED ON THIS FORM.

I. Permit Information

UPDES Storm Water General Permit Number: UTR104838

Check Here if You are No Longer the Operator of the Facility: Check Here if the Storm Water Discharge is Being Terminated:

II. Facility Operator Information

Name: arbor residential Phone: 801 561-8594

Address: 45w 10,000s #301

City: Sandy State: UT Zip: 84070

III. Facility Site/Location Information

Name: The Village at Riverwalk Development

Address: Approximately 700w. 10200s. County: SALT LAKE

City: SOUTH JORDAN State: UT Zip: 84094

Latitude: ____ ____ ____ Longitude: ____ ____ ____

IV. Certification: I certify under penalty of law that either: a) all storm water discharges associated with construction activity from the portion of the identified facility where I was an operator have ceased or have been eliminated or b) I am no longer an operator at the construction site and a new operator has assumed operational control for those portions of the construction site where I previously had operational control. I understand that by submitting this notice of termination, I am no longer authorized to discharge storm water associated with construction activity under this general permit, and that discharging pollutants in storm water associated with construction activity to waters of the State is unlawful under the State of Utah Water Quality Act where the discharge is not authorized by a UPDES permit. I also understand that the submittal of this notice of termination does not release an operator from liability for any violations of this permit or the Water Quality Act.

Print Name: Date:

Signature:

Instructions for Completing Notice of Termination (NOT) Form

Who May File A Notice Of Termination (NOT) Form

Permittees who are presently covered under the State issued Utah Pollutant Discharge Elimination System (UPDES) General Storm Water Permit for Construction Activity may submit a notice of termination (NOT) form when their facilities no longer have any storm water discharges associated with industrial activity as defined in the storm water regulations at UAC R317-8-3.8(b)(c) and (d), or when they are no longer the operator of the facilities.

For construction activities, elimination of all storm water discharges associated with industrial activity occurs when disturbed soils at the construction site have been finally stabilized and temporary erosion and sediment control measures have been removed or will be removed at an appropriate time, or that all storm water discharges associated with construction activity from the construction site that are authorized by a UPDES general permit have otherwise been eliminated. Final stabilization means that all soil-disturbing activities at the site have been completed, and that a uniform perennial vegetative cover with a density of 70% of the cover for unpaved areas and areas not covered by permanent structures has been established, or equivalent permanent stabilization measures (such as the use of riprap, gabions, or geotextiles) have been employed.

Where to File NOT Form

Send this form to the following address:

Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114-4870

Completing the Form

Type or print, using upper-case letters, in the appropriate areas only. Please place each character between the marks. Abbreviate if necessary to stay within the number of characters allowed for each item. Use only one space for breaks between words, but not for punctuation marks unless they are needed to clarify your response. If you have any questions about this form, call the Division of Water Quality at (801) 538-6146.

Section I - Permit Information

Enter the existing UPDES Storm Water General Permit number assigned to the facility or site identified in Section III. If you do not know the permit number, contact the Division of Water Quality at (801) 538-6146.

Indicate your reason for submitting this Notice of Termination by checking the appropriate box:

If there has been a change of operator and you are no longer the operator of the facility or site identified in Section III, Check the corresponding box.

If all storm water discharges at the facility or site identified in Section III have been terminated, check the corresponding box.

Section II - Facility Operator Information

There may be more than one operator for a construction project. This form must be filled out and submitted by each of the operators listed on the notice of intent (NOI) that was submitted for receiving coverage under this permit. In this section give the legal name of the person, firm, public organization, or any other entity that is filed as an operator at the facility or site described in this application that is desiring to terminate coverage. The name of the operator may or may not be the same name as the facility. The operator of the facility is the legal entity which controls the facility's operation (referring to operation of construction activity) or a portion of it, rather that the plant or site manager of the finished or rehabilitated facility. Do not use a colloquial name. Enter the complete address and telephone number of the operator.

Section III - Facility/Site Location Information

Enter the facility's or site's official or legal name and complete address, including city, state and ZIP code and the latitude and longitude of the facility to the nearest 15 seconds of the approximate center of the site. It is preferred that the location address be the same as that which the site used in the submission of the NOI.

Section IV - Certification

State statues provide for severe penalties for submitting false information on this application form. State regulations require this application to be signed as follows:

For a corporation: by a responsible corporate officer, which means: (I) president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision making functions, or (ii) the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding $25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures;

For a partnership or sole proprietorship: by a general partner or the proprietor, respectively; or

For a municipality, State, Federal, or other public facility: by either a principal executive officer or ranking elected official.

2005-045

PURCHASE AND SALE AGREEMENT

DATE: May 19, 2005

PARTIES: SOUTH JORDAN CITY, a Utah municipal corporation, or its assignee ("Seller"), and

ARBOR GARDNER LLC, a Utah limited liability company, or its assignee ("Buyer")

SUBJECT PROPERTY: 39.8 acres of undeveloped real property generally located at approximately 692 West 104th South in the City of South Jordan, Salt Lake County, Utah.

RECITALS

A. Seller is the record owner of the Property (as defined below) and has offered Buyer the opportunity of purchasing the Property upon the terms and conditions set forth in this Agreement.

B. Buyer desires to acquire the Property upon the terms and conditions set forth in this Agreement.

C. Seller and Buyer desire to set forth in this Agreement the terms and conditions relating to the purchase by Buyer of the Property.

AGREEMENTS AND COVENANTS

NOW, THEREFORE, in consideration of the premises and the covenants of Seller and Buyer set forth in this Agreement and for other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, Seller and Buyer agree and covenant as follows:

1. Definitions. As used in this Agreement, the following terms shall have the meanings set forth below:

(a) "Agreement" means this Purchase and Sale Agreement.

(b) "Business Day" means a day other than a Saturday, Sunday, or a day which banking institutions in Salt Lake City, Utah are authorized or required by law or executive order to be closed.

(c) "City" means the City of South Jordan, a Utah municipal corporation.

(d) "Closing" means the consummation of the transactions contemplated by this Agreement pursuant to Section 7 as either the First Closing or a Subsequent Closing.

(e) "Closing Date" means the date on which the Closing occurs, as established pursuant to Section 7.

(f) "Conditions Precedent" is defined in Section 8.

(g) "Development Agreement" is defined in Section 5.1.

(h) "Down Payment" is defined in Section 3.

(i) "Final Plat(s)" means the final subdivision plats for the Property.

(j) "Investigation Period" means the period commencing upon execution of this Agreement and continuing until the Plat Approvals. During the Investigation Period, Buyer shall have the opportunity to investigate the Property pursuant to Sections 4 and 8 and to conduct such due diligence with respect to the Property as Buyer determines is necessary.

(k) "Opening of Escrow" means the date of delivery to and acceptance by Escrow Agent of a fully executed original of this Agreement and delivery of the Down Payment to Seller.

(l) "Parties" means Seller and Buyer.

(m) "Party" means Seller or Buyer.

(n) "Permitted Exceptions" means the liens and encumbrances described on the attached Exhibit "A."

(o) "Plat Approvals" is defined in Section 5.

(p) "Property" means that certain real property identified on Exhibit "B" hereto, together with all and any rights and appurtenances pertaining to such real property, including all easements, air, water, water rights, stock, or other evidence of ownership of interest in water or irrigation companies pertaining to water which is appurtenant to the real property described on Exhibit "B", or which has been used upon such property and all tenements, hereditaments, privileges, and appurtenances thereunto belonging, any other rights or appurtenances to such real property, including any right, title, or interest of the Seller in and to adjacent streets, easements, alleys, rights-of-way, river beds,

etc., and all improvements, structures, and fixtures situated upon such real property.

(q) "Purchase Price" is defined in Section 3.

(r) "Title Commitment" means a commitment of the Title Company to issue the Title Insurance Policy.

(s) "Title Company" means [Surety Title, whose address is 1665 West 10600 South, South Jordan UT 84095.

(t) "Title Insurance Policy" is defined in Section 8.3.

2. Offer and Acceptance. Seller shall convey the Property to Buyer and Buyer shall purchase the Property, all upon the terms and conditions set forth in this Agreement.

3. Purchase Price. The purchase price for the Property shall be equal to Three Million Three Hundred Thirty thousand Dollars ($3,330,000.00) (the "Purchase Price"). The Purchase Price is determined based upon Seller's delivery to Buyer of not less than 39.8 acres. The Purchase Price shall be paid as follows:

Upon execution of this Agreement, Buyer shall deposit with the Title Company cash or other immediately available funds in the amount of Five Thousand and 00/100 Dollars ($5,000.00) (the "Down Payment"). The Down Payment shall be applied to the Purchase Price paid at the Closing. Any accrued interest earned on the Down Payment shall be paid to the Party entitled to receive the Down Payment hereunder. Except as specifically provided herein, the Down Payment shall be fully non-refundable to Buyer from and after the close of the Investigation Period. In the event of an undisputed Buyer default hereunder, Buyer hereby irrevocably authorizes and instructs the Title Company to immediately deliver the Down Payment and any accrued interest thereon to Seller. In the event that the Title Company requires further instructions and/or indemnifications in order to deliver the Down Payment to Seller in the event of an undisputed Buyer default, Buyer shall immediately execute and deliver to the Title Company such instructions or indemnifications. Written notice to the Title Company from Seller certifying that a Buyer default has occurred and identifying the nature of said default shall be sufficient evidence to justify the Title Company's delivery of the Down Payment to Seller, so long as Buyer does not dispute such position.

(a) At the Closing, Buyer shall deliver to Seller the balance of the Purchase Price in cash.

4. Inspection–Investigation Period. Buyer and its authorized representatives shall, upon reasonable notice to Seller and at reasonable times during the Investigation Period, have access on and to the Property for the purpose of investigating all matters pertaining to the transaction contemplated by this Agreement and as otherwise needed for surveys, inspections,

examinations, and review of the Permitted Exceptions and other matters (the cost of any and all such reports, inspections or studies to be paid by Buyer). To the extent that Buyer damages or disturbs the Property as a consequence of such access, Buyer shall return such real property to substantially the same condition that existed prior to Buyer's (or its representatives') investigations. Buyer shall indemnify, hold harmless, and defend Seller from and against all losses, actual damages, claims, actions, costs, or expenses that are caused by any act or omission of Buyer or Buyer's representatives during such access. Buyer's obligations under the previous sentence shall survive the Closing or earlier termination of this Agreement.

5. Plat Approvals. Buyer shall, at its sole cost and expense, design and complete the engineering work necessary in connection with the processing and approval of preliminary and final plats for the Property (the "Plat Approvals"). The Parties expressly agree that the Plat Approvals shall be deemed to have been obtained upon approval of final plats for the Property (the "Final Plats").

(a) As an integral part of the plat approval the parties agree that:

(i) The overall development density on the plat shall not be greater or less than the City's current R-2.5 zoning density.

(ii) The Buyer shall build, install and construct the projects road entrance with an applicable support wall.

(b) The seller shall provide to Buyer a road right-of-way to the Buyer's development through the seller's Mulligans Golf course.

(c) The seller shall provide as much clean fill dirt as is reasonably possible, at no cost to the Buyer. Said fill dirt amounts include such dirt as has been place upon the project in to by the City's designee and to be place upon the site by the City's designee. The fill dirt being placed upon the site is being drawn for a certain water tank project currently under construction.

6. Reimbursement of Certain Engineering Costs. Seller has previously completed or caused to be completed certain engineering with respect to the Property. Buyer hereby agrees to reimburse the Seller for the cost of such engineering in an amount not to exceed Eighty Thousand and 00/100 Dollars ($80,000.00), said reimbursement to be paid together with the portion of the Purchase Price paid at the Closing.

7. Closing. The Closing shall occur at the offices of the Title Company in Salt Lake County, State of Utah, on or before 5:00 PM June 30, 2005, provided the Buyer has received preliminary plat approval by the South Jordan Planning Commission by said date. In the event the Buyer has not received said preliminary plat approval by said date, then the closing shall take place within 10 days of said preliminary plat approval.

(a) At the Closing, Buyer shall:

(i) Pay the Purchase Price in accordance with the amounts set forth in Section 3 hereof; and

(ii) Pay all recording fees related to the Closing except for encumbrance or lien releases, which shall be paid by Seller.

(b) At the Closing, Seller shall:

(i) Convey title to the Property being conveyed to Buyer by executed special warranty deed subject to the Permitted Exceptions, those matters arising by, through, or under Buyer, any matters arising pursuant to the Plat Approvals, and to those matters which would be disclosed by an accurate survey or physical inspection of the Property; and

(ii) Provide Buyer with the Title Insurance Policy in the full amount of the Purchase Price for the Property being purchased effective as of the Closing, insuring Buyer that fee simple title to the Property being conveyed as of the Closing is vested in Buyer subject only to the Permitted Exceptions, to matters arising by, through or under Buyer, any matters arising pursuant to the Plat Approvals, and to those matters which would be disclosed by an accurate survey or physical inspection of the Property. Seller shall pay the cost to obtain a standard Title Insurance Policy and the cost of any endorsements offered by Seller as a cure for any Title Objections made by Buyer, and Buyer shall pay the difference between the cost of a standard Title Insurance Policy and an extended Title Insurance Policy and for any endorsements requested by Buyer.

(c) At Closing, Seller and Buyer shall each pay one-half (½) of the escrow fees of the Title Company. If the applicable Closing does not occur because of Seller's default, Seller shall be liable for all customary escrow cancellation charges. If the applicable Closing does not occur because of Buyer's default, Buyer shall be liable for all customary escrow cancellation charges. If the applicable Closing does not occur because of a failure of a Condition Precedent, Seller shall pay all customary escrow cancellation charges.

(d) All items of income and expense in respect of the Property, including, without limitation, rents, insurance premiums, and real estate taxes and assessments (except for green belt rollback taxes), shall be prorated between Seller and Buyer as of the applicable Closing Date, based upon the latest available information. From and after the Closing Date, Buyer shall be solely responsible for real estate taxes and assessments for the Property conveyed at the applicable Closing. At the Closing, Seller shall pay any greenbelt rollback taxes that may become due with respect to the portion of the Property conveyed at such Closing. Any other Closing costs shall, to the extent not previously paid, be paid by Buyer and Seller according to the usual and customary practice of the Title Company.

(e) Seller agrees that all Closing prorations and costs payable by Seller shall be deducted from Seller's proceeds at the Closing. On or before the Closing, Buyer agrees to deposit with the Title Company cash in an amount sufficient to pay the portion of the Purchase Price due at the Closing.

8. Buyer's Conditions Precedent. Buyer may elect not to proceed with the purchase and sale transaction and shall be entitled to a return of the Down Payment if the following matters are not completed to Buyer's satisfaction within the time frames set forth below.

8.1 Commitment for Title Insurance. Promptly following Opening of Escrow, Title Company shall issue and deliver to Buyer and Seller a commitment for title insurance with respect to the Property disclosing all matters of record and other matters of which Title Company has knowledge that relate to the title to the Property, detailing Title Company's requirements for Closing, committing to issue to Buyer an extended coverage owner's policy of title insurance with respect to the Property, and providing legible copies of all instruments referred to in the commitment (collectively, the "Commitment").

8.2 Amendments to Commitment. If the Commitment is amended by Title Company, Title Company shall immediately deliver to Buyer and Seller the amendment and provide legible copies of all additional instruments referred to in the amendment (collectively, the "Amendment").

8.3 Title Insurance Policy. At each Closing, Escrow Agent shall commit to issue to and in favor of Buyer an extended coverage owner's policy of title insurance with respect to the applicable portion of the Property, including any endorsements Buyer may require as a result of Buyer's due diligence, in the amount of the Purchase Price for the portion of the Property to be conveyed, effective on the Closing Date, insuring fee simple title to the portion of the Property conveyed in Buyer, subject only to the Permitted Exceptions (the "Title Insurance Policy") to matters arising by, through or under Buyer, any matters arising pursuant to the Plat Approvals, and to those matters which would be disclosed by an accurate survey or physical inspection of the Property.

8.4 Survey. Seller shall deliver any existing ALTA/ACSM Land Title Survey of the Property or larger parcel of property of which the Property is a part, within five (5) days after the Opening of Escrow (the "Survey"). Buyer may order an update of the Survey, and Seller shall cooperate with Buyer in relation thereto.

8.5 Plat Approvals. Seller shall have obtained the Plat Approvals with respect to the Property prior to the Closing.

8.6 Fill Dirt. Seller shall provide to Buyer all the fill dirt from Seller's water tank excavation project, delivered to the property as part of this purchase and sale agreement.

9. Possession. Possession of the applicable portion of the Property shall be delivered to Buyer at the applicable Closing.

10. Seller's Representations and Warranties. Seller represents and warrants to Buyer as follows:

10.1 Litigation. There is no pending or, to Seller's actual knowledge, threatened litigation or administrative proceeding affecting Seller or the Property.

10.2 Authorization. The execution and delivery of, and Seller's performance under, this Agreement is within Seller's powers and has been duly authorized by all requisite actions. This Agreement constitutes a binding obligation of Seller.

10.3 Liens. At the Closing there will be no unpaid charges, debts, liabilities, claims, or obligations arising from the ownership or operation of the Property that could give rise to any mechanics' or materialman's liens against the Property.

10.4 Organization and Standing. Seller has full power and authority to enter into this Agreement and complete the purchase and sale transaction. Further, the person signing on behalf of Seller is authorized by Seller to sign this Agreement.

10.5 Title. There are no unrecorded agreements, leases, liens or encumbrances that may affect title to the Property.

10.6 Binding Agreement. Upon Seller's execution of this Agreement, this Agreement will be binding and enforceable against Seller in accordance with its terms, and upon Seller's execution of the additional documents contemplated by this Agreement, they will be binding and enforceable against Seller in accordance with their terms.

10.7 Other Agreements. Neither the execution and delivery of this Agreement nor the consummation of the purchase and sale transaction will constitute a breach under any contract or agreement to which Seller is a party or by which Seller is bound or affected or that affects the Property or any part thereof. Seller has not entered into any agreement or contract with respect to the Property or granted any interest in the Property that is inconsistent with Seller's obligation to convey to Buyer good and marketable fee simple title to the Property subject only to the Permitted Exceptions. Seller shall not, prior to any termination of this Agreement, enter into or execute any easement, encumbrance, lease, or other agreement with respect to the Property without Buyer's prior written consent. Seller shall not, prior to termination of this Agreement, execute and record or consent to any declaration of covenants, conditions and restrictions or other similar document with respect to the Property without Buyer's prior written consent.

10.8 No Condemnation, Moratoria or Violations. Seller has not received notice of any pending or threatened condemnation affecting the Property, any moratorium on building on the Property, or any violation with regard to any applicable law, regulation, ordinance, requirement, covenant, condition or restriction relating to the present use, occupancy or condition of the Property from any person, authority or agency having jurisdiction over the Property.

10.9 Improvement Lien Assessments. Seller has not received notice of any intended public improvements that will result in any condemnation or taking of all or a portion of any Property or of any special assessments, levies, taxes or other charges being assessed against any Property that will impose a lien upon the Property. Seller has not received notice of any special assessments pending or threatened against or with respect to the Property on account of or in connection with streets, roads or any other public improvements including, but not limited to, storm and sanitary sewer, water or other utility lines, curbs, gutters, drainage facilities, sidewalks, lighting and the like.

10.10 No Default. Seller is not in default under the terms of any written agreement by Seller pertaining to the Property, nor has any event occurred that, with notice or passage of time, or both, would constitute a default by Seller under any agreement, nor has Seller received notice of any default under any agreement or encumbrance to which the Property, or any portion of the Property, is subject.

10.11 Environmental. Based upon Seller's current actual knowledge, Seller has no actual knowledge of the presence or existence of any Hazardous Materials (as defined below) or petroleum underground storage tanks on or near the Property that would necessitate or require remediation, cleanup or any other action in accordance with any Environmental Laws (as defined below). To Seller's current actual knowledge, the Property is in compliance with the provisions of all Environmental Laws and all permits, licenses or other approvals issued thereunder, and to Seller's actual knowledge, prior to the date of this Agreement, the Property has been used in compliance with Environmental Laws. To Seller's actual knowledge, all permits, licenses and other approvals required under Environmental Laws have been obtained for the Property. Seller has not at any time used, stored or kept at the Property any Hazardous Materials, except in compliance with all Environmental Laws, and to Seller's current actual knowledge, no Hazardous Materials have been used, stored or kept at the Property except in compliance with all Environmental Laws. To Seller's current actual knowledge, the Property is not designated by any governmental or quasi-governmental authority as an area subject to environmental or other regulation that would materially affect the use of the Property for single-family residential housing. As used in this Agreement, the term "Hazardous Materials" is defined to include, without limitation, (i) oil hydrocarbons, petroleum, petroleum products or products containing or derived from petroleum; and (ii) any hazardous or toxic waste, substance, material, chemical, gas or particulate matter, as presently defined by or for purposes of any Environmental Laws. As used in this Agreement, the term "Environmental Laws" is defined to include, without limitation, the Comprehensive Environmental Response, Compensation and Liability Act, 42 U.S.C.A. Section 9601, et seq.; the Hazardous Materials Transportation Act, 49 U.S.C.A. Section 1801, et seq.; the Resource Conservation and Recovery Act, 42 U.S.C.A. Section 6901, et seq.; the Toxic Substances Control Act, 15 U.S.C.A. Section 2601, et seq.; the Federal Water Pollution Control Act, 33 U.S.C.A. Section 1251, et seq.; the Safe Drinking Water Act, 42 U.S.C.A. Section 300f, et seq.; the Clean Air Act, 42 U.S.C.A. Section 7401, et seq.; Utah Code Annotated; any successor to those laws (in existence on the date this representation is made or updated); any rules, regulations, ordinances, orders or decrees issued pursuant to those laws; any

other Federal, State or local environmental, health or safety statute, ordinance, code, rule, regulation, order or decree as may now or at any later time be in effect regulating, relating to or imposing liability or standards concerning or in connection with hazardous or toxic wastes, substances, materials, chemicals, gases or particulate matter or the emission, discharge, dumping or other release of any substance to the environment; and any common law theory based on nuisance or strict liability.

10.12 Disclosure. Seller has not intentionally withheld from Buyer any information known to Seller affecting or in any way relating to the Property and/or Buyer's ability to develop and use the Property for Buyer's intended purpose.

10.13 Notices. Seller shall, immediately upon receiving notice of any actual or threatened claims or proceedings (i) for the condemnation of the Property or any portion thereof, (ii) arising out of injury or damage to or upon the Property or any portion thereof, (iii) arising out of any violation or threatened violation of applicable laws or regulations relating to or affecting the Property, including but not limited to any violation of an environmental law, or that may result in the liability of the owner or a successor owner of any interest in the Property, (iv) arising out of the imposition of any special assessment, levy or tax, (v) relating to the potential formation of any taxing authority affecting the Property, (vi) that could affect or cloud title to or ownership of the Property, or (vii) that could result in a moratorium against building on the Property, notify Buyer thereof in writing with reference to this paragraph and Buyer's right to cancel as provided below. Prior to the respective Closing, Buyer shall have a period of ten (10) days from receipt of such notice to waive the matter described in the notice or cancel this Agreement and receive a return of the Down Payment (or such portion thereof as remains for Property not previously conveyed by Seller) by written notice to Seller. Failure of Buyer to so notify Seller shall be an automatic cancellation of this Agreement under the preceding sentence.

The foregoing representations, warranties and covenants shall be true, correct and accurate on and as of the date of this Agreement and on and as of each respective Closing Date. All representations, warranties and covenants by Seller set forth in this Agreement will survive the consummation of this Agreement and the delivery and recordation of the deed, for a period of eighteen (18) months following each respective Closing, as to the Property conveyed at such Closing.

11. Buyer's Representations and Warranties. Buyer represents and warrants to Seller as follows:

11.1 The execution and delivery of, and Buyer's performance under, this Agreement are within Buyer's powers and have been duly authorized by all requisite actions. This Agreement constitutes a binding obligation of Buyer.

11.2 Performance of this Agreement by Buyer will not result in any default under, or result in the imposition of any lien or encumbrance upon the Property under, any contract or other agreement that affects Buyer.

11.3 There are no attachments, executions, assignments for the benefit of creditors, or voluntary or involuntary proceedings in bankruptcy or under other debtor relief laws contemplated by, pending, or threatened against Buyer.

11.4 Buyer is a validly existing Utah limited liability company and has full power and authority to enter into this Agreement and complete the purchase and sale transaction. Further, the person signing on behalf of Buyer is authorized by Buyer to sign this Agreement.

11.5 Upon Buyer's execution of this Agreement, this Agreement will be binding and enforceable against Buyer in accordance with its terms, and upon Buyer's execution of the additional documents contemplated by this Agreement, they will be binding and enforceable against Buyer in accordance with their terms.

11.6 Neither the execution and delivery of this Agreement nor the consummation of the purchase and sale transaction will constitute a breach under any contract or agreement to which Buyer is a party or by which Buyer is bound or affected or that affects the Property or any part thereof.

11.7 Buyer is not in default under the terms of any written agreement by Buyer pertaining to the Property, nor has any event occurred that, with notice or passage of time, or both, would constitute a default by Buyer under any agreement, nor has Buyer received notice of any default under any agreement or encumbrance to which the Property, or any portion of the Property, is subject.

11.8 Buyer has no knowledge of the existence of any criminal or other investigation concerning Buyer that may result in a forfeiture of all or any portion of the Property.

12. Releases from Representations and Warranties. Prior to the close of the Investigation Period and in any event prior to the Closing, Buyer has or shall make such on-site inspections of the Property and review such documents relating to the Property as Buyer deems necessary. Upon each respective Closing, except for the express warranties stated in this Agreement and any Closing documents, Buyer shall accept the Property "As Is" in its present condition without any representation or warranty, either express or implied. Buyer expressly acknowledges that Buyer has not relied on any warranties, promises, understandings or representations, express or implied, of Seller relating to the Property that are not expressly set forth on the face of this Agreement. Buyer acknowledges that any and all engineering data, cost estimates, feasibility or marketing reports, soil reports, or other information of any type which Buyer has received or may receive from Seller or Seller's agents is furnished on the express condition that Buyer shall make an independent verification of the accuracy of such information, all such information being furnished without any warranty.

13. THIS SECTION INTENTIONALY DELETED.

14. Brokerage. If any person or entity shall assert a claim to a finder's fee, brokerage commission or other compensation on account of alleged employment as a finder or broker for performance of services as a finder or broker in connection with this transaction, the Party under whom the finder or broker is claiming shall indemnify and hold the other Party harmless for, from and against any such claim and all costs, expenses and liabilities incurred in connection with such claim or any action or proceeding brought on such claim including, but not limited to, counsel and witness fees and court costs in defending against such claim. This indemnity shall survive the Closing or the termination of this Agreement and shall not be limited by the waiver or other limitation of remedies set forth in Sections 23 and 24. The parties acknowledge that certain employees of Buyer are licensed real estate brokers in the state of Utah.

15. Risk of Loss. In the event any casualty loss or destruction of all or some of the Property occurs prior to the Closing, Buyer may either: (a) elect to rescind this Agreement, in which event Buyer shall not be required to purchase all or any of the Property and the parties hereto shall be released from any further liability hereunder with respect to the Property; provided, that the Down Payment (or an applicable portion thereof determined in accordance with Section 3) shall be returned forthwith to Buyer; or (b) accept, by written notice to Seller, the Property in its destroyed condition, along with the insurance proceeds covering such loss, and proceed to Closing pursuant to Section 7. Such election shall be made within ten (10) days after Seller provides written notice to Buyer that such loss or destruction has occurred. If Buyer fails to timely make an election to cancel this Agreement, Buyer shall be deemed to have cancelled this Agreement and the Down Payment (or the applicable portion thereof determined in accordance with Section 3) shall be returned to Buyer.

16. Eminent Domain. If, prior to the date of Closing, all or some of the Property are taken by eminent domain, Buyer may either: (a) elect to rescind this Agreement with respect to the Property so taken, in which event Buyer shall not be required to purchase such Property and the parties hereto shall be released from any further liability hereunder with respect to such Property; provided, that the portion of the Down Payment (or the applicable portion thereof determined in accordance with Section 3) shall be returned forthwith to Buyer; or (b) elect to rescind the Agreement in which event the Down Payment shall be immediately returned to Buyer and the parties shall be released from any further liability hereunder; or (c) elect to proceed with the transaction with respect to such Property or in totality, in which event Buyer shall receive an assignment from Seller of such condemnation proceeds as are allocable to the portion Property taken. If Buyer elects to rescind this Agreement with respect to such Property, it shall so notify Seller in writing within thirty (30) days after Buyer has written notice from Seller of such taking. The failure to provide such notice shall constitute an election to proceed with the transaction as set forth in option (b) of this Section. The phrase "taken by eminent domain" includes any taking under eminent domain power, but excludes any claim for inverse condemnation.

17. Assignment. Seller or Buyer may assign or otherwise transfer its rights and obligations under this Agreement without the consent of the other; provided, however, that the assigning Party in all cases shall remain obligated for such Party's performance hereunder notwithstanding any such assignment, unless otherwise agreed in writing by the other party.

18. Further Documentation. Seller and Buyer each agree to act in good faith to execute such further or additional documents or instruments as may be necessary or appropriate to fully carry out the intent and purpose of this Agreement.

19. Authorization.

(a) Prior to each respective Closing, Seller shall provide Buyer and Title Company with satisfactory evidence that execution and delivery of this Agreement and performance by it of its obligations under this Agreement have been approved by all requisite action of Seller and designating the person or persons authorized to sign documents on behalf of Seller.

(b) Prior to each respective Closing, Buyer shall provide Seller and Title Company with satisfactory evidence that the transaction and performance by it of its obligations under this Agreement have been approved by all requisite action of Buyer and designating the person or persons authorized to sign documents on behalf of Buyer in connection with this transaction.

20. Time Periods. Except as expressly provided for in this Agreement, the time for performance of any obligation or taking any action under this Agreement shall be deemed to expire at 6:00 p.m., Salt Lake City time, on the last day of the applicable time period provided for herein. If the time for the performance of any obligation or taking any action under this Agreement expires on a Saturday, Sunday, or legal holiday in the State of Utah, the time for performance or taking any action shall be extended to the next succeeding day which is not a Saturday, Sunday, or legal holiday. Time is of the essence with respect to the obligations of the Parties pursuant to this Agreement.

21. Certification as to "Non-Foreign" Status.

(a) At the Closing, Seller shall deliver or cause to be delivered to Buyer, at Seller's sole cost and expense, a certification, signed and acknowledged by Seller under penalties of perjury, certifying the following:

(i) Seller's U.S. Taxpayer Identification Number;

(ii) The business address of Seller; and

(iii) That Seller is not a non-resident alien, foreign corporation, foreign partnership, foreign trust, foreign estate or other foreign person within the meaning of Sections 1445 and 7701 of the Internal Revenue Code and the Treasury Regulations thereunder (collectively the "IRC").

(b) Buyer and/or Title Company is hereby authorized to submit any certification delivered by Seller pursuant to this paragraph to the Internal Revenue Service (the "Service") and, in connection therewith, to disclose the details of this transaction to the Service.

22. Notices. Any notice required or permitted to be given or transmitted between the parties pursuant to this Agreement shall either be; (i) personally delivered; (ii) mailed, postage prepaid by certified mail, return receipt requested; (iii) sent by recognized overnight carrier; or (iv) sent by facsimile transmission addressed as follows:

To Seller:

SOUTH JORDAN CITY
Attention: City Manager
1600 West Towne Center Drive
South Jordan, Utah 84095
Facsimile No. _____

To Buyer:

ARBOR GARDNER LLC
Attention: _____
_____
_____
_____
Facsimile No. _____

(a) All notices, demands, or requests provided for or permitted to be given pursuant to this Agreement must be in writing.

(b) All notices, demands and requests shall be effective three (3) days after being deposited in the United States mail, first class postage prepaid, registered or certified with return receipt requested, one (1) Business Day after depositing with an overnight carrier and upon receipt of facsimile transmission prior to 5:00 p.m. MST.

(c) Actual physical hand delivery to a Party shall also constitute effective notice and shall be effective on the date of such delivery.

23. Buyer's Remedy. If Seller does not perform its obligations under this Agreement and that failure continues for ten (10) business days after Seller's receipt of written notice from Buyer (except in the event of a failure to convey at Closing for which there shall be no cure period), Buyer may, at its option, either: (A) enforce specific performance; (B) terminate this Agreement, (C) without waiving any rights or remedies, proceed to consummate the purchase and sale transaction, and/or (D) pursue any other remedy available to Buyer under this Agreement, at law or in equity. If Buyer terminates this Agreement due to Seller's default, the Seller shall promptly return the Down Payment to Buyer. Except for the remedies specified in this Section 23, Buyer waives all other remedies available at law or in equity. Seller and Buyer expressly agree that the foregoing waiver of remedies shall not in any way limit Seller's

obligation to indemnify Buyer pursuant to Section 14 of this Agreement. In no event shall the City's failure to grant the Plat Approvals constitute an event of default under this Agreement.

24. Seller's Remedy. If Buyer does not perform its obligations under this Agreement for any reason and that failure continues for ten (10) business days after Buyer's receipt of written notice from Seller (except in the event of a failure to tender the Purchase Price at Closing for which there shall be no cure period), Seller may, as its sole and exclusive remedy, waiving all other remedies, terminate this Agreement. If Seller terminates this Agreement due to Buyer's default, Seller shall retain the Down Payment (or such portion thereof as has not previously been applied to the Purchase Price of Property previously conveyed by Seller to Buyer) together with any accrued interest thereon as liquidated damages, this Agreement shall be automatically terminated, and the parties thereafter have no further rights, liabilities, or obligations under this Agreement. Seller's damages are difficult to ascertain given delays incident to Buyer's failure to perform and Seller's inability to market the Property pending Buyer's performance under this Agreement, and Buyer and Seller hereby agree that the amount of the Down Payment is a fair approximation of Seller's damages. Seller and Buyer expressly agree that the foregoing waiver of remedies shall not in any way limit Buyer's obligation to indemnify Seller pursuant to Sections 4, 12 and 14 of this Agreement.

25. Counterparts. This Agreement may be executed in counterparts, and the counterparts shall constitute one binding and enforceable agreement.

26. Entire Agreement. This Agreement, together with the Exhibit hereto, constitutes the entire agreement between the parties pertaining to the Property and the respective rights and obligations in connection with the conveyance of the Property by Seller to Buyer. All prior and contemporaneous agreements, representations and understandings of the parties, oral or written, are superseded by and merged in this Agreement. No supplement, modification or amendment of this Agreement shall be binding unless in writing and executed by Buyer and Seller.

27. Governing Law. This Agreement shall be governed by and construed in accordance with the laws of the State of Utah.

28. Miscellaneous.

(a) In the event of any judicial or administrative action between the Parties with respect to this Agreement, the prevailing Party shall be entitled to recover all costs and expenses incurred in connection with any such action, including reasonable attorneys' fees, interest and court costs. In the event a Party, without fault, is made a party to any judicial or administrative action or proceeding by reason of the conduct of the other Party, the other Party shall indemnify and hold the first Party harmless from and against all loss, cost, liability and expense, including reasonable attorneys' fees, incurred in such action.

(b) Section titles or captions contained in this Agreement are inserted only as a matter of convenience and for reference, and in no way define, limit, extend or describe

the scope or substance of this Agreement or the intent of any provisions of this Agreement.

(c) Unless the context otherwise clearly requires, words of any gender used in this Agreement shall be deemed to include the other gender and words of a singular number shall be deemed to include the plural and vice versa.

(d) Each provision of this Agreement shall inure to the benefit of and be binding upon the Parties hereto and their respective successors in interest and assigns.

(e) References to "Sections" by number are to Sections of this Agreement unless reference is expressly made to another agreement or document.

(f) All Exhibits attached to this Agreement are deemed incorporated in this Agreement by this reference as though set forth in full.

THIS SPACE INTENTIONALLY LEFT BLANK

IN WITNESS WHEREOF, Seller and Buyer have executed this Agreement on the date first set forth above.

"SELLER"

SOUTH JORDAN CITY, a political subdivision of the State of Utah

Name: Ricky A. Horst
Title: City Manager

ATTEST:

Tammy Bradford
South Jordan City, Recorder

"BUYER"

ARBOR GARDNER LLC, a Utah limited liability company

Name: John Gust
Title: Manager

Exhibit "A"
to
Purchase and Sale Agreement

(Permitted Exceptions)

[TO BE COMPLETED]

<< >>

Exhibit "B"
to
Purchase and Sale Agreement

(Preliminary Legal Descriptions)

Shane Greenwood

From: Chris Drent [chris@arborutah.com]
Sent: Tuesday, April 18, 2006 11:48 AM
To: Shane Greenwood
Cc: 'Cory Gust'; mikemaddoxbeingpiece@hotmail.com; mikem@arborutah.com
Subject: Riverwalk Fees

Shane
I am going through the fees the City is charging us. On there you have engineering and storm drain fees for the 10 lots above that were Gary McDougal's. These should not be charged to us. Looking through the agreement that he had with the City it looks like the City waived all of these. I am attaching a page from that agreement. Please look it over and make sure I am right. If they do need to pay let me know and I will get you the information for the people that purchased the lots from Gary.

Thanks
Chris

Shane Greenwood

From: Jed Bell
Sent: Friday, March 31, 2006 1:25 PM
To: Shane Greenwood
Subject: FW: Riverwalk subdivision concerns

FYI

Thank you for your time and consideration,

Jed A. Bell
City of South Jordan
Construction Manager
jbell@sjc.utah.gov

Phone Number
(801) 253-0615
Fax Number
(801) 253-0617

-----Original Message-----
From: Todd Heitman
Sent: Friday, March 31, 2006 11:46 AM
To: Jed Bell
Subject: Riverwalk subdivision concerns

The following are the details as I understood from the meeting today with Earthmovers.

Mystic creek hydrant move
-**Upon verification of the engineer's bid quantities,** City will pay the difference between the price of the 16x8 cross vs. price of the 8x16 tee shown on plans.
-City will pay for (1) 8" mega lug
-City will receive credit for (1) washout assembly.

Mystic Falls Way re-alignment
-**Upon verification of the engineer's bid quantities**, the City will pay the difference between the price of 16x8 tee vs. a 16x8 cross.
-City will pay for (1) additional 45 degree bend that was required to get the pipe back to original alignment.

Fire hydrant at the East end of the 16" waterline
-City will pay for (1) additional fire hydrant.
-city will pay for (1) additional 6" valve.
-City will pay for (1) additional 6x18" spool.
-City will pay for (1) 16x10 reducer
-City will pay for (1) 10x6 reducer
-City will pay for (1) 6" MJxFL adapter
- City will receive credit for (1) 2" washout assembly.

Let me know if this sounds correct,

Thanks,

Todd

TOTALS - CITY 16" WATER LINE

2/16/2006

Vendor	Invoice Number	Amount	
Civil Sience	5001	$ 9,533.00	
Earth Movers	UNC05115	$ 110,886.00	6,000
Earth Movers	* 1 2 Fire Hydrants	$ ~~6,400.00~~	3,200
Earth Movers	* Dewatering	$ 12,125.00	—
Earth Movers	* Move Spoils	$ 2,550.00	?
Earth Movers	? Additional Fittings	$ 23,550.00	?
Earth Movers	* Import Fill	$ 7,242.00	
Earth Movers	* Road Cut	$ * 30,850.00	
Arbor Residential 3%			
Management & Accounting		$ 6,094.08	
	Total	$ 209,230.08	

* Make check payable to Arbor/Gardner $203,136.00
* Make check payable to Arbor Residential $6094.08

up sizes of 16" 2nd phase

4 locations - Fittings changed to cross.

Arbor Gardner L.C.

45 West 10000 South, Suite 301
Sandy, Utah 84070

Invoice

Bill To:

City of South Jordan

Invoice #: 00000003
Date: 2/16/2006

Page: 1

DATE	DESCRIPTION	AMOUNT
2/16/2006	City of South Jordan (42" Storm Drain)	$203,136.00

Sales Tax:	$0.00
Total Amount:	$203,136.00
Amount Applied:	$0.00
Balance Due:	$203,136.00

Terms: C.O.D.

Arbor Residential Properties LLC
45 West 10000 South Suite 301
Sandy, Utah 84070
801-561-8594 Office
801-561-8647 Fax

Invoice

Bill To:

City of South Jordan

Invoice #: 00000681
Date: 2/16/2006

Page: 1

DATE	DESCRIPTION	AMOUNT
2/16/2006 2/16/2006	City of South Jordan 16" Water Line (Accounting & Managment Fee 3%)	$6,094.08

Sales Tax:	$0.00
Total Amount:	$6,094.08
Amount Applied:	$0.00
Balance Due:	$6,094.08

Terms: C.O.D.

EARTH MOVERS

TO: Mike Maddox

FROM: Kevin Neff

DATE: 02/15/06

RE: Additional cost to 42" storm and 16" water line.

Original 16" water as per bid.....$110,886.00

Additions required by the City

Two fire hydrants $6,400.00
Dewatering trench.....$12,125.00
Move spoils from east end of water line.....$2,550.00
Additional fittings and re-route of pipe to crosses w/thrust blocks.....$23,550.00
Import fill material over water main.....$7,242.00
Road cut and tie in main to existing line under Palmer Vista Dr.....$30,850.00

TOTAL $193,603.00

Original 42" RCP as per bid $94,940.00

Additions required by the City

Gravel shading over pipe.....$2,952.00 spec.
Import fill material over storm drain.....$6,727.50 not requested by city
Camera storm drain, 1484 feet.....$964.60 spec

msn Hotmail®

arborm@msn.com Retrieval: Tuesday, February 14, 2006 [illegible]

From : Brad Kenison <bkenison@civilscience.com>
Sent : Thursday, February 9, 2006 8:46 PM
To : <arborm@msn.com>
CC : <mikemaddoxbeingpeace@hotmail.com>
Subject : Construction cost estimates for 42" Storm Drain and 16" waterline @ Riverwalk

Mike

On Feb 1, 2006 you called me and indicated that you wanted me to split-out the engineering and construction staking costs for the 42" RCP SD and 16" DIP culinary waterline pipes within the Village @ Riverwalk Subdivision. At that time I indicated to you that it would be nearly impossible to determine an exact number for these by looking into the past billing files. I suggested that a better way to split-up these costs would likely be to determine these design and construction staking costs based on percentages of cost to purchase and install them.

The next day, you indicated that the following costs have been estimated for the construction of these two utility appurtenances:

42" "RCP Storm Drain pipe = $106,500
16" ductile iron waterline = $181,582

Based on these installation costs shown above, I have estimated that the engineering design and construction staking components of these pipelines would be as approximated below:

42" RCP Storm Drain Pipe = 6.5% ($6,922.50)
16" DIP Culinary waterline = 5.25% ($9,533.00)

If you have any questions regarding these approximate costs to engineer and stake the 42" RCP storm drainage and 16" DIP culinary waterlines, please feel free to give me a call.

Thank you,

p.s. Until I know that we have got the "bugs" worked out of my e-mail I will send my e-mails to both of your e-mail accounts, please respond to this e-mail as a verification that you have received it.

Brad A. Kenison, P.E.

Civil Science, Inc.

3160 W. Clubhouse Drive

Lehi, Ut 84043

(801) 768-7200 ext. 142 (office)

(801) 768-7201 (Facsimile)

(801) 367-4202 (Cellular)

bkenison@civilscience.com

TOTALS - CITY 42" STORM DRAIN

2/16/2006

Vendor	Invoice Number	Amount
Earth Movers	UNC05117	$ ~~94,940.00~~
Earth Movers	Gravel	$ 2,952.00
Earth Movers	* Import Fill	$ 6,727.50
Earth Movers	Camera Drain	$ 964.60
~~Civil Science~~		$ ~~6,922.50~~
Arbor Residential 3%		
Management & Accounting		$ ~~3,375.20~~
	Total	**$ 115,881.80**

106,227.37

*** Make check payable to Arbor/Gardner $112,506.60**
*** Make check payable to Arbor Residential $3,375.20**

106,227
8000
114,227

1600 Towne Center Dr.
South Jordan, Utah 84095
(801) 254-3742

SOUTH JORDAN CITY

Memo

To: Shane Greenwood

From: Todd Heitman

Date: March 23, 2006

Re: Riverwalk Concerns

Shane,

The following items are explanations of what we discussed on Riverwalk. Let me know if any clarification is needed.

Fire Hydrants-

- One fire hydrant was moved in Mystic Creek Bay to avoid having a dead end line and this resulted in deleting a blow-off. This would be a cost savings.
- A decision to install a fire hydrant on the East end of the 16-inch line was made on November 21 2005. Sheet UP-05, note 2 States **"Install fire hydrant (preferred) or wash-out valve at low points and end-of-line of culinary water mains to act as blow-off."** The City prefers the fire hydrant and EM saw a benefit of easier flushing of the water main after disinfection.

Added Fittings-

- There was an error on the design plans at where the 16-inch line ties into the 8 inch at Mystic Falls Way. EM was in contact with Civil Science on a solution. The solution was going to be to move the 8-inch pipe to the east so the intersection would be square. The 8-inch was moved and field measured by EM to line up with the 16inch. On January 5th when EM came back through to lay the 16-inch, they discovered they had not moved the 8-inch line far enough to the east. As a result, (2) 16 inch 22 ¼ degree bends had to be installed. The City allowed this but did not request it. The problem in this area is a design flaw.

Dewatering and hauling away of spoil-

- The standard plans show our trench detail and the trenches were done per plan. Dewatering in the river bottoms is a standard practice when working in ground water. This was not a special request made by SJC.
- The backfill around the storm drain is also in our construction notes. EM made a comment that they didn't have to lay the storm drain in Retail 5 on gravel. That is because they were installing a private storm drain on private property, which the city has no control of.

Storm drain camera-

- This is also a city standard for all storm drain and was not a special request.

AGREEMENT CONCERNING THE VILLAGE AT RIVERWALK

THIS AGREEMENT (the "**Agreement**") is made and entered into this 23rd day of August, 2005 (the "**Effective Date**"), by and between South Jordan City, a Utah municipal corporation (the "**City**") and Arbor/Gardner L.LC. a Utah Limited Liability Company (the "**Developer**").

RECITALS:

A. The City and Developer have previously entered into a Purchase and Sale Agreement (the "**Agreement**"), relating to the development of a master-planned community commonly known as The Village at Riverwalk (the "**Project**" or "**Riverwalk**").

B. The development of the Project contemplates the installation of certain water and storm-water pipelines by Developer (as set forth on the Project Plat Map), which pipelines serve or will benefit residences and businesses not comprising part of the Project.

C. In the course of the Project development, the City has agreed that it will reimburse, or provide credits to Developer for any and all amounts expended or costs incurred by the Developer in the construction the extra and/or oversized pipelines to do not directly benefit the Project.

D. In conjunction with the pipeline installation, the Developer acquired a certain utility easement to facilitate the said pipeline installation, and the Developer has agreed to convey said easement to the City as part of this agreement.

E. As part of the development of the Project, the City has agreed to provide to Developer a certain amount of fill dirt that is being excavated from the City's water tank projects.

NOW, THEREFORE, for good and valuable consideration, the parties hereto agree as follows:

1. **Developer agrees to**:

A. Install a 42 inch pipeline for storm sewer in the area shown on Exhibit "A" attached hereto, which pipeline shall be approximately 1484 lineal feet, and shall cost approximately $106,227.37, as shown on Exhibit "B" attached hereto.

B. Install a 16 inch water line in the are shown on Exhibit "A" attached hereto, which water line shall be approximately 2200 lineal feet, and shall cost approximately $110,886.37, as shown on Exhibit "C" attached hereto.

C. Convey to the City of South Jordan the utility easement acquired by

Developer for the installation of the water line as shown on Exhibit "D" attached hereto and known as the Jerry and Ferry Ohrn Easement.

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B. Upon installation of the 16 inch water line, referred to herein, and upon presentation of invoice from the Developer, City shall within thirty (30) days of the presentation of the invoice, reimburse Developer for the cost of the installation of the said water line. It is anticipated the total installed cost of said water line shall be $110,886.37 which the City agrees to pay an amount equal to total costs **less** the actual and true cost of the up sizing of the water line, (up sizing is the difference between an eight inch water line up sized to a sixteen inch water line and is anticipated to cost an additional $12,000).

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3. **Miscellaneous Provisions:**

(a) Time is of the essence with respect to the performance of every provision of this Agreement in which time of performance is specified or is clearly a factor.

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(d) This Agreement may be executed in any number of counterparts, each of which shall be deemed an original, but all of which when taken together shall constitute one and the same instrument.

Village @ Riverwalk Meeting 3/16/06

No watershed
No Parks fees
No Stm drain fees

Pay Engineering Fees
Pay Improvement Bond

Met w/ Rich Horst expect payment
in two weeks.

Check notes from Planning Commission
11.25° bends added document
Any changes in development work notify developer
Find reimbursement agreement
Development agreements pass down line
Review invoices from Arbor - bill $100k for SD
Send letter to Mike Maddox.
Construction meetings periodically or memos (letter)
Document!!

STAEDTLER® No. 937 811E Engineer's Computation Pad

STORM WATER POLLUTION PREVENTION PLAN AND EROSION CONTROL PLAN NOTES:

CONTROLLING SEDIMENT TRANSPORT AND PREVENTING AND/OR CORRECTING PROBLEMS ASSOCIATED WITH EROSION AND RUNOFF PROCESSES WHICH COULD OCCUR BOTH DURING AND AFTER PROJECT CONSTRUCTION WILL BE CLOSELY MONITORED. PERIODIC MAINTENANCE AND INSPECTION OF SEDIMENT CONTROL DEVICES WILL BE SCHEDULED. PARTICULAR ATTENTION SHALL BE GIVEN TO EXISTING DRAINAGE PATTERNS WHICH RUN THROUGH DISTURBED AREAS AND OVER EXTREME SLOPES. THESE PATTERNS WILL BE IDENTIFIED TO ISOLATE PROBLEM AREAS WHERE WATER WILL CONCENTRATE. PROVISIONS SHALL BE MADE TO CHANNEL RUNOFF AWAY FROM NEW OR EXISTING IMPROVEMENTS TO PREVENT UNDERMINING AND GENERAL SITE EROSION. THESE PROVISIONS SHALL BE STABILIZED AND SHALL REMAIN IN PLACE UNTIL THE PERMANENT STORM DRAINAGE FACILITIES ARE INSTALLED AND FUNCTIONAL.

EROSION CONTROL – AN SWP3 HAS BEEN PREPARED IN ACCORDANCE WITH THE UTAH DISCHARGE ELIMINATION SYSTEM (UPDES) PERMIT FOR CONSTRUCTION, OUTLINING HOW EROSION AND SILTATION WILL BE CONTROLLED. A COPY OF THE PLAN MUST BE ON SITE AT ALL TIMES. THE CONTRACTOR SHALL BE RESPONSIBLE FOR IMPLEMENTING THE PLAN AND INSTALLING AND MAINTAINING THE EROSION CONTROL FACILITIES. SHOULD SILT LEAVE THE SITE OR EROSION OCCUR, IT IS THE CONTRACTOR'S RESPONSIBILITY TO TAKE CORRECTIVE ACTION AND REPAIR ANY DAMAGE CAUSED BY THE SILT OR EROSION IMMEDIATELY.

BEFORE CONSTRUCTION BEGINS, THE LIMITS OF DISTURBANCE BOUNDARY SHALL BE FLAGGED ON SITE AND APPROVED BY THE PROJECT ENGINEER. UNDER NO CIRCUMSTANCES SHALL SITE DISTURBANCE OCCUR OUTSIDE THE DESIGNATED AREAS AT ANY TIME DURING CONSTRUCTION.

EXCAVATION AND EMBANKMENT OPERATIONS SHALL PROCEED IN SUCH A MANNER SO THAT FINISHING OF SLOPES, INCLUDING REVEGETATION, SHALL BE ACCOMPLISHED AS SOON AS POSSIBLE AFTER ROUGH GRADING. ALL SLOPES 2:1 OR FLATTER SHALL BE SCARIFIED WITH HEAVY EQUIPMENT, LEAVING TRACKS PERPENDICULAR TO THE SLOPE.

CUT SLOPES SHALL BE 1:1 MAXIMUM AND FILL SLOPES 2:1 MAXIMUM UNLESS ROCK IS ENCOUNTERED. CUT SLOPES IN ROCK MAY BE STEEPENED, DEPENDING UPON GEOTECHNICAL CONSIDERATIONS. THE TOPS OF ALL CUT SLOPES IN SOIL SHALL BE ROUNDED FOR A HORIZONTAL DISTANCE OF THREE FEET BEYOND THE CATCH POINT. SLOPE ROUNDING SHALL OCCUR AS THE SLOPE IS BEING BROUGHT DOWN. THE OVERALL SHAPE, HEIGHT AND GRADE OF ANY CUT AND/OR FILL SLOPE SHALL BE DEVELOPED IN CONCERT WITH THE EXISTING NATURAL CONTOURS, SCALE AND VEGETATION OF NATURAL TERRAIN.

STABILIZATION PRACTICES MAY INCLUDE, BUT NOT BE LIMITED TO, TEMPORARY SEEDING, PERMANENT SEEDING, MULCHING, GEOTEXTILES, SOD STABILIZATION, VEGETATIVE BUFFER STRIPS, PROTECTION OF TREES, PRESERVATION OF NATURAL VEGETATION, AND OTHER APPROPRIATE MEASURES. USE OF IMPERVIOUS SURFACES FOR STABILIZATION SHALL BE AVOIDED. EXCEPT AS PROVIDED BELOW, STABILIZATION MEASURES SHALL BE INITIATED AS SOON AS POSSIBLE IN DISTURBED PORTIONS OF THE SITE WHERE CONSTRUCTION ACTIVITIES HAVE PERMANENTLY CEASED, BUT IN NO CASE MORE THAN 15 DAYS AFTER THE CONSTRUCTION ACTIVITY IN THAT PORTION OF THE SITE HAS PERMANENTLY CEASED.

(A) WHERE THE INITIATION OF STABILIZATION MEASURES BY THE 15TH DAY AFTER CONSTRUCTION ACTIVITY PERMANENTLY CEASES IS PRECLUDED BY DEEP SNOW OR FROZEN GROUND CONDITIONS, STABILIZATION MEASURES SHALL BE INIATED AS SOON AS PRACTICABLE.

(B) WHERE CONSTRUCTION ACTIVITY ON A PORTION OF THE SITE IS TEMPORARILY CEASED, AND EARTH DISTURBING WILL RESUME WITHIN 15 WORKING DAYS, TEMPORARY STABILIZATION MEASURES NEED NOT BE INITIATED ON THAT PORTION OF THE SITE.

SPECIFICALLY OUTLINED DISTURBED AREAS, BOTH ON AND OFF-SITE SHALL BE REVEGETATED. THESE AREAS SHALL INCLUDE, BUT NOT BE LIMITED TO, ALL UNSURFACED AREAS WITHIN THE FLAGGED LIMITS OF DISTURBANCE, STAGING AND STORAGE AREAS, MATERIAL WASTE AREAS, UNDERGROUND UTILITY CONSTRUCTION AREAS, BENCHED AREAS, INCLUDING RETAINING WALL BENCHES, AND TEMPORARY OR EXISTING ACCESS ROADS USED FOR CONSTRUCTION ACTIVITIES. CUT AND FILL SLOPES OVER 3:1 REQUIRE THE PLACEMENT OF EROSION CONTROL/REVEGETATION MATTING. SLOPES LESS THAN 3:1 MAY BE SPRAYED WITH TACKIFIER. ROCK CUTS STEEPER THAN 1:1 WILL NOT BE REVEGETATED.

SEDIMENT TRAPS MUST OUTLET ONTO STABILIZED (PREFERABLY UNDISTURBED) GROUND, OR LEFT TO PERCOLATE INTO THE GROUND.

CONTROLLED OUTLETS SHALL DIRECT COLLECTED RUNOFF THROUGH SILT FENCES OR STRAW BALES.

TYPICAL FUGITIVE DUST SHALL BE CONTROLLED BY WATERING AND/OR CHEMICAL STABILIZATION, PROVIDING VEGETATIVE OR SYNTHETIC COVER AND WIND BREAKS CONSISTENT WITH UTAH STATE DIVISION OF AIR QUALITY STANDARDS.

REVEGETATION NOTES:

1. RECOMMENDED SEEDING MIXTURES, RATES AND CULTURAL PRACTICES MUST BE DONE ON A SITE SPECIFIC BASIS WHICH ACCOUNTS FOR THE FOLLOWING: SOIL PROPERTIES, CLIMATIC FACTORS, TOPOGRAPHIC POSITION, CULTURAL PLANS, AND FEASIBILITY.
2. VEGETATIVE PLANTING SHALL BE DONE WHERE DEEMED NECESSARY TO HASTEN THE RETURN OF PREEXISTING SITE CHARACTERISTICS AND IN THE FOLLOWING SITUATIONS:
   A. ANY FINISHED SLOPE WHICH WILL REMAIN UNDISTURBED FOR AT LEAST 10 YEARS.
   B. ALL TYPES OF LANDSCAPING.
3. ALL DISTURBED OPEN SPACE AREAS, AND CUT AND FILL AREAS, SHALL RECEIVE AN ACCEPTABLE SEED MIX. APPLICATION PROCEDURE TO MATCH PRE-EXISTING CONDITIONS.
4. SEED MIX SHALL BE APPLIED AT A RATE SO THAT GERMINATION AND SUBSEQUENT COVERAGE REACHES 80 PERCENT IN A REPRESENTATIVE 10' x 10' AREA. IF COVERAGE DOES NOT REACH 80 PERCENT, RESEEDING MUST OCCUR.
5. APPROPRIATE FERTILIZER SHALL BE APPLIED TO ALL SLOPES RECEIVING SEED. APPLICATION RATES OF THE FERTILIZER SHALL BE STRICTLY ADHERED TO.

WARNING
LINE IS 4 INCHES
AT FULL SIZE
(IF NOT 4"-SCALE ACCORDINGLY)

STORM WATER MANAGEMENT PLAN

1. Maintain catch basin and stormwater inlets on a regular basis to remove pollutants, reduce high pollutant concentrations during the first flush of storms, prevent clogging of the downstream conveyance system, and restore the catch basins' sediment trapping capacity. A catch basin is distinguished from a stormwater inlet by having at its base a sediment sump designed to catch and retain sediments below the overflow point. This information sheet focuses on the cleaning of accumulated sediments from catch basins.
2. Proper maintenance and siltation removal is required on both a routine and corrective basis to promote effective stormwater pollutant removal efficiencies for wet/dry detention pond and infiltrative devices.
3. Prevent or reduce the discharge of pollutants to stormwater from buildings and grounds maintenance by washing and cleaning up with as little water as possible, preventing and cleaning up spills immediately, and maintaining the stormwater collection system.
4. Employee training, like equipment maintenance, is a method by which to implement BMPs. Employee training should be used in conjunction with all other BMPs as part of the facility's SWPPP.
5. Prevent or reduce the discharge of pollutants to stormwater from hazardous waste through proper material use, waste disposal, and training of employees and subcontractors.
6. Promote efficient and safe housekeeping practices (storage, use, and cleanup) when handling potentially harmful materials such as fertilizers, pesticides, cleaning solutions, paint products, automotive products, and swimming pool chemicals.
7. Implement measures to detect, correct, and enforce against illegal dumping of pollutants on streets, into the storm drain system, and into creeks. Substances illegally dumped on streets, into the storm drain system, and into creeks includes paints, used oil and other automotive fluids, construction debris, chemicals, fresh concrete, leaves, grass clippings, and pet wastes. All of these wastes can cause storm water and receiving water quality problems as well as clog the storm drain system.

GENERAL NOTES:

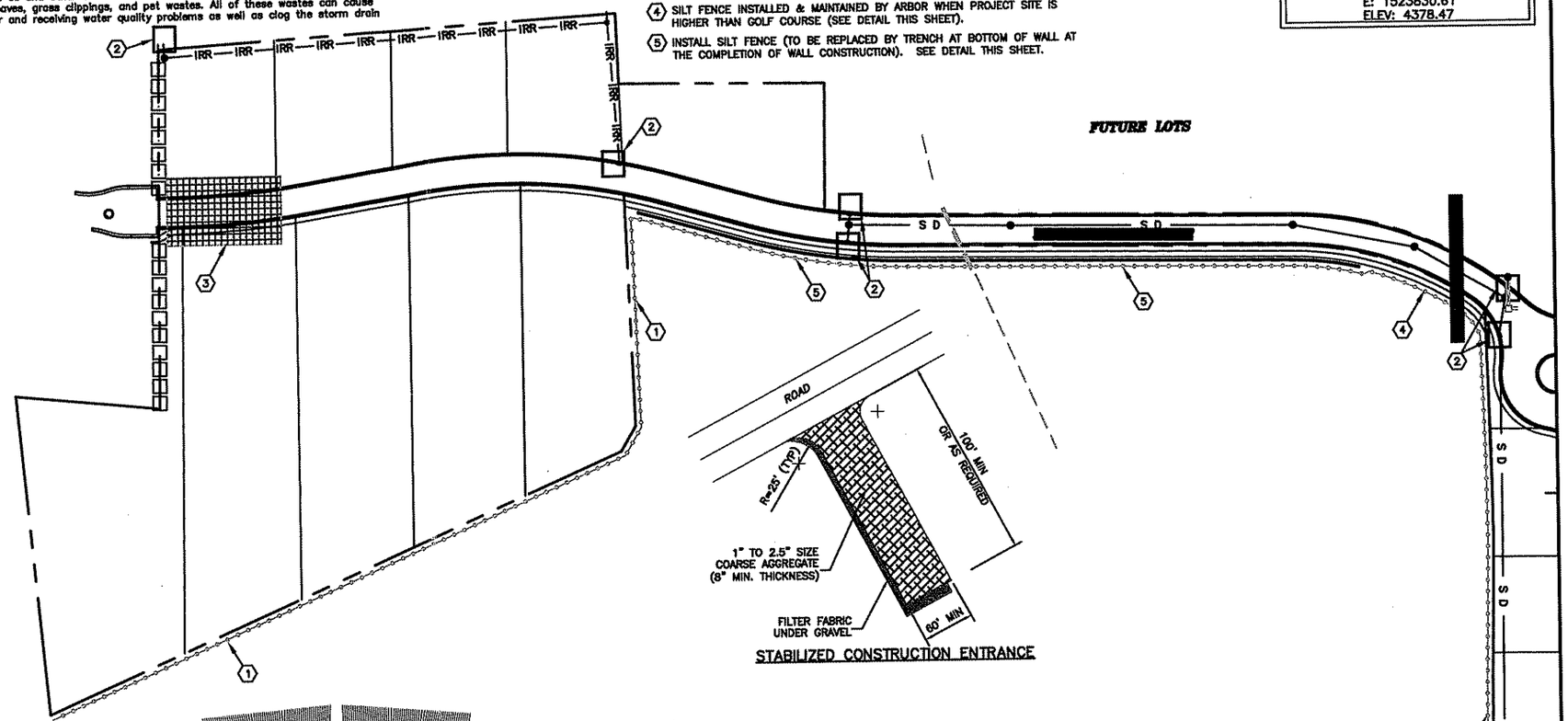
1. CONTRACTOR SHALL BE RESPONSIBLE FOR CONTACTING BLUE STAKES 48 HOURS PRIOR TO EXCAVATING.
2. CONTRACTOR SHALL BE RESPONSIBLE FOR FLAGGING, CAUTION SIGNS AND PUBLIC SAFETY ON ALL ADJACENT STREETS, CONSTRUCTION SITE, AND CONSTRUCTION CROSSINGS.
4. CONTRACTOR SHALL BE RESPONSIBLE FOR PUBLIC SAFETY AND OSHA/MSHA SAFETY STANDARDS.
5. CONTRACTOR SHALL BE RESPONSIBLE FOR CARE OF ALL CONSTRUCTION STAKES.
3. CONTRACTOR SHALL STRIP, STOCKPILE, PROTECT, AND SAVE ALL TOPSOIL.
7. CONTRACTOR SHALL BE RESPONSIBLE TO RESEED ALL DISTURBED AREAS WITH APPROVED SEED MIX.
8. BACKFILL SHALL BE COMPACTED TO 95% MODIFIED PROCTOR – ASTM D1557
CONTRACTOR SHALL BE RESPONSIBLE FOR ALL EROSION CONTROL AND FUGITIVE DUST MEASURES.
9. CONTRACTOR SHALL INSTALL SILT FENCE BELOW ALL DISTURBED AREAS AS OUTLINED ON THIS SHEET.
10. CONTRACTOR SHALL SLOPE ALL EXCAVATIONS TO AN ANGLE OF REPOSE OF MATERIAL BEING EXCAVATED OR USE BRACING OR SHORING. CONTRACTOR SHALL BE RESPONSIBLE FOR COMPLIANCE WITH OSHA/MSHA REGULATIONS AND GUIDELINES.

CALL BEFORE YOU DIG! IT'S THE LAW BLUE STAKES 1 800 662 4111

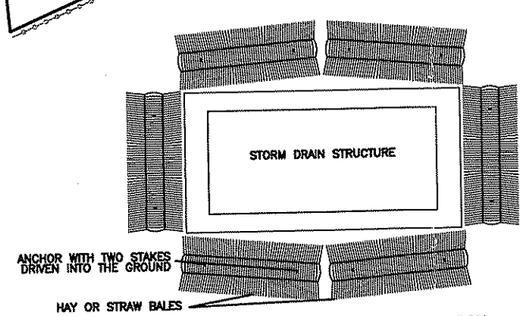
GRAPHIC SCALE
0 60 180
30 120
HORIZONTAL
11x17 – 1"=120'
24x36 – 1"=60'

BENCHMARK
FOUND SALT LAKE COUNTY BRASS CAP
SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

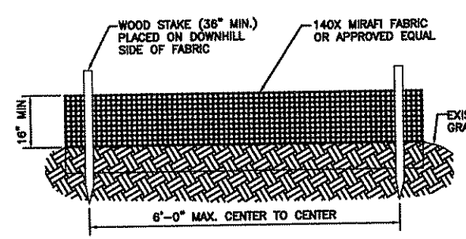
(1) SILT FENCE INSTALLED & MAINTAINED BY LIBERTY VENTURES (SEE DETAIL THIS SHEET)
(2) INSTALL CATCHBASIN PROTECTION (SEE DETAIL THIS SHEET)
(3) INSTALL STABILIZED CONSTRUCTION ENTRANCE OR MUDPLATES (SEE DETAIL THIS SHEET)
(4) SILT FENCE INSTALLED & MAINTAINED BY ARBOR WHEN PROJECT SITE IS HIGHER THAN GOLF COURSE (SEE DETAIL THIS SHEET).
(5) INSTALL SILT FENCE (TO BE REPLACED BY TRENCH AT BOTTOM OF WALL AT THE COMPLETION OF WALL CONSTRUCTION). SEE DETAIL THIS SHEET.



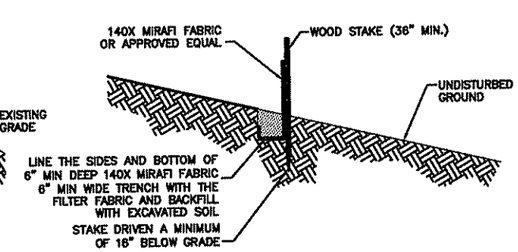
STABILIZED CONSTRUCTION ENTRANCE



STRAW BALE CATCHBASIN PROTECTION



SILT FENCE FRONT VIEW



SILT FENCE SIDE VIEW

NO.	REVISIONS	BY	DATE

DRAWN TT 7/8/05 DATE
CHECKED RWA 7/8/05 DATE (PROJECT ENGINEER)
APPROVED BAK 7/8/05 DATE (PROJECT MANAGER)

ARBOR
COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070
801-561-8594

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CIVIL SCIENCE
ENGINEERS – SURVEYORS – PLANNERS – SCIENTISTS
3160 West Clubhouse Drive
Lehi, UT 84043
PHONE (801)768-7200, FAX (801)768-7201

THE VILLAGE AT RIVERWALK
STORM WATER POLLUTION PREVENTION PLAN

PROJECT NO.: 04122
SHEET NO. GP-05
FILE NAME: GP-05 SCALE: AS SHOWN

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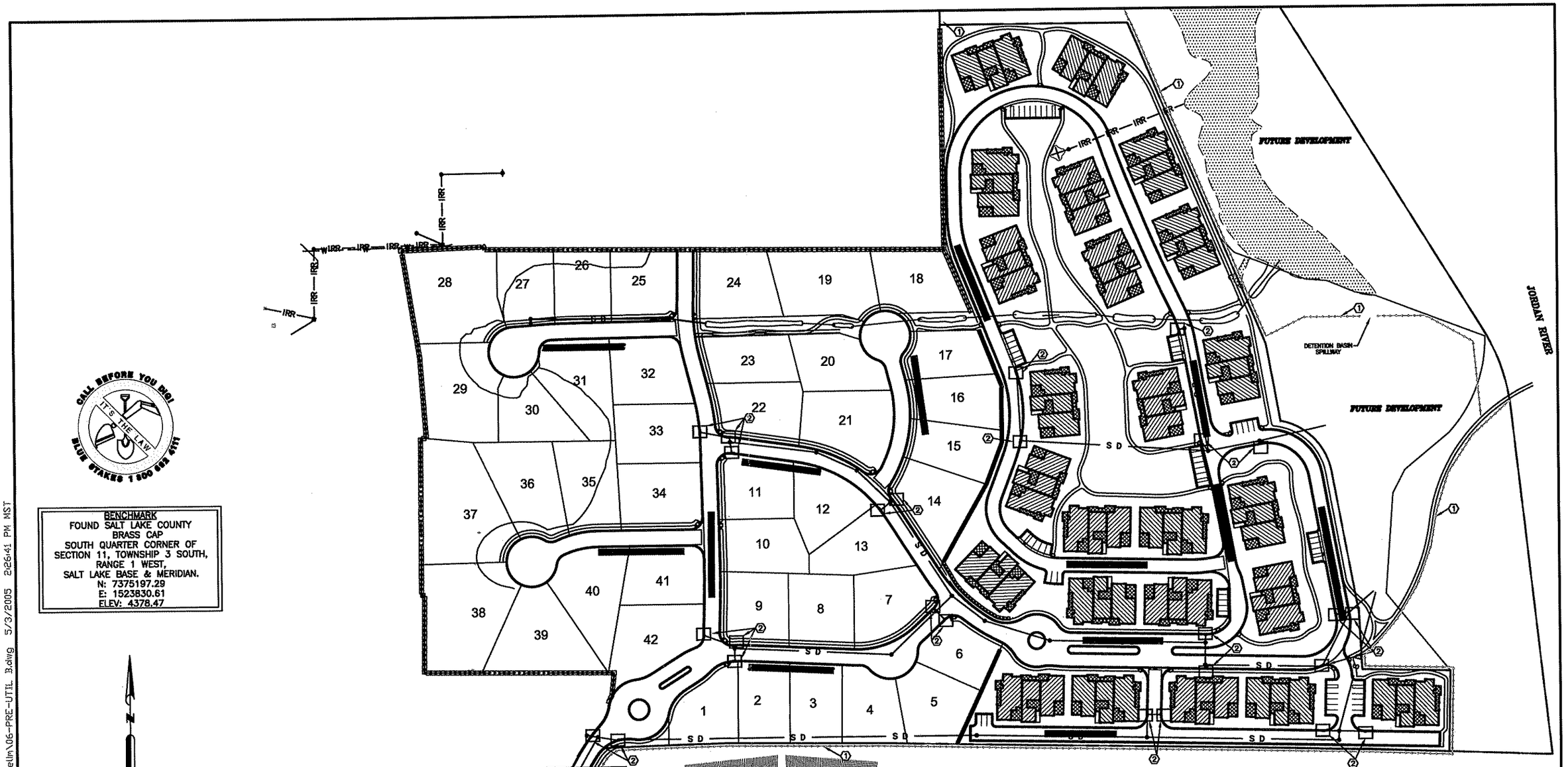

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BLUE STAKES 1 800 662 4111

BENCHMARK
FOUND SALT LAKE COUNTY
BRASS CAP
SOUTH QUARTER CORNER OF
SECTION 11, TOWNSHIP 3 SOUTH,
RANGE 1 WEST,
SALT LAKE BASE & MERIDIAN.
N: 7375197.29
E: 1523830.61
ELEV: 4378.47

N

GRAPHIC SCALE
0 80 240
40 160

HORIZONTAL
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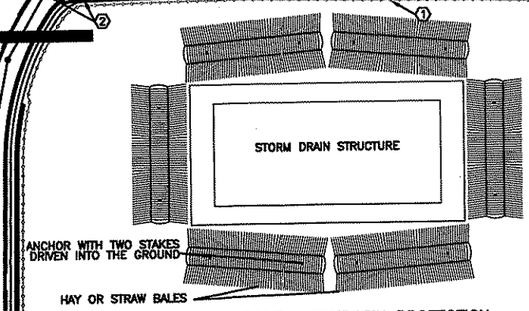
① INSTALL SILT FENCE WHEN PROJECT SITE IS HIGHER THAN SURROUNDING PROPERTY (SEE DETAIL THIS SHEET).
② INSTALL CATCHBASIN PROTECTION (SEE DETAIL THIS SHEET)

SEE SHEET GP-05 FOR THE FOLLOWING NOTES:
1. STORM WATER POLLUTION PREVENTION PLAN
2. EROSION CONTROL PLAN
3. STORM WATER MANAGEMENT PLAN
4. REVEGETATION NOTES
5. GENERAL NOTES



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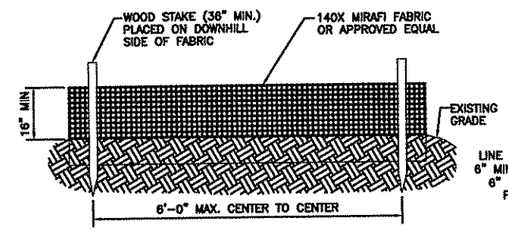
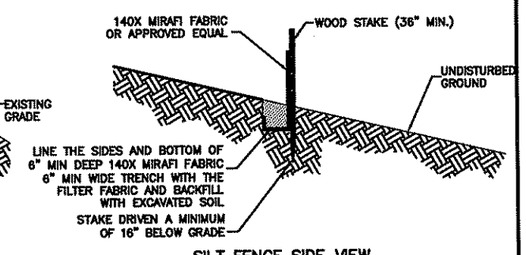


SILT FENCE FRONT VIEW



SILT FENCE SIDE VIEW

NO.	REVISIONS	BY	DATE

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CHECKED RWA	PROJECT ENGINEER	7/8/05 DATE
APPROVED BAK	PROJECT MANAGER	7/8/05 DATE

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THE VILLAGE AT RIVERWALK

STORM WATER POLLUTION PREVENTION PLAN

PROJECT NO.: 04122
SHEET NO. GP-06
FILE NAME: GP-06 SCALE: AS SHOWN

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2005-045 (A)

AGREEMENT CONCERNING THE VILLAGE AT RIVERWALK

THIS AGREEMENT (the "**Agreement**") is made and entered into this 23rd day of August, 2005 (the "**Effective Date**"), by and between South Jordan City, a Utah municipal corporation (the "**City**") and Arbor/Gardner L.LC. a Utah Limited Liability Company (the "**Developer**").

RECITALS:

A. The City and Developer have previously entered into a Purchase and Sale Agreement (the "**Agreement**"), relating to the development of a master-planned community commonly known as The Village at Riverwalk (the "**Project**" or "**Riverwalk**"). 2005-045

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(d) This Agreement may be executed in any number of counterparts, each of which shall be deemed an original, but all of which when taken together shall constitute one and the same instrument.

(e) Notwithstanding anything to the contrary contained herein, this Agreement shall not be deemed or construed to make the parties partners or joint ventures, or to render either party liable for any of the debts or obligations of the other.

(f) This Agreement and the transactions contemplated herein will be construed in accordance with and governed by the laws of the State of Utah.

IN WITNESS WHEREOF, the parties have executed this Agreement by and through their respective duly authorized representatives as of the Effective Date.

"City"

CITY OF SOUTH JORDAN

By: _____
Ricky A. Horst
City Manager

"Developer"

Arbor/Gardner L.L.C.

By: _____

Its: manager

Break Down 16" Water Line South Jordan Water Line

Footage	Unit	Description	Price	Total
482	LF	Upgraded Water Line 8"C 900 to 16" DIP	$ 21.69	$ 10,454.58
1718	LF	16 DIP	$ 46.45	$ 79,801.10
2	EA	Upgrade Bend From 8" to 16"	$ 800.00	$ 1,600.00
2	EA	Bends 16" Inc Thrust Blocks	$ 1,200.00	$ 2,400.00
1	EA	16" X 8" MJ Cross	$ 1,287.95	$ ~~1,287.95~~
1	EA	16" X 8" DI Flang Cross	$ 2,368.75	$ ~~2,368.75~~
1	EA	Fire Hyrdant & Assembly 16 X 10 Reducer 6" Gate Valve	$ 5,176.29	$ ~~5,176.29~~ 1/2
		10 to 6 Reducer, 18 X 6 Spool, 6" MJ Adapter		$ -
2	EA	16" Valves	$ 2,304.29	$ ~~4,608.58~~
1	Unit	Dewatering Wet Lands	$ 12,125.00	$ 12,125.00
1	Unit	Move Spoils From Wet Lands	$ 2,550.00	$ ~~2,550.00~~
1	Unit	630 Cubic Yards of Engineered Fill For Wet Lands	$ 7,242.00	$ 7,242.00
1	Unit	630 Cubic Yards Placed Fill For Wet Lands	$ 1,732.50	$ 1,732.50
2200	LF	Pipe Testing	$ 1.00	$ ~~2,200.00~~ 1718
1	Unit	Civil Science Design & Staking	$ 9,533.00	$ ~~9,533.00~~ 7435 .79
		Sub Total		**$ 143,079.75**
3%	1	Management & Accounting Fee		$ 4,292.39
		Total Due		$ 147,372.14
				127097.06

Break Down 16" Water Line South Jordan Water Line

Footage	Unit	Description	Price	Total
482	LF	Upgraded Water Line 8"C 900 to 16" DIP	$ 21.69	$ 10,454.58
1718	LF	16 DIP	$ 46.45	$ 79,801.10
2	EA	Upgrade Bend From 8" to 16"	$ 800.00	$ 1,600.00
4	EA	Bends 16" Inc Thrust Blocks	$ 1,200.00	$ 4,800.00
1	EA	16" X 8" MJ Cross	$ 1,287.95	$ 1,287.95
1	EA	16" X 8" DI Flang Cross	$ 2,368.75	$ 2,368.75
1	EA	Fire Hyrdant & Assembly 16 X 10 Reducer 6" Gate Valve 10 to 6 Reducer, 18 X 6 Spool, 6" MJ Adapter	$ 5,176.29	$ 5,176.29
				$ -
2	EA	16" Valves	$ 2,304.29	$ 4,608.58
1	Unit	Dewatering Wet Lands	$ 12,125.00	$ 12,125.00
1	Unit	Move Spoils From Wet Lands	$ 2,550.00	$ 2,550.00
1	Unit	630 Cubic Yards of Engineered Fill For Wet Lands	$ 7,242.00	$ 7,242.00
1	Unit	630 Cubic Yards Placed Fill For Wet Lands	$ 1,732.50	$ 1,732.50
2200	LF	Pipe Testing	$ 1.00	$ 2,200.00
1	Unit	Civil Science Design & Staking	$ 9,533.00	$ 9,533.00
		Sub Total		**$ 145,479.75**
3%	1	Management & Accounting Fee		$ 4,364.39
		Total Due		$ 149,844.14

EARTH MOVERS
"When Quality Matters Most"

Earthmovers, LLC
4662 South 150 West
Murray, UT 84107
www.earthmovers.biz

T 801-268-8228
F 801-747-0766

To:	Arbor Development	**Contact:**	Cory Gust
Address:	42 West 100th South Sandy, UT	**Phone:**	801-561-8594
		Fax:	801-561-8647
Project Name:	Village At Riverwalk	**Bid Number:**	
Project Location:	10500 South 800 West, Sandy, UT	**Bid Date:**	

REVISED - August 18, 2005

Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
AAdditional Items					
D 5	42" RCP Storm Drain Incldg Trenching, Pipe, Gravel, Backfill	1,484.00	LF	$52.63	$78,132.60
D 10	42" End Section W/o Grate	1.00	EACH	$1,885.00	$1,885.00
D 6	Cleanout Box	6.00	EACH	$2,219.17	$13,315.02
D 11	Import Backfill	585.00	CY	$2.75	$1,608.75
W 8	16" DIP Water	2,200.00	LF	$46.45	$102,190.00
W 10	16" Butterfly Valve	2.00	EACH	$2,304.29	~~$2,304.29~~ 4608.58
W 8	2" Blowoff	2.00	EACH	$950.00	$1,900.00
W 9	Misc Fittings	8.00	EACH	$70.00	$560.00
W 11	Import Backfill	630.00	CY	$2.75	$1,732.50
W 12	Pipe Testing	2,200.00	LF	$1.00	$2,200.00
				Total Price for above AAdditional Items Items:	**$205,828.16**
Sewer					
S 1	Connect To Existing Manhole (1) 900" east N	3.00	EACH	$1,200.00	$3,600.00
S 2	60" Sewer Manhole 9 east N & case in place	11.00	EACH	$2,675.00	$29,425.00
S 3	48" Sewer Manhole 33N	33.00	EACH	$2,150.00	$70,950.00
S 4	8" PVC Sewer Incldg Trenching, Pipe, Gravel, , Backfill	5,300.00	LF	21.75 $18.92	$100,276.00
S 5	4" PVC Sewer Incldg Trenching, Pipe, Gravel, Backfill	5,148.00	UNIT	19.50 $15.89	$81,801.72
S 6	off Connect To Existing Sewer Main (1) Nose - on S 600" 7 east N	7.00	EACH	$1,200.00	$8,400.00
S 7	Import Backfill	6,560.00	CY	$2.75	$18,040.00
S 8	Pipe Testing	10,446.00	LF	$2.00	$20,896.00
				Total Price for above Sewer Items:	**$333,388.72**
Storm Drain					
D 1	15" RCP Storm Drain Incldg Trenching, Pipe, Gravel, Backfill	1,108.00	LF	$28.90	$32,021.20
D 2	18" RCP Storm Drain Incldg Trenching, Pipe, , Backfill	324.00	LF	$32.62	$10,568.88
D 3	24" RCP Storm Drain Incldg Trenching, Pipe And Backfill	1,452.00	LF	$37.88	$55,001.76
D 4	30" RCP Storm Drain Incldg Trenching, Pipe, Gravel, Backfill	723.00	LF	$46.85	$33,149.55
D 6	Cleanout Box	28.00	EACH	$1,319.17	$36,936.76
D 7	Curb Inlet Box	25.00	EACH	$1,425.00	$35,625.00
D 8	24" End Section W/o Grate	1.00	EACH	$1,025.00	$1,025.00
D 9	30" End Section W/o Grate	1.00	EACH	$1,175.00	$1,175.00
D 12	Storm Drain Box	1.00	EACH	$15,841.50	$15,841.50
				Total Price for above Storm Drain Items:	**$221,344.65**

EARTH MOVERS

"When Quality Matters Most"

Request for Change

002

PROJECT: Riverwalk
JOB CODE:

TO: Arbor Development

FROM: Kevin Neff

DATE: 12/30/2005

EarthMovers, LLC
4682 South 150 West
Murray, UT 84107
PH: 801.864.0770
FAX: 801.747.0766
www.earthmovers.biz

Item	Unit	Qty	Price	Total
DE-WATERING OF 16" DIP WATER LINE FOR ONE WEEK				
4" SUB-PUMP				
3" TRASH PUMP				
60 WATT GENERATOR				
ADDITIONAL SAND				
ADDITIONAL GRAVEL TO STABLIZE TRENCH				
SLOW DOWN TIME				
				$12,1254.00

Client Approval:

Signature

Print Date

EarthMovers Approval:

Superintendent or Foreman Signature

Print Date

EARTH MOVERS

"When Quality Matters Most"

Earthmovers, LLC
4682 South 150 West
Murray, UT 84107
www.earthmovers.biz

T 801-268-0228
F 801-747-0708

To:	Arbor Development	**Contact:**	Mike Maddox
Address:	42 West 100th South Sandy, UT	**Phone:**	801-561-8594
		Fax:	801-561-8647
Project Name:	UNC - Riverwalk RFC 10 - Move Spoils From East End Of 16" Main	**Bid Number:**	
Project Location:	10500 South 800 West, Sandy, UT	**Bid Date:**	

RFC 10 - Move Spoils From East End of 16" Main

Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
Storm Drain					
D	Move Spoils From 16" Main	1.00	LS	$2,550.00	$2,550.00
				Total Price for above Storm Drain Items:	**$2,550.00**
				Total Bid Price:	**$2,550.00**

Notes:

- This bid is a unit price bid and is based on quantities from Engineer. Payment will be based on actual project quantities. Bid only includes items noted on this bid form. Bid is based on a 40 hour work week with no overtime.
- General Exclusions:
  Unless otherwise specified, No engineering, as-builts, inspection, testing, lane closures, city or state sales tax, bonds, re-bar, timbers, concrete, saw cutting, winter conditions/protection, permits, fees, electrical, telephone & plumbing hook-ups, surveying, demolition, unknown obstructions/conditions, utility adjustment or relocation, rip rap, spoils from other trades, import/export, environmental fees, snow removal, trash, garbage, shoring, excessive rock/hard material (to be defined by inability to fill bucket more than ½ full with each pass, with a 45,000 lb. Excavator). Topsoil and landscaping, and handling or disposing of hazardous material, blasting, drilling, boring, Dry wells, soft material (soil that is unstable or cannot hold its own vertical bank), un tested fill or water/de-watering, water meters, abandonment of any existing utility lines not defined on plans, televising or hydrovacing of sewer and storm drains, vacuum testing man-holes. All asphalt milling & re-paving. Any damage to existing curb and gutter, asphalt or concrete.

- A. Our price is based solely on drawings, specifications, and other contract documents as listed. 1. Plans by Civil Science, dated August, 2005 2. Soils report by AGEC (#1040659) dated August 24, 2004.
  B. Information and prices on this proposal supersedes any previously submitted; we reserve the right to modify our price and/or terms to reflect adjustments resulting from the continuous review of plans and specifications.
  C. Due to all public agencies intense dust control concerns and/or policies regarding construction sites, it is important that the Client provide some contingency for random traffic. Suggestions might be to fence perimeter of site, berming, or partial fencing with signage. Ultimately, some form of traffic flow must be maintained by Owner and/or Client.
  D. This bid, including any such modifications, shall remain effective and will not be further modified or withdrawn for thirty (30) days from the bid submission date unless: we are notified that our bid was not relied upon for the General's bid, or we are asked to modify our bid, whichever occurs first.
  E. Price will be subject to change after field verification of survey.
  F. With respect to balancing of earth grading operations, Earthmovers LLC., may provide value engineering associated with import or export. The burden of final design to achieve a balanced result and any consequential costs related thereto shall be the responsibility of the owner and/or engineer. If requested Earthmovers LLC., will suggest ideas to achieve this goal. However, Earthmovers LLC., will not assume liability for final design. Any costs related to regrading, as part of adjustments to achieve a balanced site, are not incorporated into this proposal.
  G. Earthmovers LLC., shall not be responsible for the coordination of or the supplying labor, equipment and material necessary to adjust manholes provided by any public utility agency.
  H. This proposal is based solely and specifically on information noted in plans and specifications as listed above.

Additional Cost to the City per meeting 3/30/06

Mistic Creek

16 x 8 MJ Cross	$1,220.83
8" Mega lug	$67.12
	1287 95

Mistic Falls

16 x 8 DI flange cross	$2,250.00
8' 45 bend	$118.75
	2,368.75

East End of 16" DIP

Fire Hydrant	$2,487.18
16 x 10 Reducer	$1,570.85
10 x 6 Reducer	$402.18
18 x 6 Spool	$183.75
6" MJ adapter	$67.12
6" Gate Valve	$465.21
	5176 39
Total	$8,832.99

PROPOSAL

NOLAND & SON CONSTRUCTION Co., Inc
1350 WEST 7900 SOUTH
WEST JORDAN, UTAH 84088
Phone (801) 566-7219 Fax (801) 566-7210

Proposal Submitted To: Arbor Commercial / Residential	Phone: 652 6916	Fax: 561 8647	Date: 23-Jun-05
Street:	Job Name: Village at Riverwalk		Attention: Mike Maddox
City, State, Zip Code:	Job Location: 10500 South 800 West		
Engineer: Civil Science	Date of Plans: Preliminary		
Proposal:			

PROPOSAL:

#	Description	Quantity	Unit	Unit Price	Extension
	16" Waterline:				
1	16" DIP w/ Sand Pipe Zone	1,700	LF	42.00	$71,400.00
2	16 x 8 Tee w/ Thrust Block	3	EA	1,550.00	$4,650.00
3	16 x 2 Temporary Blowoff (16 x 2 Tapt Cap w/ 2" Ball Valve)	2	EA	950.00	$1,900.00
4	16" Bends w/ Thrust Block	2	EA	1,200.00	$2,400.00
5	16 x 8 Cross (Assumed - Need detail)	1	EA	1,950.00	$1,950.00
6	16" Butterfly Valve (If Needed)	1	EA	2,200.00	$2,200.00
7	Import Backfill - For Portions in Roadway Only	350	Ton	6.75	$2,362.50
			Subtotal =	**$86,862.50**	

Note: Our schedule will need to be negotiated - Please let us know when you plan to start.
Note: This bid is preliminary only. We will re-price when you have final plans.

Total Extended Price **$86,862.50**

Not Included:

1 Engineering & Survey
2 Compaction and Proctor Testing.
3 Haulaway of Excess Excavated Material.
4 Video Inspection of New Lines
5 Tree & Fence Removal
6 Storm Water Plan, Permit & Devices (No Plan)
7 Relocation of Existing Utilities
8 Trench Dewatering
9 Waterline Loops
10 Connection to Existing Waterlines

We Propose hereby to furnish material and labor - complete according to the Contract and Specifications of Governing Improvement Agency, for the sum of Eight Hundred Sixty Six Thousand Two Hundred Seventy Five dollars and No/100 ($ 866,275.00) All quantities are approximate only - final billing will reflect exact quantities installed.

AVAILABILITY OF FUNDS:

Funds for this project are to be furnished by _____ (Owner or Contractor). A copy of this agreement will be signed by the aboved named owner or contractor prior to beginning construction.

PAYMENT TO BE MADE AS FOLLOWS:

Monthly estimates will be submitted in writing by the fifth day of each month for work during the previous month. Payment for these estimates will be due by the fifteenth of the same month. Five percent may be held from these payments until completion of the utility lines if desired.

At the time of completion of the utility lines, Noland & Son Construction Co., Inc. ("Noland") will obtain a letter from the District stating that it has installed according to the plans and specifications and that the lines have been tested to their satisfaction. At that time Noland will submit a final billing by the fifth of the month. Payment in full will be due by the fifteenth of the same month.

If any payment is not made in a timely manner, as above provided owner or contractor agrees to pay 1 1/2% per month interest together will all costs orcing the agreement, including reasonable attorneys fees.

All material to be as specified. All work to be completed in a workmanlike manner according to standard practices. Any alterations or deviation from the above specifications involving extra cost will be executed

PROPOSAL

NOLAND & SON CONSTRUCTION Co., Inc
1350 WEST 7900 SOUTH
WEST JORDAN, UTAH 84088
Phone (801) 566-7219 Fax (801) 566-7210

Proposal Submitted To:	Phone:	Fax:	Date:
Arbor Commercial / Residential	652 6916	561 8647	06-Jun-05
Street:	Job Name: Village at Riverwalk		Attention: Mike Maddox
City, State, Zip Code:	Job Location: 10500 South 800 West		
Engineer: Civil Science	Date of Plans: Preliminary		
Proposal: Water, Sewer & Storm Drain			

PROPOSAL:

#	Description	Quantity	Unit	Unit Price	Extension
	SEWER				
1	Connection to Existing Sewer Manhole	3	EA	900.00	$2,700.00
2	60" Manhole on Existing 36" Sewer Line	2	EA	3,225.00	$6,450.00
3	60" Sewer Manhole	9	EA	1,900.00	$17,100.00
4	48" Sewer Manhole	33	EA	1,575.00	$51,975.00
5	8" PVC Sewer w/ 3/4" Gravel Pipe Zone	5,300	LF	21.75	$115,275.00
6	4" PVC Sewer w/ 3/4" Gravel Pipe Zone	5,148	LF	19.50	$100,386.00
7	8" x 4" Wye Fitting	92	EA	90.00	$8,280.00
8	Nose-On Connection to Existing 36" Sewer Main	7	EA	600.00	$4,200.00
9	Dewatering For Sewer Installation (Need Geotech Info)	1	Lump	Pending	$0.00
10	Import Backfill - Sewer (If Required)	0	Ton	6.75	$0.00
	WATER				
11	Connection to Existing Waterline Stub @ Baxter	1	EA	350.00	$350.00
12	8" C900 Water w/ Sand Pipe Zone	6,780	LF	15.00	$101,700.00
13	8" Bends w/ Thrust Blocks	24	EA	400.00	$9,600.00
14	8" Tee w/ Thrust Block	8	EA	500.00	$4,000.00
15	8" Gate Valve	24	EA	850.00	$20,400.00
16	8" x 2" Temporary Blowoff	2	EA	400.00	$800.00
17	Fire Hydrant	17	EA	2,650.00	$45,050.00
18	16" Water - Not Enough Info	No Info	LF	Need Info	$0.00
19	16" x 8" Tee	No Info	EA	Need Info	$0.00
20	16" x 2" Temporary Blowoff	No Info	EA	Need Info	$0.00
21	16" Bends	No Info	EA	Need Info	$0.00
22	16" Connection to Existing	No Info	Lump	Need Info	$0.00
23	3/4" Poly Water Service	99	EA	575.00	$56,925.00
24	Import Backfill - Waterline (If Required)	0	Ton	6.75	$0.00
	STORM DRAIN				
25	15" RCP Storm Drain w/ 3/4" Gravel Pipe Zone	1,108	LF	20.00	$22,160.00
26	18" RCP Storm Drain w/ 3/4" Gravel Pipe Zone	324	LF	22.00	$7,128.00
27	24" RCP Storm Drain w/ 3/4" Gravel Pipe Zone	1,452	LF	30.75	$44,649.00
28	30" RCP Storm Drain w/ 3/4" Gravel Pipe Zone	723	LF	47.00	$33,981.00
29	42" RCP Storm Drain w/ 3/4" Gravel Pipe Zone	1,484	LF	86.50	$128,366.00
30	Cleanout Box	28	EA	1,675.00	$46,900.00
31	Curb Inlet Box	25	EA	1,400.00	$35,000.00
32	24" End Section - No Grate Included	1	EA	650.00	$650.00
33	30" End Section - Not Grate Included	1	EA	1,000.00	$1,000.00
34	42" End Section - No Grate Included	1	EA	1,250.00	$1,250.00
35	Import Backfill - Storm Drain (If Required)	0	Ton	6.75	$0.00

$304,366

msn® Hotmail®

mikemaddoxbeingpeace@hotmail.com Printed: Wednesday, April 12, 2006 6:00 PM

From : Brad Kenison <bkenison@civilscience.com>
Sent : Thursday, February 9, 2006 8:46 PM
To : <arborm@msn.com>
CC : <mikemaddoxbeingpeace@hotmail.com>
Subject : Construction cost estimates for 42" Storm Drain and 16" waterline @ Riverwalk

Mike

On Feb 1, 2006 you called me and indicated that you wanted me to split-out the engineering and construction staking costs for the 42" RCP SD and 16" DIP culinary waterline pipes within the Village @ Riverwalk Subdivision. At that time I indicated to you that it would be nearly impossible to determine an exact number for these by looking into the past billing files. I suggested that a better way to split-up these costs would likely be to determine these design and construction staking costs based on percentages of cost to purchase and install them.

The next day, you indicated that the following costs have been estimated for the construction of these two utility appurtenances:

42" "RCP Storm Drain pipe = $106,500
16" ductile iron waterline = $181,582

Based on these installation costs shown above, I have estimated that the engineering design and construction staking components of these pipelines would be as approximated below:

42" RCP Storm Drain Pipe = 6.5% ($6,922.50)
16" DIP Culinary waterline = 5.25% ($9,533.00)

If you have any questions regarding these approximate costs to engineer and stake the 42" RCP storm drainage and 16" DIP culinary waterlines, please feel free to give me a call.

Thank you,

p.s. Until I know that we have got the "bugs" worked out of my e-mail I will send my e-mails to both of your e-mail accounts, please respond to this e-mail as a verification that you have received it.

Brad A. Kenison, P.E.

Civil Science, Inc.

3160 W. Clubhouse Drive

Lehi, Ut 84043

(801) 768-7200 ext. 142 (office)

(801) 768-7201 (Facsimile)

(801) 367-4202 (Cellular)

bkenison@civilscience.com

Break Down 42" South Jordan City Storm Drain

Footage	Unit	Description	Price	Total	
1484	LF	RCP 42" Pipe	$ 52.65	$ 78,132.60	
1484	LF	3/4 Rock In Pipe Zone	$ 1.99	$ 2,952.42	
1484	LF	Camera Pipe	$ 0.65	$ 964.60	
585	CY	Import Backfill Materials (Road Way Only)	$ 11.50	$ 6,727.50	OK
585	CY	Placement Imported Backfill	$ 2.75	$ 1,608.75	NO
6	EA	Clean Out Boxes	$ 2,219.17	$ 13,315.02	
1	EA	Clean Out Boxe (Lori Vance Property)	$ 1,450.00	$ 1,450.00	OK
1	EA	42" End Section	$ 1,885.00	$ 1,885.00	
1	EA	Civil Science Engineering & Staking	$ 6,922.55	$ 6,922.55	OK
		Sub Total		**$ 113,958.44**	
3%	1	Management & Accounting Fee		$ 3,418.75	NO
		Total Due		$ 117,377.19	
				- 1608.75	
				- 3,418.75	
				112,349.69	

Highligted were not apart of the orginal scope of work

Original Bid	$ 106,227.37
Costs	$(117,377.19)
Difference	**$ (11,149.82)**

DB 5/5/06

Break Down 16" Water Line South Jordan Water Line

Footage	Unit	Description	Price	Total
482	LF	Upgraded Water Line 8"C 900 to 16" DIP	$ 21.69	$ 10,454.58 ✓
1718 x 21.69	LF	16 DIP	$ 46.45	$ 79,801.10 ✓
2	EA	Upgrade Bend From 8" to 16"	$ 800.00	$ 1,600.00 ✓
2	EA	Bends 16" Inc Thrust Blocks	$ 1,200.00	$ 2,400.00 ✓
1	EA	16" X 8" MJ Cross	$ 1,287.95	~~4,287.95~~ ✓
1	EA	16" X 8" DI Flang Cross	$ 2,368.75	~~2,368.75~~ ✓
1	EA	Fire Hyrdant & Assembly 16 X 10 Reducer 6" Gate Valve	$ 5,176.29	$ 5,176.29 1/2 2,588.14
		10 to 6 Reducer, 18 X 6 Spool, 6" MJ Adapter		$ -
2	EA	16" Valves	$ 2,304.29	$ ~~4,608.58~~ 1 valve on Org Bid
1	Unit	Dewatering Wet Lands	$ 12,125.00	$ 12,125.00 ✓
1	Unit	Move Spoils From Wet Lands	$ 2,550.00	$ 2,550.00 NO
1	Unit	630 Cubic Yards of Engineered Fill For Wet Lands	$ 7,242.00	$ 7,242.00 ✓
1	Unit	630 Cubic Yards Placed Fill For Wet Lands	$ 1,732.50	$ 1,732.50 ✓
2200	LF	Pipe Testing	$ 1.00	$ ~~2,200.00~~ 1718.00
1	Unit	Civil Science Design & Staking % 78	$ 9,533.00	$ 9,533.00 7,435.74
		Sub Total		**$ 143,079.75**
3%	1	Management & Accounting Fee		$ 4,292.39
		Total Due		$ 147,372.14

127,097.06

~~124,506.92~~

Original Bid	$ 110,886.37
Costs	$ (147,372.14)
Difference	$ (36,485.77)

46.45 25.00

21.45

2200 lf @ 21.45 = 47,190

46.17%

482
1718
2200

-16,1220

Break Down 42" South Jordan City Storm Drain

Footage	Unit	Description	Price	Total
1484	LF	RCP 42" Pipe	$ 52.65	$ 78,132.60
1484	LF	3/4 Rock In Pipe Zone	$ 1.99	$ 2,952.42
1484	LF	Camera Pipe	$ 0.65	$ 964.60
585	CY	Import Backfill Materials (Road Way Only)	$ 11.50	$ 6,727.50
585	CY	Placement Imported Backfill	$ 2.75	$ 1,608.75
6	EA	Clean Out Boxes	$ 2,219.17	$ 13,315.02
1	EA	Clean Out Boxe (Lori Vance Property)	$ 1,450.00	$ 1,450.00
1	EA	42" End Section	$ 1,885.00	$ 1,885.00
1	EA	Civil Science Engineering & Staking	$ 6,922.55	$ 6,922.55
		Sub Total		**$ 113,958.44**
3%	1	Management & Accounting Fee		$ 3,418.75
		Total Due		**$ 117,377.19**

EARTH MOVERS
"When Quality Matters Most"

Earthmovers, LLC
4602 South 150 West
Murray, UT 84107
www.earthmovers.biz

T 801-268-8228
F 801-747-0766

To:	Arbor Development	**Contact:**	Mike Maddox
Address:	42 West 100th South Sandy, UT	**Phone:**	801-652-6916
		Fax:	801-561-8647
Project Name:	UNC - Riverwalk RFC 16 - (2) Air Vacs, SD Box, MH Repair	**Bid Number:**	RFC 16
Project Location:	10500 South 800 West, Sandy, UT	**Bid Date:**	3/29/2006

REVISED BID DUE TO PLAN CHANGES. Contract amount to be ammended to the following prices.

Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
2 Sewer					
209	48" Manhole Repair	1.00	EACH	$1,080.00	$1,080.00
3 Water					
102	Air Vac	2.00	EACH	$4,300.00	$8,600.00
5 Storm Drain					
443	Catch Basin 42"	1.00	EACH	$1,450.00	$1,450.00
				Total Bid Price:	**$11,130.00**

Notes:

- Price is based solely on drawings, specifications and other contract documents as listed:
  - Plans by Civil Science, dated August, 2005.
  - Soils report by AGEC (#1040659) dated August 24, 2004.
- Information and prices on this proposal supersede any previously submitted and will remain effective for 30 days from the submission date. Any costs related to regrading, as part of adjustments to achieve a balanced site, are not incorporated into this proposal.
- Prices for labor, equipment and materials are guaranteed for 30 days from date of bid, at which time prices are subject to escalation.
- This proposal is bid assuming there is adequate water pressure available at hydrants on the property to satisfy the requirements of our construction effort. Any cost related to addressing inadequate construction water supply would be considered an addition to our proposed amount
- Unless otherwise specified, this bid excludes the following:
  - Engineering, surveying, as-builts, material testing, bonds, permits, fees and taxes.
  - Snow Removal and winter conditions / protection.
  - Hard rock excavating (inability to fill bucket of 45,000 lb excavator more than half full with one pass)
  - Blasting, drilling or boring.
  - Demolition, abandonment or removal of any items not clearly defined on plans.
  - Dry utilities, utility relocation, saw cutting, unknown obstructions/conditions, utility adjustment or relocation, environmental fees, shoring, landscaping, and handling or disposing of hazardous material, dry wells, vacuum testing man-holes, asphalt milling & re-paving and any damage to existing curb and gutter, asphalt or concrete due to normal construction activities.

Payment Terms: All accounts are due and payable a thirty (30) days. Interest rate on past due accounts is 1.5% per month or 18% per year. Purchaser agrees to pay attorney fees in the event this account is placed with an attorney for collection.

ACCEPTED: The above prices, specifications and conditions are satisfactory and hereby accepted. Buyer: _____ Signature: _____ Date of Acceptance: _____	**CONFIRMED:** **Earthmovers, LLC** Authorized Signature: _____ Estimator: Daniel Mills

3/29/2006 4:38:34 PM

EARTH MOVERS
"When Quality Matters Most"

Earthmovers, LLC
4862 South 150 West
Murray, UT 84107
www.earthmovers.biz

T 801-268-8228
F 801-747-0766

To:	Arbor Development	**Contact:**	Cory Gust
Address:	42 West 100th South Sandy, UT	**Phone:**	801-561-8594
		Fax:	801-561-8647
Project Name:	Village At Riverwalk	**Bid Number:**	
Project Location:	10500 South 800 West, Sandy, UT	**Bid Date:**	

REVISED - August 18, 2005

Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
AAdditional Items					
D 5	42" RCP Storm Drain Incldg Trenching, Pipe, Gravel, Backfill	1,484.00	LF	$52.03	$78,132.60 ✓
D 10	42" End Section W/o Grate	1.00	EACH	$1,885.00	$1,885.00 ✓
D 6	Cleanout Box	6.00	EACH	$2,219.17	$13,315.02 ✓
D 11	Import Backfill	585.00	CY	$2.75	$1,608.75 ●
W 8	16" DIP Water	2,200.00	LF	$46.45	$102,190.00
W 10	16" Butterfly Valve	1.00	EACH	$2,304.29	$2,304.29
W 8	2" Blowoff	2.00	EACH	$950.00	$1,900.00
W 9	Misc Fittings	8.00	EACH	$70.00	$560.00
W 11	Import Backfill	630.00	CY	$2.75	$1,732.50
W 12	Pipe Testing	2,200.00	LF	$1.00	$2,200.00
				Total Price for above AAdditional Items Items:	**$205,828.16**
Sewer					
S 1	Connect To Existing Manhole	3.00	EACH	$1,200.00	$3,600.00
S 2	60" Sewer Manhole	11.00	EACH	$2,675.00	$29,425.00
S 3	48" Sewer Manhole	33.00	EACH	$2,150.00	$70,950.00
S 4	8" PVC Sewer Incldg Trenching, Pipe, Gravel, , Backfill	5,300.00	LF	$18.92	$100,276.00
S 5	4" PVC Sewer Incldg Trenching, Pipe, Gravel, Backfill	5,148.00	UNIT	$15.89	$81,801.72
S 6	Connect To Existing Sewer Main	7.00	EACH	$1,200.00	$8,400.00
S 7	Import Backfill	6,560.00	CY	$2.75	$18,040.00
S 8	Pipe Testing	10,446.00	LF	$2.00	$20,896.00
				Total Price for above Sewer Items:	**$333,388.72**
Storm Drain					
D 1	15" RCP Storm Drain Incldg Trenching, Pipe, Gravel, Backfill	1,108.00	LF	$28.90	$32,021.20
D 2	18" RCP Storm Drain Incldg Trenching, Pipe, , Backfill	324.00	LF	$32.62	$10,568.88
D 3	24" RCP Storm Drain Incldg Trenching, Pipe And Backfill	1,452.00	LF	$37.88	$55,001.76
D 4	30" RCP Storm Drain Incldg Trenching, Pipe, Gravel, Backfill	723.00	LF	$46.85	$33,149.55
D 6	Cleanout Box	28.00	EACH	$1,319.17	$36,936.76
D 7	Curb Inlet Box	25.00	EACH	$1,425.00	$35,625.00
D 8	24" End Section W/o Grate	1.00	EACH	$1,025.00	$1,025.00
D 9	30" End Section W/o Grate	1.00	EACH	$1,175.00	$1,175.00
D 12	Storm Drain Box	1.00	EACH	$15,841.50	$15,841.50
				Total Price for above Storm Drain Items:	**$221,344.65**

110,886 .A

EARTH MOVERS
"When Quality Matters Most"

Earthmovers, LLC
4682 South 150 West
Murray, UT 84107
www.earthmovers.biz

T 801-268-8228
F 801-747-0766

To:	Arbor Development	**Contact:**	Cory Gust
Address:	42 West 100th South Sandy, UT	**Phone:** **Fax:**	801-561-8591 801-561-8647
Project Name:	UNC - Riverwalk RFC 05 - Revisions & Irrigation Connections	**Bid Number:**	RFC 05
Project Location:	10500 South 800 West, Sandy, UT	**Bid Date:**	1/11/2006

Request For Change 05

Item #	Item Description	Estimated Quantity	Unit	Unit Price	Total Price
Storm Drain					
401	Storm Drain Backfill 3/4" Rock (as Per City Inspector)	1,082.00	LF	$2.73	$2,953.86
				Total Price for above Storm Drain Items:	**$2,953.86**
Water					
336	Fire Hydrant	2.00	EACH	$3,200.00	$6,400.00
				Total Price for above Water Items:	**$6,400.00**
				Total Bid Price:	**$9,353.86**

Notes:

- This bid is a unit price bid and is based on quantities from Engineer. Payment will be based on actual project quantities. Bid only includes items noted on this bid form. Bid is based on a 40 hour work week with no overtime.
- General Exclusions:
  Unless otherwise specified, No engineering, as-builts, inspection, testing, lane closures, city or state sales tax, bonds, re-bar, embeds, concrete, saw cutting, winter conditions/protection, permits, fees, electrical, telephone & plumbing hook-ups, surveying, demolition, unknown obstructions/conditions, utility adjustment or relocation, rip rap, spoils from other trades, import/export, environmental fees, snow removal, trash, garbage, shoring, excessive rock/hard material (to be defined by inability to fill bucket more than ½ full with each pass, with a 45,000 lb. Excavator). Topsoil and landscaping, and handling or disposing of hazardous material, blasting, drilling, boring, Dry wells, soft material (soil that is unstable or cannot hold its own vertical bank), un-tested fill or water/de-watering, water meters, abandonment of any existing utility lines not defined on plans, televising or hydrovacing of sewer and storm drains, vacuum testing man-holes. All asphalt milling & re-paving. Any damage to existing curb and gutter, asphalt or concrete.
- A. Our price is based solely on drawings, specifications, and other contract documents as listed. 1. Plans by Civil Science, dated August, 2005 7. Soils report by AGEC (#1040659) dated August 24, 2004.
  B. Information and prices on this proposal supersedes any previously submitted; we reserve the right to modify our price and/or terms to reflect adjustments resulting from the continuous review of plans and specifications.
  C. Due to all public agencies intense dust control concerns and/or policies regarding construction sites, it is important that the Client provide some contingency for random traffic. Suggestions might be to fence perimeter of site, berming, or partial fencing with signage. Ultimately, some form of traffic flow must be maintained by Owner and/or Client.
  D. This bid, including any such modifications, shall remain effective and will not be further modified or withdrawn for thirty (30) days from the bid submission date unless: we are notified that our bid was not relied upon for the General's bid, or we are asked to modify our bid, whichever occurs first.
  E. Price will be subject to change after field verification of survey.
  F. With respect to balancing of earth grading operations, Earthmovers LLC., may provide value engineering associated with import or export. The burden of final design to achieve a balanced result and any consequential costs related thereto shall be the responsibility of the owner and/or engineer. If requested Earthmovers LLC., will suggest ideas to achieve this goal, However, Earthmovers LLC., will not assume liability for final design. Any costs related to regrading, as part of adjustments to achieve a balanced site, are not incorporated into this proposal.
  G. Earthmovers LLC., shall not be responsible for the coordination of or the supplying labor, equipment and material necessary to adjust manholes provided by any public utility agency.
  H. This proposal is based solely and specifically on information noted in plans and specifications as listed above.

EARTH MOVERS

TO: **Mike Maddox**

FROM: **Kevin Neff**

DATE: 02/15/06

RE: Additional cost to 42" storm and 16" water line.

Original 16" water as per bid.....$110,886.00

Additions required by the City

Two fire hydrants $6,400.00
Dewatering trench.....$12,125.00
Move spoils from east end of water line.....$2,550.00
Additional fittings and re-route of pipe to crosses w/thrust blocks.....$23,550.00
Import fill material over water main.....$7,242.00
Road cut and tie in main to existing line under Palmer Vista Dr.....$30,850.00

Original 42" RCP as per bid $94,940.00

Additions required by the City

Gravel shading over pipe.....$2,952.00
Import fill material over storm drain.....$6,727.50
Camera storm drain, 1484 feet.....$964.60

TOTAL $ 105,584.00

msn Hotmail

From : Brad Kenison <bkenison@civilscience.com>
Sent : Thursday, February 9, 2006 8:46 PM
To : <arborm@msn.com>
CC : <mikemaddoxbeingpeace@hotmail.com>
Subject : Construction cost estimates for 42" Storm Drain and 16" waterline @ Riverwalk

Mike

On Feb 1, 2006 you called me and indicated that you wanted me to split-out the engineering and construction staking costs for the 42" RCP SD and 16" DIP culinary waterline pipes within the Village @ Riverwalk Subdivision. At that time I indicated to you that it would be nearly impossible to determine an exact number for these by looking into the past billing files. I suggested that a better way to split-up these costs would likely be to determine these design and construction staking costs based on percentages of cost to purchase and install them.

The next day, you indicated that the following costs have been estimated for the construction of these two utility appurtenances:

42" "RCP Storm Drain pipe = $106,500
16" ductile iron waterline = $181,582

Based on these installation costs shown above, I have estimated that the engineering design and construction staking components of these pipelines would be as approximated below:

42" RCP Storm Drain Pipe = 6.5% ($6,922.50)
16" DIP Culinary waterline = 5.25% ($9,533.00)

If you have any questions regarding these approximate costs to engineer and stake the 42" RCP storm drainage and 16" DIP culinary waterlines, please feel free to give me a call.

Thank you,

p.s. Until I know that we have got the "bugs" worked out of my e-mail I will send my e-mails to both of your e-mail accounts, please respond to this e-mail as a verification that you have received it.

Brad Kenison, P.E.

Civil Science, Inc.

3160 W. Clubhouse Drive

Lehi, Ut 84043

(801) 768-7200 ext. 142 (office)

(801) 768-7201 (Facsimile)

(801) 367-4202 (Cellular)

bkenison@civilscience.com

May 11, 2006

Arbor Development
Attn: John Gust
45 West 10000 South, Suite 301
Sandy, UT 84070

Re: The Village at Riverwalk

Dear John,

Last week, City staff reviewed the costs for the 42" storm drain line and 16" waterline as submitted by Arbor Development. Those cost lists have been marked with notes and initialed by myself resolving that the City will pay Arbor $112,349.69 for the 42" storm drain line and $127,097.06 for the 16" waterline (see attachment).

The City has not received the fees or the bond for The Village at Riverwalk development, despite several notices given to Arbor. The Engineering Review Fees pending are $3,721.00 for Mulligan Ridge and $18,617.00 for the remainder of The Village at Riverwalk. The development agreement for Mulligan Ridge at Riverwalk does not waive engineering review fee. These fees will be deducted from the amount owed to Arbor. In regards to the improvement bond, this will be the last and final notice. If the City does not receive the improvement bond for this development in two weeks from the date of this notice, a stop work notice will be issued.

In conjunction with the Arbor/ City cost agreement for the Mulligans parking lot pavement, the City will deduct $16,000 from the amount owed to Arbor for their share of the pavement cost.

In summary, the amount owed to Arbor from the City will be **$201,108.75** ($112,349.69 + $127,097.06 - $3,721.00 - $18,617.00 - $16,000).

If you have any questions please feel free to contact me at your earliest convenience.

Sincerely,

Rick Horst
City Manager

Attachment enclosed

cc: Shane Greenwood

Mayor	William Kent Money
Council Member	Brian C. Butters
Council Member	David W. Colton
Council Member	Bradley G. Marlor
Council Member	Larry Short
Council Member	Leona Winger

SOUTH JORDAN
U T A H

City Manager	Ricky A. Horst
Deputy City Manager	Gary Whatcott
Assistant City Manager, Municipal Services	I. Robert Wall
Director, Operations	Don Bruey
City Engineer/Director, Engineering	Brad Klavano
Director, Community Development	Brian Preece
Director, Strategic Planning & Budgets	Cliff Strachan

MUNICIPAL SERVICES
1600 West Towne Center Drive/ South Jordan, UT 84095/ Telephone (801) 254-3742 / Fax (801) 253-5235
e-mail: info@sjc.utah.gov, www..sjc.utah.gov

Break Down 42" South Jordan City Storm Drain

Footage	Unit	Description	Price	Total	
1484	LF	RCP 42" Pipe	$ 52.65	$ 78,132.60	
1484	LF	3/4 Rock In Pipe Zone	$ 1.99	$ 2,952.42	
1484	LF	Camera Pipe	$ 0.65	$ 964.60	
585	CY	Import Backfill Materials (Road Way Only)	$ 11.50	$ 6,727.50	OK
585	CY	Placement Imported Backfill	$ 2.75	$ 1,608.75	NO
6	EA	Clean Out Boxes	$ 2,219.17	$ 13,315.02	
1	EA	Clean Out Boxe (Lori Vance Property)	$ 1,450.00	$ 1,450.00	OK
1	EA	42" End Section	$ 1,885.00	$ 1,885.00	
1	EA	Civil Science Engineering & Staking	$ 6,922.55	$ 6,922.55	OK
		Sub Total		**$ 113,958.44**	
3%	1	Management & Accounting Fee		$ 3,418.75	NO
		Total Due		$ 117,377.19	

- 1608.75
- 3,418.75

112,349.69

Highligted were not apart of the orginal scope of work

Original Bid	$ 106,227.37
Costs	$(117,377.19)
Difference	$ (11,149.82)

DB 5/5/06

Break Down 16" Water Line South Jordan Water Line

Footage	Unit	Description	Price	Total
482	LF	Upgraded Water Line 8"C 900 to 16" DIP	$ 21.69	$ 10,454.58 ✓
1718 x 21.69	LF	16 DIP	$ 46.45	$ 79,801.10 ✓
2	EA	Upgrade Bend From 8" to 16"	$ 800.00	$ 1,600.00 ✓
2	EA	Bends 16" Inc Thrust Blocks	$ 1,200.00	$ 2,400.00 ✓
1	EA	16" X 8" MJ Cross	$ 1,287.95	~~4,287.95~~ ✓
1	EA	16" X 8" DI Flang Cross	$ 2,368.75	~~2,368.75~~ ✓
1	EA	Fire Hyrdant & Assembly 16 X 10 Reducer 6" Gate Valve	$ 5,176.29	$ 5,176.29 1/2 2,588.14
1		10 to 6 Reducer, 18 X 6 Spool, 6" MJ Adapter		$ -
2	EA	16" Valves	$ 2,304.29	$ ~~4,608.58~~ 1 valve on Org Bid
1	Unit	Dewatering Wet Lands	$ 12,125.00	$ 12,125.00 ✓
1	Unit	Move Spoils From Wet Lands	$ 2,550.00	$ 2,550.00 NO
1	Unit	630 Cubic Yards of Engineered Fill For Wet Lands	$ 7,242.00	$ 7,242.00 ✓
1	Unit	630 Cubic Yards Placed Fill For Wet Lands	$ 1,732.50	$ 1,732.50 ✓
2200	LF	Pipe Testing	$ 1.00	$ ~~2,200.00~~ 1718.00
1	Unit	Civil Science Design & Staking % 78	$ 9,533.00	$ 9,533.00 7,435.74
		Sub Total		**$ 143,079.75**
3%	1	Management & Accounting Fee		$ 4,292.39
		Total Due		$ 147,372.14

127,097.06

~~124,506.9~~

Original Bid	$	110,886.37
Costs	$	(147,372.14)
Difference	$	(36,485.77)

21.45

46.45 25.00

2200 Lf @ 21.45 = 47,190

46.17%

482
1718
2200

-16,220

October 26, 2005

Arbor Residential
Attn: Chris Drent
45 West 10000 South Suite 301
Sandy, UT 84070

RE: The Village at Riverwalk Subdivision

The following amount is due the City of South Jordan for engineering review fees, and storm drainage facilities for The Village at Riverwalk Subdivision, located at approximately 10100 South 770 West. Consisting of 10 units and 5.17 acres.

Engineering Review Fees, $1,061 + $266 per lot	$ 3,721.00
Storm Drain Facilities @ $1,433 per acre	~~$ 7,408.61~~ Waived per Rick 3/16/06
Total Due	**$ ~~11,129.61~~**

Sincerely,

Shane Greenwood
Senior Engineer

cc: File

Mayor-William Kent Money
Council Member-David Colton
Council Member-Ann Gayheart
Council Member-Bradley G. Marlor
Council Member-Mary Wenner
Council Member-Leona Winger

City Manager-Ricky A. Horst

SOUTH JORDAN
U T A H
"Life Just off the Fast Lane"

1600 West Towne Center Drive / South Jordan, UT 84095-8265 / Telephone (801) 254-3742/ Fax (801) 254-5235
e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

October 26, 2005

Arbor Residential
Attn: Chris Drent
45 West 10000 South Suite 301
Sandy, UT 84070

RE: The Village at Riverwalk Subdivision

The following amount is due the City of South Jordan for engineering review fees, and storm drainage facilities for The Village at Riverwalk Subdivision, located at approximately 10100 South 770 West. Consisting of 66 units and 44.56 acres.

Engineering Review Fees, $1,061 + $266 per lot	$ 18,617.00
Storm Drain Facilities @ $1,433 per acre	~~$ 63,854.48~~ Waived per Rick 3/16/06
Total Due	**~~$ 82,471.48~~**

Sincerely,

Shane Greenwood
Senior Engineer

cc: File

Mayor-William Kent Money
Council Member-David Colton
Council Member-Ann Gayheart
Council Member-Bradley G. Marlor
Council Member-Mary Wenner
Council Member-Leona Winger

City Manager-Ricky A Horst

SOUTH JORDAN
UTAH
"Life Just off the Fast Lane"

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e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

EXHIBIT _____

SOUTH JORDAN CITY
BOND ESTIMATES

Date Prepared:	OCTOBER 31,2005
Prepared By:	SHANE GREENWOOD
Prepared For:	VILLAGE AT RIVERWALK
Number of Lots	76
Total Acreage:	49.73

Site Address:	10100 SOUTH 770 WEST, SOUTH JORDAN
Developer:	ARBOR RESIDENTIAL
Address:	45 WEST 10000 SOUTH, SUITE 301, SANDY UTAH 84070
Phone #:	(801) 561-8594

Fee Zone:

Street Lights: 42

DESCRIPTION	UNIT of MEASUREMENT	QUANTITY	UNIT PRICE	TOTAL PRICE	BOND RELEASE	PREVIOUS RELEASES
WATER SYSTEM						
16" Water Main	LF	2200.00	$45.00	$99,000.00	$0.00	$0.00
12" Water Main	LF	0.00	$35.00	$0.00	$0.00	$0.00
10" Water Main	LF	0.00	$30.00	$0.00	$0.00	$0.00
8" Water Main	LF	7,400.00	$20.00	$148,000.00	$0.00	$0.00
14" Water Main	LF	0.00	$40.00	$0.00	$0.00	$0.00
24" Water Main	LF	0.00	$80.00	$0.00	$0.00	$0.00
16" Butterfly Valve	EA	2.00	$2,200.00	$4,400.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,200.00	$0.00	$0.00	$0.00
8" Valve	EA	25.00	$830.00	$20,750.00	$0.00	$0.00
14" Valve	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
24" Valve	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Fire Hydrant	EA	17.00	$2,500.00	$42,500.00	$0.00	$0.00
Blowoff Assembly	EA	3.00	$950.00	$2,850.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Service Connections	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Sample Stations	EA	0.00	$500.00	$0.00	$0.00	$0.00
PRV Station	EA	0.00	$28,000.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Connect to Existing System (Hot Tap)	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Meter Box	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				*$39,350.00*		
WATER SYSTEM SUB-TOTAL				**$432,850.00**	**$0.00**	**$0.00**

ROAD WORK						
Excavation	CY	11,498.00	$4.00	$45,992.00	$0.00	$0.00
Road Export	CY	0.00	$10.00	$0.00	$0.00	$0.00
Road Import/Fill	CY	4,562.00	$12.00	$54,744.00	$0.00	$0.00
Granular Fill	SQ FT	0.00	$0.55	$0.00	$0.00	$0.00
6" Road Base	SQ FT	290,440.00	$0.50	$145,220.00	$0.00	$0.00
4" Road Base	SQ FT	60,000.00	$0.30	$18,000.00	$0.00	$0.00
Curb and Gutter	LF	18,580.00	$12.00	$222,960.00	$0.00	$0.00
Waterway	LF	885.00	$28.00	$24,780.00	$0.00	$0.00
Sidewalk	SQFT	56,250.00	$2.50	$140,625.00	$0.00	$0.00
4' Sidewalk w/Road Base	LF	0.00	$11.00	$0.00	$0.00	$0.00
5' Sidewalk w/Road Base	LF	0.00	$12.00	$0.00	$0.00	$0.00
3" Asphalt	SQ FT	248,276.00	$1.00	$248,276.00	$0.00	$0.00
4" Asphalt	SQ FT	0.00	$1.35	$0.00	$0.00	$0.00
3" Asphalt with Roadbase	SQ FT	0.00	$1.50	$0.00	$0.00	$0.00
Subdivision Street Light	EA	42.00	$2,000.00	$84,000.00	$0.00	$0.00
Collector Street Light 71' R/W	EA	0.00	$3,300.00	$0.00	$0.00	$0.00
Collector Street Light 85'-111' R/W	EA	0.00	$3,800.00	$0.00	$0.00	$0.00
Temporary Access	SF	0.00	$1.50	$0.00	$0.00	$0.00
Temporary Turnaround	SF	0.00	$1.50	$0.00	$0.00	$0.00
Asphalt Cutting	LF	0.00	$0.95	$0.00	$0.00	$0.00
Handicap Ramp	EA	31.00	$200.00	$6,200.00	$0.00	$0.00
Traffic Circle	EA	0.00	$10,000.00	$0.00	$0.00	$0.00
Striping	LF	0.00	$0.81	$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				*$99,079.70*		
ROAD WORK SUB-TOTAL				**$1,089,876.70**	**$0.00**	**$0.00**

STORM DRAINAGE						
42" RCP	LF	1,475.00	$60.00	$88,500.00	$0.00	$0.00
36" RCP	LF	0.00	$55.00	$0.00	$0.00	$0.00
30" RCP	LF	875.00	$50.00	$43,750.00	$0.00	$0.00
24"RCP,import granular backfill	LF	1,950.00	$40.00	$78,000.00	$0.00	$0.00
21" RCP	LF	0.00	$38.00	$0.00	$0.00	$0.00
18" RCP,import granular backfill	LF	1,200.00	$36.00	$43,200.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
12" RCP	LF	0.00	$30.00	$0.00	$0.00	$0.00
TV Storm Drain Line	LF	5,500.00	$1.00	$5,500.00	$0.00	$0.00
Inlet Box	EA	40.00	$1,500.00	$60,000.00	$0.00	$0.00
Cleanout Box	EA	28.00	$1,900.00	$53,200.00	$0.00	$0.00
Combination Box	EA	0.00	$2,700.00	$0.00	$0.00	$0.00
Energy Disipator Box	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
4' x 8' Storm Drain Vault	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Retention Pond Landscaping	SQ FT	98,010.00	$1.75	$171,517.50	$0.00	$0.00
Retention Basin	CY	6,037.00	$4.00	$24,148.00	$0.00	$0.00
Oil/Water Separator	EA	0.00	$175.00	$0.00	$0.00	$0.00
Grease Trap	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Underdrain 8"	LF	0.00	$12.00	$0.00	$0.00	$0.00
Manhole	EA	0.00	$2,500.00	$0.00	$0.00	$0.00
Side and Backyard Drainage Swale	LF	0.00	$12.00	$0.00	$0.00	$0.00
Rip Rap Channel	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Berm	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$56,781.55*		
STORM DRAINAGE SUB-TOTAL				**$624,597.05**	**$0.00**	**$0.00**

SECONDARY WATER SYSTEM						
8" Main Line	LF	0.00	$20.00	$0.00	$0.00	$0.00
8" Valve	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Drain Assembly	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
12" PVC Waterline (Irrigation)	LF	0.00	$26.00	$0.00	$0.00	$0.00
10" PVC Waterline (Irrigation)	LF	0.00	$24.00	$0.00	$0.00	$0.00
16" Valve	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,150.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
SECONDARY WATER SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

IRRIGATION SYSTEM						
18" RCP,import granular backfill	LF	0.00	$36.00	$0.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
Clean Out Box	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
Head Wall	EA	0.00	$800.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
IRRIGATION SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FENCE AND LANDSCAPE						
Six Foot Chain Link	LF	2,950.00	$12.00	$35,400.00	$0.00	$0.00
Six Foot Vinyl Fence	LF	1,475.00	$30.00	$44,250.00	$0.00	$0.00
Six Foot Block Wall	LF	1,650.00	$60.00	$99,000.00	$0.00	$0.00
Six Foot Concrete Panel Fence	LF	3,700.00	$60.00	$222,000.00	$0.00	$0.00
Collector Street Fencing	LF	0.00	$75.00	$0.00	$0.00	$0.00
Parkstrip Improvements	SQFT	19,780.00	$2.25	$44,505.00	$0.00	$0.00
Landscaping Tree/Irrigation/Sod	LF	0.00	$10.00	$0.00	$0.00	$0.00
Stamped Concrete	SQFT	4,725.00	$8.00	$37,800.00	$0.00	$0.00
Dyed Concrete	LF	0.00	$9.00	$0.00	$0.00	$0.00
Parkstrip Trees	EA	100.00	$300.00	$30,000.00	$0.00	$0.00
Anti-graffiti seal for concrete walls	LF	3,700.00	$2.00	$7,400.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$52,035.50*		
FENCING SUB-TOTAL				**$572,390.50**	**$0.00**	**$0.00**

PARKS AND TRAILS						
Sod & Sprinkler	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Trail Regrind	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Asphalt Trail	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Tot Lot	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Parking	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Fencing	LF	0.00	$10.00	$0.00	$0.00	$0.00
Trail Improvements	SQFT	0.00	$1.50	$0.00	$0.00	$0.00
Pedestrian Path w/Fence	LF	0.00	$30.00	$0.00	$0.00	$0.00
Playground/Park Amenities	LS	0.00	$50,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				$0.00	$0.00	$0.00
PARKS AND TRAILS SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FINISH ITEMS						
Meter Boxes	EA	76.00	$120.00	$9,120.00	$0.00	$0.00
Concrete Pad, Valves & Hydrants	EA	44.00	$175.00	$7,700.00	$0.00	$0.00
Secondary Service Risers	EA	0.00	$300.00	$0.00	$0.00	$0.00
Storm Drain Inlet Grate	EA	40.00	$300.00	$12,000.00	$0.00	$0.00
Raise Manhole	EA	28.00	$400.00	$11,200.00	$0.00	$0.00
Street Signs	EA	21.00	$200.00	$4,200.00	$0.00	$0.00
Survey Monuments	EA	0.00	$300.00	$0.00	$0.00	$0.00
Electronic Format of As-builts (.dxf)	EA	1.00	$500.00	$500.00	$0.00	$0.00
As-built Drawings (Mylar)	EA	2.00	$1,000.00	$2,000.00	$0.00	$0.00
Relocate Utility Underground	LF	0.00	$120.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				$4,672.00		
FINISH ITEMS SUB-TOTAL				**$51,392.00**	**$0.00**	**$0.00**

PROJECT SUB-TOTAL	$2,771,106.25
2" MILL & OVERLAY RETENTION THROUGH WARRENTY PERIOD	$99,310.40
TOTAL PROJECT BONDING AMOUNT	**$2,870,416.65**
TOTAL AMOUNT THIS BOND RELEASE	$0.00
AMOUNT REMAINING	$2,870,416.65

***NOTE TO DEVELOPER**

The Unit Prices, Quantities, Sub-Totals, Bond Release amounts and Project Total on this Document are ESTIMATES ONLY and are intended only to establish the Bond Amount as set forth in the Bond Agreement of which this document is an exhibit. The estimates shall not limit Developer's financial responsibility to fully complete and warrant all Improvements as required by South Jordan City ordinances and the Bond Agreement. The Developer shall be obligated to compensate the City for all costs, including incidental costs, related to the completion and warranty of the Improvements should the Bond Amount provided to the City, for whatever reason be inadequate.

May 11, 2006

Arbor Development
Attn: John Gust
45 West 10000 South, Suite 301
Sandy, UT 84070

Re: The Village at Riverwalk

Dear John,

Last week, City staff reviewed the costs for the 42" storm drain line and 16" waterline as submitted by Arbor Development. Those cost lists have been marked with notes and initialed by myself resolving that the City will pay Arbor $112,349.69 for the 42" storm drain line and $127,097.06 for the 16" waterline (see attachment). It would appear that a few small items where needed to meet Arbor's obligation and therefore have been discounted from the reimbursement.

Additionally, it has been brought to my attention that the City has not received the fees or the bond for The Village at Riverwalk development. The Engineering Review Fees pending are $3,721.00 for Mulligan Ridge and $18,617.00 for the remainder of The Village at Riverwalk. As related storm fees have been waived as it has been determined that the "project" does not impact the city's infrastructure. It is our opinion that the engineering review fees related to the development agreement for Mulligan Ridge at Riverwalk do require that Arbor pay the related engineering review fee. We have determined that these fees will be deducted from the amount owed to Arbor.

In regards to the improvement bond, if the City does not receive the improvement bond for this development in two weeks from the date of this notice, by necessity a stop work notice will be issued.

In conjunction with the Arbor/ City cost agreement for the Mulligans parking lot pavement, the City will deduct $16,000 from the amount owed to Arbor for their share of the pavement cost.

In summary, the amount owed to Arbor from the City will be **$201,108.75** ($112,349.69 + $127,097.06 - $3,721.00 - $18,617.00 - $16,000).

Sincerely,

Rick Horst
City Manager

Attachment enclosed

cc: Gary Whatcott, D.C.M
Shane Greenwood, Project Engineer
Dean Lundell, City Treasurer
File

Mayor	William Kent Money	City Manager	Ricky A. Horst
Council Member	Brian C. Butters	Deputy City Manager	Gary Whatcott
Council Member	David W. Colton	Assistant City Manager, Municipal Services	I. Robert Wall
Council Member	Bradley G. Marlor	Director, Operations	Don Bruey
Council Member	Larry Short	City Engineer/Director, Engineering	Brad Klavano
Council Member	Leona Winger	Director, Community Development	Brian Preece
		Director, Strategic Planning & Budgets	Cliff Strachan

SOUTH JORDAN
U T A H

MUNICIPAL SERVICES
1600 West Towne Center Drive/ South Jordan, UT 84095/ Telephone (801) 254-3742 / Fax (801) 253-5235
e-mail: info@sjc.utah.gov, www..sjc.utah.gov

Break Down 42" South Jordan City Storm Drain

Footage	Unit	Description	Price	Total	
1484	LF	RCP 42" Pipe	$ 52.65	$ 78,132.60	
1484	LF	3/4 Rock In Pipe Zone	$ 1.99	$ 2,952.42	
1484	LF	Camera Pipe	$ 0.65	$ 964.60	
585	CY	Import Backfill Materials (Road Way Only)	$ 11.50	$ 6,727.50	OK
585	CY	Placement Imported Backfill	$ 2.75	$ 1,608.75	NO
6	EA	Clean Out Boxes	$ 2,219.17	$ 13,315.02	
1	EA	Clean Out Boxe (Lori Vance Property)	$ 1,450.00	$ 1,450.00	OK
1	EA	42" End Section	$ 1,885.00	$ 1,885.00	
1	EA	Civil Science Engineering & Staking	$ 6,922.55	$ 6,922.55	OK
		Sub Total		**$ 113,958.44**	
3%	1	Management & Accounting Fee		$ 3,418.75	NO
		Total Due		$ 117,377.19	

- 1608.75
- 3,418.75

12,347.69

Highligted were not apart of the orginal scope of work

Original Bid	$ 106,227.37
Costs	$(117,377.19)
Difference	$ (11,149.82)

DB 5/5/06

Break Down 16" Water Line South Jordan Water Line

Footage	Unit	Description	Price	Total
482	LF	Upgraded Water Line 8"C 900 to 16" DIP	$ 21.69	$ 10,454.58
1718 x 21.69	LF	16 DIP	$ 46.45	$ 79,801.10
2	EA	Upgrade Bend From 8" to 16"	$ 800.00	$ 1,600.00
2	EA	Bends 16" Inc Thrust Blocks	$ 1,200.00	$ 2,400.00
1	EA	16" X 8" MJ Cross	$ 1,287.95	~~4,287.95~~
1	EA	16" X 8" DI Flang Cross	$ 2,368.75	~~2,368.75~~
1	EA	Fire Hyrdant & Assembly 16 X 10 Reducer 6" Gate Valve	$ 5,176.29	$ 5,176.29 ½ 2,588.14
		10 to 6 Reducer, 18 X 6 Spool, 6" MJ Adapter		$ -
2	EA	16" Valves	$ 2,304.29	~~4,608.58~~ 1 valve on Orig Bid
1	Unit	Dewatering Wet Lands	$ 12,125.00	$ 12,125.00
1	Unit	Move Spoils From Wet Lands	$ 2,550.00	$ 2,550.00 NO
1	Unit	630 Cubic Yards of Engineered Fill For Wet Lands	$ 7,242.00	$ 7,242.00
1	Unit	630 Cubic Yards Placed Fill For Wet Lands	$ 1,732.50	$ 1,732.50
2200	LF	Pipe Testing	$ 1.00	~~2,200.00~~ 1718.00
1	Unit	Civil Science Design & Staking % 78	$ 9,533.00	$ 9,533.00 7,435.74
		Sub Total		$ 143,079.75
3%	1	Management & Accounting Fee		$ 4,292.39
		Total Due		$ 147,372.14

127,097.06

~~124,506.9~~

Original Bid	$ 110,886.37
Costs	$ (147,372.14)
Difference	$ (36,485.77)

21.45

46.45 25.00

2200 lf @ 21.45 = 47,190

46.17%

482
1718
2200

-16,000

October 26, 2005

Arbor Residential
Attn: Chris Drent
45 West 10000 South Suite 301
Sandy, UT 84070

RE: The Village at Riverwalk Subdivision

The following amount is due the City of South Jordan for engineering review fees, and storm drainage facilities for The Village at Riverwalk Subdivision, located at approximately 10100 South 770 West. Consisting of 10 units and 5.17 acres.

Engineering Review Fees, $1,061 + $266 per lot	$ 3,721.00
Storm Drain Facilities @ $1,433 per acre	~~$ 7,408.61~~ Waived per Rick 3/16/06
Total Due	**~~$ 11,129.61~~**

Sincerely,

Shane Greenwood
Senior Engineer

cc: File

Mayor-William Kent Money
Council Member-David Colton
Council Member-Ann Gayheart
Council Member-Bradley G. Marsh
Council Member-Mary Wenner
Council Member-Leona Winger

SOUTH JORDAN
C I T Y

City Manager-Ricky A. Horst

1600 West Towne Center Drive / South Jordan, UT 84095-8265 / Telephone (801) 254-3742 / Fax (801) 254-5235
e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

October 26, 2005

Arbor Residential
Attn: Chris Drent
45 West 10000 South Suite 301
Sandy, UT 84070

RE: The Village at Riverwalk Subdivision

The following amount is due the City of South Jordan for engineering review fees, and storm drainage facilities for The Village at Riverwalk Subdivision, located at approximately 10100 South 770 West. Consisting of 66 units and 44.56 acres.

Engineering Review Fees, $1,061 + $266 per lot	$ 18,617.00
Storm Drain Facilities @ $1,433 per acre	$ ~~63,854.48~~ Waived per Rick 3/16/06
Total Due	**$ ~~82,471.48~~**

Sincerely,

Shane Greenwood
Senior Engineer

cc: File

Mayor William Kent Money
Council Member-David Cotton
Council Member-Ann Gayheart
Council Member-Bradley G. Marlor
Council Member-Mary Wenner
Council Member-Leona Winger

SOUTH JORDAN
U T A H

City Manager Ricky A. Horst

1600 West Towne Center Drive • South Jordan, UT 84095-8265 / Telephone (801) 254-3742 / Fax (801) 254-5235
e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

EXHIBIT _____

SOUTH JORDAN CITY
BOND ESTIMATES

Date Prepared:	OCTOBER 31,2005
Prepared By:	SHANE GREENWOOD
Prepared For:	VILLAGE AT RIVERWALK
Number of Lots	76
Total Acreage:	49.73

Site Address:	10100 SOUTH 770 WEST, SOUTH JORDAN
Developer:	ARBOR RESIDENTIAL
Address:	45 WEST 10000 SOUTH, SUITE 301, SANDY UTAH 84070
Phone #:	(801) 561-5594

Fee Zone:

Street Lights: 42

DESCRIPTION	UNIT of MEASUREMENT	QUANTITY	UNIT PRICE	TOTAL PRICE	BOND RELEASE	PREVIOUS RELEASES
WATER SYSTEM						
16" Water Main	LF	2200.00	$45.00	$99,000.00	$0.00	$0.00
12" Water Main	LF	0.00	$25.00	$0.00	$0.00	$0.00
10" Water Main	LF	0.00	$30.00	$0.00	$0.00	$0.00
8" Water Main	LF	7,400.00	$20.00	$148,000.00	$0.00	$0.00
14" Water Main	LF	0.00	$40.00	$0.00	$0.00	$0.00
24" Water Main	LF	0.00	$80.00	$0.00	$0.00	$0.00
16" Butterfly Valve	EA	2.00	$2,200.00	$4,400.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,200.00	$0.00	$0.00	$0.00
8" Valve	EA	25.00	$830.00	$20,750.00	$0.00	$0.00
14" Valve	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
24" Valve	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Fire Hydrant	EA	17.00	$2,500.00	$42,500.00	$0.00	$0.00
Blowoff Assembly	EA	3.00	$950.00	$2,850.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Service Connections	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Sample Stations	EA	0.00	$500.00	$0.00	$0.00	$0.00
PRV Station	EA	0.00	$28,000.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Connect to Existing System (Hot Tap)	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Meter Box	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				$39,350.00		
WATER SYSTEM SUB-TOTAL				$432,850.00	$0.00	$0.00
ROAD WORK						
Excavation	CY	11,498.00	$4.00	$45,992.00	$0.00	$0.00
Road Export	CY	0.00	$10.00	$0.00	$0.00	$0.00
Road Import/Fill	CY	4,562.00	$12.00	$54,744.00	$0.00	$0.00
Granular Fill	SQ FT	0.00	$0.55	$0.00	$0.00	$0.00
6" Road Base	SQ FT	290,442.00	$0.50	$145,220.00	$0.00	$0.00
4" Road Base	SQ FT	60,000.00	$0.30	$18,000.00	$0.00	$0.00
Curb and Gutter	LF	18,580.00	$12.00	$222,960.00	$0.00	$0.00
Waterway	LF	885.00	$28.00	$24,780.00	$0.00	$0.00
Sidewalk	SQFT	56,250.00	$2.50	$140,625.00	$0.00	$0.00
4' Sidewalk w/Road Base	LF	0.00	$11.00	$0.00	$0.00	$0.00
5' Sidewalk w/Road Base	LF	0.00	$12.00	$0.00	$0.00	$0.00
3" Asphalt	SQ FT	248,276.00	$1.00	$248,276.00	$0.00	$0.00
4" Asphalt	SQ FT	0.00	$1.25	$0.00	$0.00	$0.00
3" Asphalt with Roadbase	SQ FT	0.00	$1.50	$0.00	$0.00	$0.00
Subdivision Street Light	EA	42.00	$2,000.00	$84,000.00	$0.00	$0.00
Collector Street Light 71' R/W	EA	0.00	$3,300.00	$0.00	$0.00	$0.00
Collector Street Light 85'-111' R/W	EA	0.00	$3,800.00	$0.00	$0.00	$0.00
Temporary Access	SF	0.00	$1.50	$0.00	$0.00	$0.00
Temporary Turnaround	SF	0.00	$1.50	$0.00	$0.00	$0.00
Asphalt Cutting	LF	0.00	$0.95	$0.00	$0.00	$0.00
Handicap Ramp	EA	31.00	$200.00	$6,200.00	$0.00	$0.00
Traffic Circle	EA	0.00	$10,000.00	$0.00	$0.00	$0.00
Striping	LF	0.00	$0.81	$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				$99,079.70		
ROAD WORK SUB-TOTAL				$1,089,876.70	$0.00	$0.00

STORM DRAINAGE

24" RCP	LF	1,475.00	$60.00	$88,500.00	$0.00	$0.00
36" RCP	LF	0.00	$55.00	$0.00	$0.00	$0.00
30" RCP	LF	875.00	$50.00	$43,750.00	$0.00	$0.00
24"RCP,import granular backfill	LF	1,950.00	$40.00	$78,000.00	$0.00	$0.00
21" RCP	LF	0.00	$38.00	$0.00	$0.00	$0.00
18" RCP,import granular backfill	LF	1,250.00	$35.00	$43,800.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
12" RCP	LF	0.00	$30.00	$0.00	$0.00	$0.00
TV Storm Drain Line	LF	5,500.00	$1.00	$5,500.00	$0.00	$0.00
Inlet Box	EA	40.00	$1,500.00	$60,000.00	$0.00	$0.00
Cleanout Box	EA	28.00	$1,900.00	$53,200.00	$0.00	$0.00
Combination Box	EA	0.00	$2,700.00	$0.00	$0.00	$0.00
Energy Dissipator Box	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
4' x 8' Storm Drain Vault	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Retention Pond Landscaping	SQ FT	98,010.00	$1.75	$171,517.50	$0.00	$0.00
Retention Basin	CY	6,037.00	$4.00	$24,148.00	$0.00	$0.00
Oil/Water Separator	EA	0.00	$175.00	$0.00	$0.00	$0.00
Grease Trap	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Underdrain 8"	LF	0.00	$12.00	$0.00	$0.00	$0.00
Manhole	EA	0.00	$2,500.00	$0.00	$0.00	$0.00
Side and Backyard Drainage Swale	LF	0.00	$12.00	$0.00	$0.00	$0.00
Rip Rap Channel	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Berm	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				$56,781.35		
STORM DRAINAGE SUB-TOTAL				**$624,597.85**	**$0.00**	**$0.00**

SECONDARY WATER SYSTEM

8" Main Line	LF	0.00	$20.00	$0.00	$0.00	$0.00
8" Valve	EA	0.00	$1,600.00	$0.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Drain Assembly	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
12" PVC Waterline (Irrigation)	LF	0.00	$26.00	$0.00	$0.00	$0.00
10" PVC Waterline (Irrigation)	LF	0.00	$24.00	$0.00	$0.00	$0.00
16" Valve	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,150.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				$0.00		
SECONDARY WATER SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

IRRIGATION SYSTEM

18" RCP,import granular backfill	LF	0.00	$36.00	$0.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
Clean Out Box	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
Head Wall	EA	0.00	$800.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				$0.00		
IRRIGATION SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FENCE AND LANDSCAPE

Six Foot Chain Link	LF	2,950.00	$12.00	$35,400.00	$0.00	$0.00
Six Foot Vinyl Fence	LF	1,475.00	$30.00	$44,250.00	$0.00	$0.00
Six Foot Block Wall	LF	1,650.00	$60.00	$99,000.00	$0.00	$0.00
Six Foot Concrete Panel Fence	LF	3,700.00	$60.00	$222,000.00	$0.00	$0.00
Collector Street Fencing	LF	0.00	$75.00	$0.00	$0.00	$0.00
Parkstrip Improvements	SQFT	19,780.00	$2.25	$44,505.00	$0.00	$0.00
Landscaping Tree/Irrigation/Sod	LF	0.00	$10.00	$0.00	$0.00	$0.00
Stamped Concrete	SQFT	4,725.00	$8.00	$37,800.00	$0.00	$0.00
Dyed Concrete	LF	0.00	$9.00	$0.00	$0.00	$0.00
Parkstrip Trees	EA	100.00	$300.00	$30,000.00	$0.00	$0.00
Anti graffiti seal for concrete walls	LF	3,700.00	$2.00	$7,400.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				$52,935.50		
FENCING SUB-TOTAL				**$572,390.50**	**$0.00**	**$0.00**

PARKS AND TRAILS						
Sod & Sprinkler	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Trail Regrind	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Asphalt Trail	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Tot Lot	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Parking	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Fencing	LF	0.00	$10.00	$0.00	$0.00	$0.00
Trail Improvements	SQFT	0.00	$1.50	$0.00	$0.00	$0.00
Pedestrian Path w/Fence	LF	0.00	$30.00	$0.00	$0.00	$0.00
Playground/Park Amenities	LS	0.00	$50,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
PARKS AND TRAILS SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FINISH ITEMS						
Meter Boxes	EA	76.00	$120.00	$9,120.00	$0.00	$0.00
Concrete Pad, Valves & Hydrants	EA	44.00	$175.00	$7,700.00	$0.00	$0.00
Secondary Service Risers	EA	0.00	$300.00	$0.00	$0.00	$0.00
Storm Drain Inlet Grate	EA	40.00	$300.00	$12,000.00	$0.00	$0.00
Raise Manhole	EA	28.00	$400.00	$11,200.00	$0.00	$0.00
Street Signs	EA	21.00	$200.00	$4,200.00	$0.00	$0.00
Survey Monuments	EA	0.00	$300.00	$0.00	$0.00	$0.00
Electronic Format of As-builts (.dxf)	EA	1.00	$500.00	$500.00	$0.00	$0.00
As-built Drawings (Mylar)	EA	2.00	$1,000.00	$2,000.00	$0.00	$0.00
Relocate Utility Underground	LF	0.00	$120.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$4,672.00*		
FINISH ITEMS SUB-TOTAL				**$51,392.00**	**$0.00**	**$0.00**

PROJECT SUB-TOTAL	$2,771,166.25
2" MILL & OVERLAY RETENTION THROUGH WARRENTY PERIOD	$99,250.40
TOTAL PROJECT BONDING AMOUNT	**$2,870,416.65**

TOTAL AMOUNT THIS BOND RELEASE	$0.00
AMOUNT REMAINING	$2,870,416.65

***NOTE TO DEVELOPER**

The Unit Prices, Quantities, Sub-Totals, Bond Release amounts and Project Total on this Document are ESTIMATES ONLY and are intended only to establish the Bond Amount as set forth in the Bond Agreement of which this document is an exhibit. The estimates shall not limit Developer's financial responsibility to fully complete and warrant all Improvements as required by South Jordan City ordinances and the Bond Agreement. The Developer shall be obligated to compensate the City for all costs, including incidental costs, related to the completion and warranty of the Improvements should the Bond Amount provided to the City, for whatever reason be inadequate.

March 31, 2006

Arbor Development
Attn: John Gust
45 West 10000 South, Suite 301
Sandy, UT 84070

Re: The Village at Riverwalk

Dear John,

Several months ago I forwarded to Arbor a copy of the development fees and bond estimate for The Village at Riverwalk development. This letter is to inform you that the City has not yet received the fees or the bond for that development. City policy states the fees and bond must be paid prior to recording the subdivision plat. Obviously the City relaxed on that policy for this development since the contractor had started several months ago and the City has not received all required fees and bonds. We both understand that The Village at Riverwalk is a unique project in that the development started with the City then transferred to Arbor Development.

The City has been very cooperative with Arbor in many aspects of the project such as easement acquisitions, accelerated development approvals, cost sharing of certain utilities, and certain fees waived. I have made several attempts in the last several months to collect on the fees and bond but each time responded back with "Rick and John almost have it worked out". I have spoken to Rick several weeks ago and he states that there is no outstanding items to be negotiated.

I have attached a copy of the bond estimate and the fee letter for your reference. Rick has waived the Storm Drain Fee. Please provide payment of the Engineering Review fee and the Improvement Bond in any of the four bond types (Cash, Escrow Deposit, Surety, or Letter of Credit) within two weeks.

If you have any questions please feel free to contact me at your earliest convenience.

Sincerely,

Shane Greenwood
Senior Engineer

Attachment enclosed

cc: Rick Horst

Mayor	William Kent Money
Council Member	Brian C. Butters
Council Member	David W. Colton
Council Member	Bradley G. Marlor
Council Member	Larry Short
Council Member	Leona Winger

SOUTH JORDAN
U T A H

City Manager	Ricky A. Horst
Deputy City Manager	Gary Whatcott
Assistant City Manager, Municipal Services	I. Robert Wall
Director, Operations	Don Bruey
City Engineer/Director, Engineering	Brad Klavano
Director, Community Development	Brian Preece
Director, Strategic Planning & Budgets	Cliff Strachan

MUNICIPAL SERVICES
1600 West Towne Center Drive/ South Jordan, UT 84095/ Telephone (801) 254-3742 / Fax (801) 253-5235
e-mail: info@sjc.utah.gov, www..sjc.utah.gov

October 26, 2005

Arbor Residential
Attn: Chris Drent
45 West 10000 South Suite 301
Sandy, UT 84070

RE: The Village at Riverwalk Subdivision

The following amount is due the City of South Jordan for engineering review fees, and storm drainage facilities for The Village at Riverwalk Subdivision, located at approximately 10100 South 770 West. Consisting of 10 units and 5.17 acres.

Engineering Review Fees, $1,061 + $266 per lot	$ 3,721.00
Storm Drain Facilities @ $1,433 per acre	~~$ 7,408.61~~ Waived per Rick 3/16/06
Total Due	**$ ~~11,129.61~~**

Sincerely,

Shane Greenwood
Senior Engineer

cc: File

Mayor-William Kent Money
Council Member-David Colton
Council Member-Ann Gayheart
Council Member-Bradley G. Marlor
Council Member-Mary Wenner
Council Member-Leona Winger

City Manager-Ricky A. Horst

SOUTH JORDAN
UTAH
"Life Just off the Fast Lane"

1600 West Towne Center Drive / South Jordan, UT 84095-8265 / Telephone (801) 254-3742/ Fax (801) 254-5235
e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

October 26, 2005

Arbor Residential
Attn: Chris Drent
45 West 10000 South Suite 301
Sandy, UT 84070

RE: The Village at Riverwalk Subdivision

The following amount is due the City of South Jordan for engineering review fees, and storm drainage facilities for The Village at Riverwalk Subdivision, located at approximately 10100 South 770 West. Consisting of 66 units and 44.56 acres.

Engineering Review Fees, $1,061 + $266 per lot	$ 18,617.00
Storm Drain Facilities @ $1,433 per acre	$ ~~63,854.48~~ Waived per Rick 3/16/06
Total Due	**$ ~~82,471.48~~**

Sincerely,

Shane Greenwood
Senior Engineer

cc: File

Mayor-William Kent Money
Council Member-David Colton
Council Member-Ann Gayheart
Council Member-Bradley G. Marlor
Council Member-Mary Wenner
Council Member-Leona Winger

City Manager-Ricky A. Horst

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e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

EXHIBIT _____

SOUTH JORDAN CITY
BOND ESTIMATES

Date Prepared:	OCTOBER 31,2005
Prepared By:	SHANE GREENWOOD
Prepared For:	VILLAGE AT RIVERWALK
Number of Lots	76
Total Acreage:	49.73

Site Address:	10100 SOUTH 770 WEST, SOUTH JORDAN
Developer:	ARBOR RESIDENTIAL
Address:	45 WEST 10000 SOUTH, SUITE 301, SANDY UTAH 84070
Phone #:	(801) 561-8594

Fee Zone:

Street Lights: 42

DESCRIPTION	UNIT of MEASUREMENT	QUANTITY	UNIT PRICE	TOTAL PRICE	BOND RELEASE	PREVIOUS RELEASES
WATER SYSTEM						
16" Water Main	LF	2200.00	$45.00	$99,000.00	$0.00	$0.00
12" Water Main	LF	0.00	$35.00	$0.00	$0.00	$0.00
10" Water Main	LF	0.00	$30.00	$0.00	$0.00	$0.00
8" Water Main	LF	7,400.00	$20.00	$148,000.00	$0.00	$0.00
14" Water Main	LF	0.00	$40.00	$0.00	$0.00	$0.00
24" Water Main	LF	0.00	$80.00	$0.00	$0.00	$0.00
16" Butterfly Valve	EA	2.00	$2,200.00	$4,400.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,200.00	$0.00	$0.00	$0.00
8" Valve	EA	25.00	$830.00	$20,750.00	$0.00	$0.00
14" Valve	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
24" Valve	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Fire Hydrant	EA	17.00	$2,500.00	$42,500.00	$0.00	$0.00
Blowoff Assembly	EA	3.00	$950.00	$2,850.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Service Connections	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Sample Stations	EA	0.00	$500.00	$0.00	$0.00	$0.00
PRV Station	EA	0.00	$28,000.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Connect to Existing System (Hot Tap)	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Meter Box	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				*$39,350.00*		
WATER SYSTEM SUB-TOTAL				**$432,850.00**	**$0.00**	**$0.00**

ROAD WORK						
Excavation	CY	11,498.00	$4.00	$45,992.00	$0.00	$0.00
Road Export	CY	0.00	$10.00	$0.00	$0.00	$0.00
Road Import/Fill	CY	4,562.00	$12.00	$54,744.00	$0.00	$0.00
Granular Fill	SQ FT	0.00	$0.55	$0.00	$0.00	$0.00
6" Road Base	SQ FT	290,440.00	$0.50	$145,220.00	$0.00	$0.00
4" Road Base	SQ FT	60,000.00	$0.30	$18,000.00	$0.00	$0.00
Curb and Gutter	LF	18,580.00	$12.00	$222,960.00	$0.00	$0.00
Waterway	LF	885.00	$28.00	$24,780.00	$0.00	$0.00
Sidewalk	SQFT	56,250.00	$2.50	$140,625.00	$0.00	$0.00
4' Sidewalk w/Road Base	LF	0.00	$11.00	$0.00	$0.00	$0.00
5' Sidewalk w/Road Base	LF	0.00	$12.00	$0.00	$0.00	$0.00
3" Asphalt	SQ FT	248,276.00	$1.00	$248,276.00	$0.00	$0.00
4" Asphalt	SQ FT	0.00	$1.35	$0.00	$0.00	$0.00
3" Asphalt with Roadbase	SQ FT	0.00	$1.50	$0.00	$0.00	$0.00
Subdivision Street Light	EA	42.00	$2,000.00	$84,000.00	$0.00	$0.00
Collector Street Light 71' R/W	EA	0.00	$3,300.00	$0.00	$0.00	$0.00
Collector Street Light 85'-111' R/W	EA	0.00	$3,800.00	$0.00	$0.00	$0.00
Temporary Access	SF	0.00	$1.50	$0.00	$0.00	$0.00
Temporary Turnaround	SF	0.00	$1.50	$0.00	$0.00	$0.00
Asphalt Cutting	LF	0.00	$0.95	$0.00	$0.00	$0.00
Handicap Ramp	EA	31.00	$200.00	$6,200.00	$0.00	$0.00
Traffic Circle	EA	0.00	$10,000.00	$0.00	$0.00	$0.00
Striping	LF	0.00	$0.81	$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				*$99,079.70*		
ROAD WORK SUB-TOTAL				**$1,089,876.70**	**$0.00**	**$0.00**

STORM DRAINAGE						
42" RCP	LF	1,475.00	$60.00	$88,500.00	$0.00	$0.00
36" RCP	LF	0.00	$55.00	$0.00	$0.00	$0.00
30" RCP	LF	875.00	$50.00	$43,750.00	$0.00	$0.00
24"RCP,import granular backfill	LF	1,950.00	$40.00	$78,000.00	$0.00	$0.00
21" RCP	LF	0.00	$38.00	$0.00	$0.00	$0.00
18" RCP,import granular backfill	LF	1,200.00	$36.00	$43,200.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
12" RCP	LF	0.00	$30.00	$0.00	$0.00	$0.00
TV Storm Drain Line	LF	5,500.00	$1.00	$5,500.00	$0.00	$0.00
Inlet Box	EA	40.00	$1,500.00	$60,000.00	$0.00	$0.00
Cleanout Box	EA	28.00	$1,900.00	$53,200.00	$0.00	$0.00
Combination Box	EA	0.00	$2,700.00	$0.00	$0.00	$0.00
Energy Disipator Box	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
4' x 8' Storm Drain Vault	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Retention Pond Landscaping	SQ FT	98,010.00	$1.75	$171,517.50	$0.00	$0.00
Retention Basin	CY	6,037.00	$4.00	$24,148.00	$0.00	$0.00
Oil/Water Separator	EA	0.00	$175.00	$0.00	$0.00	$0.00
Grease Trap	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Underdrain 8"	LF	0.00	$12.00	$0.00	$0.00	$0.00
Manhole	EA	0.00	$2,500.00	$0.00	$0.00	$0.00
Side and Backyard Drainage Swale	LF	0.00	$12.00	$0.00	$0.00	$0.00
Rip Rap Channel	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Berm	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$56,781.55*		
STORM DRAINAGE SUB-TOTAL				**$624,597.05**	**$0.00**	**$0.00**

SECONDARY WATER SYSTEM						
8" Main Line	LF	0.00	$20.00	$0.00	$0.00	$0.00
8" Valve	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Drain Assembly	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
12" PVC Waterline (Irrigation)	LF	0.00	$26.00	$0.00	$0.00	$0.00
10" PVC Waterline (Irrigation)	LF	0.00	$24.00	$0.00	$0.00	$0.00
16" Valve	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,150.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
SECONDARY WATER SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

IRRIGATION SYSTEM						
18" RCP,import granular backfill	LF	0.00	$36.00	$0.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
Clean Out Box	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
Head Wall	EA	0.00	$800.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
IRRIGATION SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FENCE AND LANDSCAPE						
Six Foot Chain Link	LF	2,950.00	$12.00	$35,400.00	$0.00	$0.00
Six Foot Vinyl Fence	LF	1,475.00	$30.00	$44,250.00	$0.00	$0.00
Six Foot Block Wall	LF	1,650.00	$60.00	$99,000.00	$0.00	$0.00
Six Foot Concrete Panel Fence	LF	3,700.00	$60.00	$222,000.00	$0.00	$0.00
Collector Street Fencing	LF	0.00	$75.00	$0.00	$0.00	$0.00
Parkstrip Improvements	SQFT	19,780.00	$2.25	$44,505.00	$0.00	$0.00
Landscaping Tree/Irrigation/Sod	LF	0.00	$10.00	$0.00	$0.00	$0.00
Stamped Concrete	SQFT	4,725.00	$8.00	$37,800.00	$0.00	$0.00
Dyed Concrete	LF	0.00	$9.00	$0.00	$0.00	$0.00
Parkstrip Trees	EA	100.00	$300.00	$30,000.00	$0.00	$0.00
Anti-graffiti seal for concrete walls	LF	3,700.00	$2.00	$7,400.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$52,035.50*		
FENCING SUB-TOTAL				**$572,390.50**	**$0.00**	**$0.00**

PARKS AND TRAILS						
Sod & Sprinkler	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Trail Regrind	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Asphalt Trail	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Tot Lot	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Parking	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Fencing	LF	0.00	$10.00	$0.00	$0.00	$0.00
Trail Improvements	SQFT	0.00	$1.50	$0.00	$0.00	$0.00
Pedestrian Path w/Fence	LF	0.00	$30.00	$0.00	$0.00	$0.00
Playground/Park Amenities	LS	0.00	$50,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
PARKS AND TRAILS SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FINISH ITEMS						
Meter Boxes	EA	76.00	$120.00	$9,120.00	$0.00	$0.00
Concrete Pad, Valves & Hydrants	EA	44.00	$175.00	$7,700.00	$0.00	$0.00
Secondary Service Risers	EA	0.00	$300.00	$0.00	$0.00	$0.00
Storm Drain Inlet Grate	EA	40.00	$300.00	$12,000.00	$0.00	$0.00
Raise Manhole	EA	28.00	$400.00	$11,200.00	$0.00	$0.00
Street Signs	EA	21.00	$200.00	$4,200.00	$0.00	$0.00
Survey Monuments	EA	0.00	$300.00	$0.00	$0.00	$0.00
Electronic Format of As-builts (.dxf)	EA	1.00	$500.00	$500.00	$0.00	$0.00
As-built Drawings (Mylar)	EA	2.00	$1,000.00	$2,000.00	$0.00	$0.00
Relocate Utility Underground	LF	0.00	$120.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$4,672.00*		
FINISH ITEMS SUB-TOTAL				**$51,392.00**	**$0.00**	**$0.00**

PROJECT SUB-TOTAL	$2,771,106.25
2" MILL & OVERLAY RETENTION THROUGH WARRENTY PERIOD	$99,310.40

TOTAL PROJECT BONDING AMOUNT	**$2,870,416.65**

TOTAL AMOUNT THIS BOND RELEASE	$0.00
AMOUNT REMAINING	$2,870,416.65

***NOTE TO DEVELOPER**

The Unit Prices, Quantities, Sub-Totals, Bond Release amounts and Project Total on this Document are ESTIMATES ONLY and are intended only to establish the Bond Amount as set forth in the Bond Agreement of which this document is an exhibit. The estimates shall not limit Developer's financial responsibility to fully complete and warrant all Improvements as required by South Jordan City ordinances and the Bond Agreement. The Developer shall be obligated to compensate the City for all costs, including incidental costs, related to the completion and warranty of the Improvements should the Bond Amount provided to the City, for whatever reason be inadequate.

VECTOR
STRUCTURAL ENGINEERS, LLC

STRUCTURAL CALCULATIONS
for
ROCK RETAINING WALL @ RIVERWALKS
at
SOUTH JORDAN, UT
for
ARBOR HOMES

LICENSED CERTIFIED STRUCTURAL ENGINEER
No. 176983
ROGER T. ALWORTH
STATE OF UTAH
OCT 27 2006
VALID WET SIGNATURE IN RED

BY: ROGER T. ALWORTH, S.E.
PRINCIPAL

PROJECT #: U0165-124-061

DATE: October 27, 2006

NOTE: The calculations presented in this package are intended for a single use at the location indicated above, for the client listed above. These calculations shall not be reproduced, reused, "card filed", sold to a third party, or altered in any way without the written authorization of Vector Structural Engineers, PC.

9138 S. State St., Suite 101 • Sandy, UT 84070 • (801) 990-1775 • Fax (801) 990-1776
St. George, UT
vector-sg@infowest.com
Sandy, UT
engineering@vectorse.com
Layton, UT
engineering@vector-layton.com

VECTOR STRUCTURAL ENGINEERS, P.C.

JOB NO.: U0165-124-061 **DESIGNED:** JMW
DATE: 10/27/06 **CHECKED:** RTA

SHEET **OF**

PROJECT: ROCK RETAINING WALL @ RIVERWALKS **SUBJECT:** STRUCTURAL NOTES

GENERAL

1 ARCHITECTURAL AND SITE PLANS FOR THIS PROJECT WERE PREPARED BY OTHERS. VECTOR STRUCTURAL ENGINEERS ASSUMES NO LIABILITY FOR THE ACCURACY, COMPLETENESS, OR CODE COMPLIANCE OF ARCHITECTURAL, ELECTRICAL, MECHANICAL OR DRAINAGE SPECIFICATIONS. ALL DIMENSIONS SHOULD BE VERIFIED PRIOR TO CONSTRUCTION.

2 RETAINING WALL DESIGN IS BASED UPON THE INTERNATIONAL BUILDING CODE, 2003 EDITION DESIGN LOADS:

PASSIVE PRESSURE (PCF):	300
EFFECTIVE FLUID PRESSSURE (PCF):	35
BEARING PRESSURE (PSF):	1500
SOIL COEFFICIENT OF FRICTION:	0.35
ROCK COEFFICIENT OF FRICTION:	0.6
FACTOR OF SAFETY:	1.5

3 RETAINING WALL DESIGN IS BASED UPON THE ABOVE VALUES. VECTOR STRUCTURAL ENGINEERS STRONGLY RECOMMENDS INDEPENDENT SOILS TESTING BE PERFORMED BY A LICENSED GEOTECHNICAL ENGINEER TO VERIFY SOIL BEARING CAPACITY, SLOPE STABILITY, AND ANY OTHER RELATED SOIL PARAMETER, AS REQUIRED.

4 STRUCTURAL REQUIREMENTS SHOWN ON THESE DETAILS SHALL TAKE PRECEDENCE OVER STRUCTURAL CALLOUTS INDICATED ON ARCHITECTURAL SECTIONS.

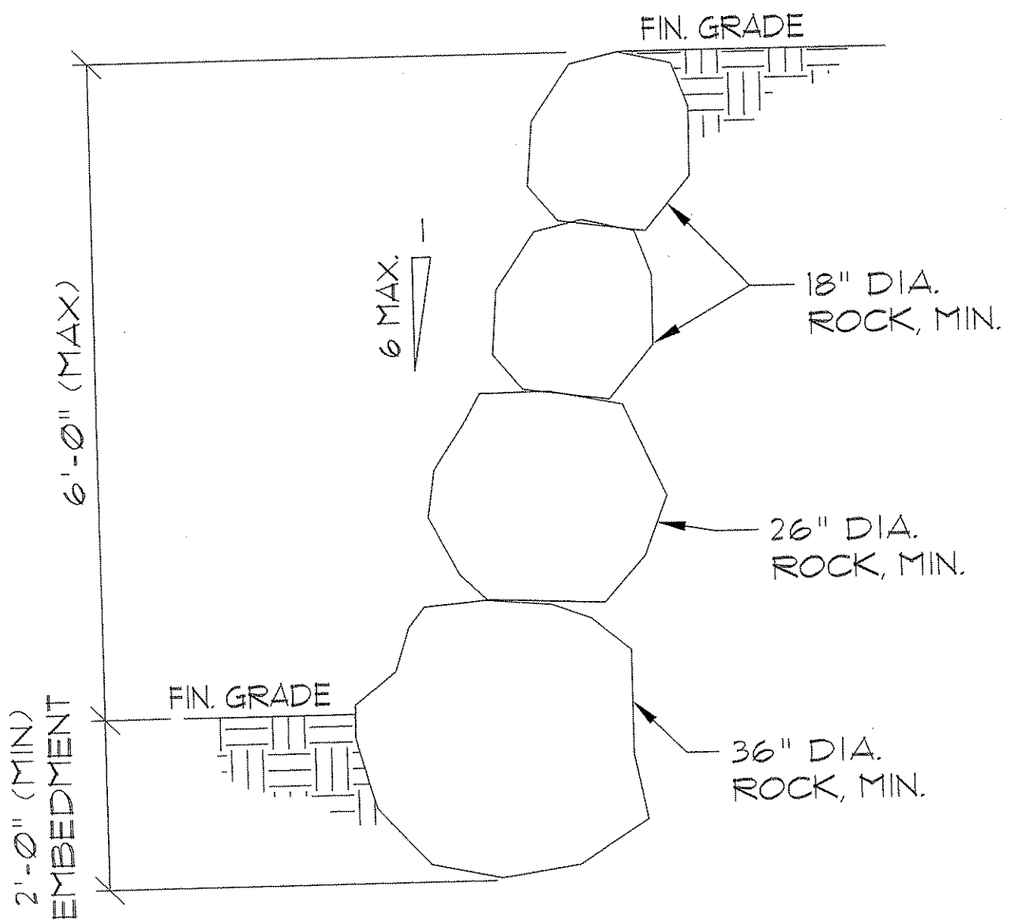
VECTOR
STRUCTURAL ENGINEERS, P.C.

JOB NO. U0165-124-061

DATE 10-27-06

PROJECT 6' ROCK RETAINING WALL @ RIVERWALK SHEET 3 OF 7

SUBJECT SK-2 DESIGNED JMW CHECKED RTA



DETAIL REFERENCE: SK-2

9138 S. STATE STREET #101
SANDY, UTAH 84070
(801) 990-1775
(801) 990-1776 FAX

VECTOR STRUCTURAL ENGINEERS, P.C.

JOB NO.: U0165-124-061
DATE: 10/27/06

DESIGNED: JMW
CHECKED: JCS

SHEET OF

PROJECT: RIVERWALK - ROCK RETAINING WALL

SUBJECT: 4' Rock Retaining Wall

INPUT

Passive Pressure (pcf):	300
EFP (pcf):	35
Bearing Pressure (psf):	1500
Soil Coefficient of Friction:	0.35
Rock Coefficient of Friction:	0.6
Factor of Safety:	1.5
Slope (Vert./1 Horiz.):	6
Embedment (in.):	18
Total Wall Height (ft):	5.4
Above Grade Height (ft):	3.9

10th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

9th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

8th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

7th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

6th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

5th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

4th Coarse:

Diameter (in.):		
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

3rd Coarse:

Diameter (in.):	18.00	
Overturning F.S.:	37.41	OK
Sliding F.S.:	9.80	OK

2nd Coarse:

Diameter (in.):	18.00	
Overturning F.S.:	5.34	OK
Sliding F.S.:	3.05	OK

Bottom Coarse:

Diameter (in.):	30.00	
Overturning F.S.:	2.59	OK
Sliding F.S.:	1.83	OK

VECTOR STRUCTURAL ENGINEERS, P.C.

JOB NO.: U0165-124-061
DATE: 10/27/06

DESIGNED: JMW
CHECKED: JCS

SHEET OF

PROJECT: RIVERWALK - ROCK RETAINING WALL

SUBJECT: 8' Rock Retaining Wall

INPUT

Passive Pressure (pcf):	300
EFP (pcf):	35
Bearing Pressure (psf):	1500
Soil Coefficient of Friction:	0.35
Rock Coefficient of Friction:	0.6
Factor of Safety:	1.5
Slope (Vert./1 Horiz.):	6
Embedment (in.):	30
Total Wall Height (ft):	10.7
Above Grade Height (ft):	8.2

10th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

9th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

8th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

7th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

6th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

5th Coarse:

Diameter (in.):	0.00	
Overturning F.S.:	#DIV/0!	OK
Sliding F.S.:	#DIV/0!	OK

4th Coarse:

Diameter (in.):	26.00	
Overturning F.S.:	462.81	OK
Sliding F.S.:	52.44	OK

3rd Coarse:

Diameter (in.):	26.00	
Overturning F.S.:	11.41	OK
Sliding F.S.:	5.06	OK

2nd Coarse:

Diameter (in.):	30.00	
Overturning F.S.:	3.48	OK
Sliding F.S.:	2.33	OK

Bottom Coarse:

Diameter (in.):	48.00	
Overturning F.S.:	1.99	OK
Sliding F.S.:	1.51	OK

CIVIL SCIENCE
ENGINEERS - SURVEYORS - PLANNERS - SCIENTISTS

3160 W. Clubhouse Dr.
Lehi, UT 84043
Phone 801-768-7200
Fax 801-768-7201

Date: September 15, 2005

Project No.: 04122.00.002

To: Shane Greenwood
South Jordan City
1600 West Towne Center Drive

Project: Village at Riverwalk

We are transmitting Herewith ___X___ Under Separate Cover _____

No. of Copies	*Description or Remarks*
1	Review Resolution Report
1	Project Geotechnical Report
3	24" x 36" Construction Plans (changed sheets only)
1	Original copies of redlines from South Jordan City

Shane,

Please call me if you have any questions regarding this information. After you have completed your review, please call me and we can get you updated sets of the corrected plans.

Thanks,

Brad

_____ No Exceptions Taken
_____ Make Corrections Noted
_____ Amend & Resubmit
_____ Rejected--Resubmit
_____ As Indicated on Each Submittal

_____ As Requested
_____ For Approval
_____ For Your Records
___X___ Review and Respond
_____ For Your Information

Respectfully,
Civil Science, Inc.

By: Brad A. Kerr

Review Resolution Report

Project Element: The Village at Riverwalk
Review Document: Public Services Plan Review
Date: 09/15/2005

Comment #	Author	Reference	Comment	Resolution	Changes Redlined	Changes Made	Final QA
1	SS	PP-01	Request 30' snow easement on either side of Jordan Creek Drive – Outside the subdivision's main gate.	This property is outside the jurisdiction of the subdivision, and the road belongs to the City. The City can add snow easements or other restrictions if desired.	N/A	N/A	N/A
2	WS	L-01	Label where you connect to the existing system. Add Air-Vac Valves as necessary.	These items are labeled on PP-01 rather than this page since this is a less detailed view to show lateral locations.	N/A	N/A	N/A
3	WS	L-01	Add valves so no more than two hydrants go out per water break.	Will do. This change has been reflected throughout the plan set.	✓	GSB	BAK
4	WS	L-01	Connect to fire hydrant and laterals to 16" instead of 8".	Talked to Shane Greenwood on 9/1/05 concerning this issue. Determined that it would be less of a maintenance issue in the future if the laterals were not directly connected to the transmission line.	N/A	N/A	N/A
5	ENG	UP-01, PP-02 PP-03	Move fire hydrants to lot lines for "Future Lots"	Will do	✓	GSB	BAK
6	ENG	UP-04	Want 8" base course for roadway instead of 6".	Geotechnical report shows two options for the roadway including 8" base course only or a 6" base course with 6" properly compacted subgrade. Talked to Shane Greenwood on 9/1/05, and he directed us to proceed with the 6" over 6" providing that we added the wording "Granular Borrow" to the plan sheet to detail the subgrade.	✓	GSB	BAK
7	ENG	UP-04	Want 5" thick concrete sidewalk instead of 4".	Will do.	✓	GSB	BAK

8	ENG	UP-04	Want 8" thick base course under sidewalk instead of 4".	Talked with Shane Greenwood on 9/1/05. APWA requires only 4" of base course. City standards show 6". Will revise to 6"	✓	GSB	BAK
9	ENG	SD-01	Questions about the 1" water service to the barn.	This water service is to appease the property owner in exchange for granting the easement for the 16" waterline. It is on the cold side of the water meter and therefore will be metered and paid for by the property owner.	N/A	N/A	N/A
10	ENG	SD-01	Need copies of recorded easement.	Will provide.	N/A	N/A	N/A
11	ENG	SD-01	Want a ten foot horizontal separation between the storm drain and the 16" waterline instead of five foot.	Discussed this issue with Shane Greenwood on 9/1/05. The main issue is that the property is thoroughly encumbered with easements, and the easement was placed in order to appease the property owner, and it is unlikely that the property owner would allow another five feet of easement. Discussed moving the waterline within the easement, but determined that for this short distance it would be acceptable to maintain only a five foot separation.	N/A	N/A	N/A
12	ENG	SD-02	Questions about the 1" water service to the barn.	See resolution to issue #8.	N/A	N/A	N/A
13	ENG	SD-04	Need copies of recorded easement for irrigation line.	This easement is recorded on the plat.	N/A	N/A	N/A
14	ENG	SD-04	Question on the flared end section on the irrigation line to catch basin in the northwest corner.	Note was revised to better explain this issue.	✓	GSB	BAK
15	ENG	SD-05	Question on bury depths for the storm drain line.	Will add finished grade and existing surface elevation to the profile view.	✓	GSB	BAK
16	ENG	SD-05	Need more location information.	Will add street names on profile view and a reference box on the index sheet.	✓	GSB	BAK
17	ENG	SD-05	Need grate on 42" end section.	Will do.	✓	GSB	BAK

18	ENG	PP-02	Proposed house will face roadway, will fence still be required along this edge.	This is why a vinyl fence was specified. Property owners to the west of the road initially requested this fence, but some are now wanting to subdivide. These owners will have to work this issue out with the developer.	N/A	N/A	N/A
19	ENG	PP-02	Raise grade for proposed driveway.	This is outside the purview of the Riverwalk Subdivision. Property owners who develop these properties will have to resolve the issues relating to fill for their properties when they decide to develop their lots.	N/A	N/A	N/A
20	ENG	PP-02	Provide drainage swell for future springs.	Discussed this issue with Shane Greenwood on 9/1/05. This future issue is completely unpredictable. Determined that the storm drain will provide a blank casing where the flow can go if needed at a future date.	N/A	N/A	N/A
21	ENG	PP-02	Note 5 – add chain link.	Will do. This change was reflected throughout the plan set.	✓	GSB	BAK
22	PROJECT ENGINEER – BRAD KENISON	PP-02	Update spring drain pipes to more-closely reflect in-field conditions	Will do	✓	GSB	BAK
23	ENG	PP-08	Eliminate 8" waterline up Moss Springs Cove. Tie fire hydrant into 16" waterline with an 8" stub.	See resolution to issue #4.	N/A	N/A	N/A
24	CONTRACTOR	PP-06	Two sewer manholes within the project have been marked as SSMH #8	Sewer manhole #8 on sheet will be changed to SSMH #48	✓	GSB	BAK
25	PROJECT ENGINEER – BRAD KENISON	PP-19, PP-20	Proposed rim elevation needs to be raised to the proposed finished ground elevation	Will do	✓	GSB	BAK
26	ENG	RW-01	Do we need to upsize the 12" culvert for future need?	Future flow should go to the Riverwalk storm drain system. See also resolution to issue #18.	N/A	N/A	N/A

SS = Streets Superintendent
WS = Water Superintendent
ENG = Engineering

When Recorded, Please Mail to:

Arbor Gardner, L.C.
45 West 10000 South, Suite 301
Sandy, Utah 84070
Attn: Cory Gust

Entry # 9887649
Bk 9370 Pg 6729-53
Date 10/25/06 Time 3:06 P M.
Request of RG+N
Gary W. Ott, Recorder
Salt Lake County, Utah
$ 67.00 By _____ Deputy

AMENDED AND RESTATED DECLARATION OF PROTECTIVE COVENANTS, CONDITIONS AND RESTRICTIONS FOR THE VILLAGE AT RIVERWALK, P.U.D.

THIS AMENDED AND RESTATED DECLARATION OF PROTECTIVE COVENANTS, CONDITIONS AND RESTRICTIONS FOR THE VILLAGE AT RIVERWALK, P.U.D. (this "Declaration") is made and executed this 23rd day of October, 2006, by ARBOR GARDNER, L.C., a Utah limited liability company ("Declarant"). This Declaration supersedes and replaces in their entirety (i) that certain Declaration of Homeowners Association Covenants, Conditions and Restrictions of The Village at Riverwalk Town Home, PUD dated August 30, 2005 and recorded in the office of the Salt Lake County Recorder on September 14, 2005 as Entry No. 9489744, and (ii) that certain Declaration of Homeowners Association Covenants, Conditions and Restrictions of The Village at Riverwalk Estates, PUD dated August 30, 2005 and recorded in the office of the Salt Lake County Recorder on September 14, 2005 as Entry No. 9489745.

RECITALS

A. Declarant is the owner of most of that certain real property located in South Jordan City, Salt Lake County, Utah, more particularly described on Exhibit A attached hereto (the "Property"). Declarant is developing the Property as a planned unit development to be known as "The Village at Riverwalk" (the "Project"). The Project currently consists of fifty-two (52) Estate Lots and seventy-two (72) Executive Lots.

B. Declarant intends to establish a common scheme and plan for the possession, use, enjoyment, repair, maintenance, restoration, and improvement of the Project.

C. In order to efficiently manage and to preserve the value and appearance of the Project, it is necessary and desirable to create a nonprofit corporation to maintain Common Areas in the Project; to collect assessments and disburse funds as hereinafter set forth; and to perform such other acts as shall generally benefit the Project and the Homeowners. The Riverwalk Estates Homeowners Association, a nonprofit corporation, and the Riverwalk Executive Homeowners Association, a nonprofit corporation, have been or will be incorporated for the purpose of exercising the aforementioned powers and functions.

DECLARATION

NOW, THEREFORE, it is hereby declared that the Project shall be held, sold, conveyed, leased, rented, encumbered, and used subject to the following easements, rights, assessments, liens, charges, covenants, servitudes, restrictions, limitations, conditions, and uses, which are for the purpose of protecting the value and desirability of, and which shall run with, the Property and be binding on all parties having any right, title or interest in the described Property or any part thereof, their heirs, successors and assigns, and shall inure to the benefit of each owner thereof.

ARTICLE I

DEFINITIONS

The following words, phrases, or terms used in this Declaration shall have the following meanings:

(a) "Annual Assessment" shall mean the charge levied and assessed each year against each Lot pursuant to Section 4.2 hereof.

(b) "Articles" shall mean and refer to the Articles of Incorporation of the Estates Association or the Executive Association, as applicable.

(c) "Association" shall mean either the Estate Association and the Executive Association and "Associations" shall mean both the Estate Association and the Executive Association, together.

(d) "Board" shall mean the Board of Trustees of the Estates Association or the Executive Association, as applicable.

(e) "Bylaws" shall mean and refer to the Bylaws of the Estates Association or the Executive Association, as applicable, and as amended from time to time.

(f) "Committee" shall mean and refer to the Architectural Control Committee established pursuant to Article VII hereof.

(g) "Common Area" shall mean all land within the Project that is designated as Common Area by this Declaration and areas shown or otherwise designated as Common Area on the Plat. Common Area shall include, but not be limited to, areas shown on the Plat as: (i) open space; (ii) private roads; (iii) landscaped areas including, without limitation, streetlights and fountains; (iv) the trail from the parking lot through Parcel A open space to the Jordan River on Sheet 4 of the Plat; and (v) entry and security gates. Common Area shall not include any areas defined hereunder as Executive Common Area, which shall be treated separately hereunder.

(h) "Common Expenses" shall mean all expenses for maintenance, repairs, landscaping, utilities and taxes incurred on or in connection with Common Areas or Executive Common Areas, as applicable, within the Project, all insurance premiums, all

expenses incurred in connection with enforcement of this Declaration, all expenses expressly declared to be Common Expenses by this Declaration or the Bylaws of the applicable Association, and all other expenses which the applicable Association is entitled to incur pursuant to the provisions of this Declaration or its Bylaws. Common Expenses do not include any utility services which are separately billed or metered to individual Lots, which separately billed or metered utility services shall be the sole responsibility of the applicable Lot Owner.

(i) "Declarant" shall mean and refer to Arbor Gardner, L.C., a Utah limited liability company and/or any successor to said company (e.g., an entity affiliated with Arbor Gardner, L.C. that acquires any Lots for purposes of building homes and then selling them to consumers), which, either by operation of law or through a voluntary conveyance, transfer, comes to stand in the same relationship to the Project as did its predecessor.

(j) "Estates Association" shall mean the Riverwalk Estates Homeowners Association, Inc., a Utah nonprofit corporation or limited liability company, organized or to be organized to administer and enforce the covenants and to exercise the rights, powers and duties set forth in this Declaration relating to the Estate Lots.

(k) "Estate Lot" shall mean any of the fifty-two (52) detached, single-family home building pads, separately numbered and individually described on the Plat and intended for private use and ownership, and any such additional building pads platted in future phases of the Project, if any (e.g., additional Estate Lots developed along Jordan Creek Drive).

(l) "Executive Association" shall mean the Riverwalk Executive Homeowners Association, Inc., a Utah nonprofit corporation or limited liability company, organized or to be organized to administer and enforce the covenants and to exercise the rights, powers and duties set forth in this Declaration relating to the Executive Lots.

(m) "Executive Common Area" shall mean all land within the Project depicted on Sheets 4 and 5 of the Plat except for (i) the private roads and the shaded areas on Sheets 4 and 5 (which shall be Common Area); (ii) the Parcel A open space on Sheets 4 and 5 (which shall be Common Area) and (iii) the space located inside the building on each Executive Lot on Sheets 4 and 5 (which shall be the responsibility of each particular Owner of the particular Executive Lot).

(n) "Executive Lot" shall mean any of the seventy-two (72) town home-styled executive home building pads, separately numbered and individually described on the Plat and intended for private use and ownership, and any such additional building pads platted in future phases of the Project, if any.

(o) "Limited Common Area" shall mean all land within the Project depicted as the cross-hatched areas on Sheets 4 and 5 of the Plat. The Limited Common Area shall be treated as Executive Common Areas for purposes of maintenance, Maintenance Charges and Common Expenses. However, access to each Limited Common Area will

be restricted to the Owner of the particular Executive Lot to which the Limited Common Area is attached.

(p) "Lot" shall mean either an Estate Lot or an Executive Lot, as applicable.

(q) "Maintenance Charges" shall mean any and all costs assessed against an Owner's Lot and to be reimbursed to the applicable Association for work done pursuant to Sections 5.2, 5.3 and 5.4 and fines, penalties and collection costs incurred in connection with delinquent Annual Assessment or Special Assessment pursuant to Section 4.6.

(r) "Member" shall mean any person that is a member of an Association pursuant to the provisions of Section 2.1.

(s) "Owner" shall mean (when so capitalized) the record holder of legal title to the fee simple interest in any Lot. If there is more than one record holder of legal title to a Lot, each record holder shall be an "Owner."

(t) "Plat" shall mean the collective reference to the following duly approved and recorded plats filed herewith in the office of the Salt Lake County Recorder entitled: (i) The Village at Riverwalk P.U.D.; and (ii) all future plats for future phases of the The Village at Riverwalk P.U.D., if any, which may be added to the Project at Declarant's discretion as provided in Section 9.3 below.

(u) "Project" shall mean the collective reference to: (i) The Village at Riverwalk P.U.D. and (ii) all future plats for future phases of the The Village at Riverwalk P.U.D., if any, which may be added to the Project at Declarant's discretion as provided in Section 9.3 below, as shown on the Plat and governed by this Declaration.

(v) "Property" shall mean and refer to that certain real property located in South Jordan City, Salt Lake County, State of Utah, and more particularly described on Exhibit A hereof, together with any other real property added to the Project pursuant to Section 9.3.

(w) "Special Assessment" shall mean any assessment levied and assessed pursuant to Section 4.3.

ARTICLE II

MEMBERSHIPS AND VOTING

2.1 Membership. Every Owner shall be a Member of an Association. In particular, each Owner of an Estate Lot shall be a Member of the Estates Association and each Owner of an Executive Lot shall be a Member of the Executive Association. No evidence of membership in the Association shall be necessary other than evidence of ownership of a Lot. Membership in the Association shall be mandatory and shall be appurtenant to the Lot in which the Owner has the necessary interest. The rights and obligations of a Member shall not be assigned, transferred,

pledged, conveyed or alienated in any way except upon transfer of ownership of an Owner's Lot, and any such transfer shall automatically transfer the membership appurtenant to such Lot to the new Owner thereof. Each Member shall have a right and easement for use and enjoyment of all Common Areas. Each Member of the Executive Association shall also have a right and easement for use and enjoyment of all Executive Common Areas. Notwithstanding the foregoing, a Member's right and easement of use and enjoyment is subject to the following:

(a) The right of South Jordan City, Salt Lake County and any other governmental or quasi-governmental body having jurisdiction over the Project to access and have ingress and egress to, from, over and across all Common Areas and Executive Common Areas;

(b) The right of each Executive Lot Owner to restrict the access to and ingress and egress to, over and across the Limited Common Area associated with that particular Owner's Executive Lot;

(c) The rights of each Association and the Declarant set forth in this Declaration.

2.2 Voting Rights. Each Association shall have the following-described two (2) classes of voting membership:

(a) Class A. Class A Members shall be all Owners, except Declarant. Class A Members shall be entitled to one (1) vote for each Lot in which the interest required for membership in the Association is held. Although each of the multiple Owners of a single Lot shall be a Class A Member, in no event shall more than one (1) Class A vote exist or be cast on the basis of a single Lot. Which of the multiple Owners of a single Lot shall cast the vote on the basis of that Lot is determined under Section 2.3 of this Article II.

(b) Class B. The Class B Member shall be the Declarant. The Class B Member shall be entitled to five (5) votes for each Lot in which the interest required for membership in the particular Association is held. The Class B membership shall cease and the Declarant shall become a Class A Member upon the first to occur of the following: (i) the expiration of one hundred and twenty (120) days after fee titles to seventy-five percent (75%) of the Lots contained in the Project for the particular Association have been conveyed by Declarant to purchasers; or (ii) the expiration of thirty (30) years after the date on which Declarant first conveys to a purchaser fee title to a Lot.

2.3 Multiple Ownership Interests. In the event there is more than one Owner of a particular Lot, the vote relating to such Lot shall be exercised as such Owners may determine among themselves. A vote cast at any Association meeting by any of such Owners, whether in person or by proxy, shall be conclusively presumed to be the vote attributable to the Lot concerned unless an objection is immediately made by another Owner of the same Lot. In the event such an objection is made, the vote involved shall not be counted for any purpose whatsoever other than to determine whether a quorum exists. Time-sharing is strictly prohibited for any Lot.

2.4 Lists of Owners. Each Association shall maintain up-to-date records showing the name of each person who is an Owner, the address of such person, and the Lot which is owned by such person. In the event of any transfer of a fee or undivided fee interest in a Lot, either the transferor or transferee shall furnish the applicable Association with evidence establishing that the transfer has occurred and that the deed or other instrument accomplishing the transfer is of record in the office of the County Recorder of Salt Lake County, Utah. The Association may for all purposes act and rely on the information concerning Owners and Lot ownership which is thus acquired by it, or at its option, the Association may act and rely on current ownership information respecting any Lot or Lots which is obtained from the office of the County Recorder of Salt Lake County, Utah. The address of an Owner shall be deemed to be the address of the lot owned by such person unless the Association is otherwise advised.

ARTICLE III

ASSOCIATION

3.1 Formation of Association. Each Association shall be a nonprofit Utah corporation or limited liability company charged with the duties and invested with the powers prescribed by law and set forth in its Articles and Bylaws and this Declaration. Neither the Articles nor Bylaws of the Association shall, for any reason, be amended or otherwise changed or interpreted so as to be inconsistent with this Declaration.

3.2 Board of Trustees and Officers. The affairs of the Association shall be conducted by the Board and such officers as the Board may elect or appoint in accordance with the Articles and Bylaws of the Association as the same may be amended from time to time. The initial Board shall be composed of three (3) natural persons, who need not be Members of the Association. The Board may also appoint various committees and may appoint and hire at Association expense a manager or management company, who shall, subject to the direction of the Board, be responsible for the day-to-day operation of the Association. The Board shall determine the compensation to be paid to the manager, the management company or any other employee of the Association.

3.3 Personal Liability. Neither the Declarant, any manager or member of Declarant, nor any member of the Board, officer, manager or other employee or committee member of the Association shall be personally liable to any Member, or to any other person, including the Association, for any damage, loss, claim or prejudice suffered or claimed on account of any act, omission to act, negligence, or other matter, of any kind or nature except for acts performed intentionally and with malice.

ARTICLE IV

ASSESSMENTS

4.1 Purpose of Assessments; Assessment Lien. All Members of an Association hereby covenant and agree, and each Owner, except Declarant, by acceptance of a deed to a Lot is deemed to covenant and agree, to pay to the applicable Association the following assessments

and charges: (a) Annual Assessments, (b) Special Assessments, and (c) Maintenance Charges, all such assessments and charges to be established and collected as hereinafter provided. The Annual Assessments, Special Assessments and Maintenance Charges, together with interest, costs and reasonable attorneys' fees, shall be secured by a lien (the "Assessment Lien") on the Lot to which they relate, in favor of the applicable Association, which shall be a continuing servitude and lien upon the Lot against which each such assessment or charge is made. The Assessment Lien shall be a charge on the Lot, shall attach from the date when the unpaid assessment or charge shall become due, and shall be a continuing lien upon the Lot against which each assessment is made. Each assessment, together with interest, costs and reasonable attorneys' fees, shall also be the personal obligation of the Owner of such Lot at the time the assessment became due. The personal obligation for delinquent assessments shall not pass to successors in title unless expressly assumed by them. The Assessment Lien may be foreclosed by the applicable Association in substantially the same manner as provided for non-judicial foreclosure of deeds of trust on real property upon the recording of a Notice of Delinquent Assessment or charge as set forth in Section 4.6 hereof. The applicable Association shall be entitled to purchase the Lot at any foreclosure sale. Notwithstanding anything in this Declaration to the contrary, Declarant shall not be charged, and is exempt from paying, any assessments, whether Annual Assessment, Special Assessment, Maintenance Charges or otherwise, with respect to Lots owned by Declarant.

4.2 Annual Assessments. Annual Assessments for each Owner of Estate Lots shall include the Owner's pro rata share of Common Expenses associated with the Common Areas based on the total amount of Lots (both Estate Lots and Executive Lots) in the Project. Commencing on January 1, 2007, an Annual Assessment shall be made against each Estate Lot, except any Lot owned by Declarant, for the purpose of paying (or creating a reserve for) all Common Expenses applicable to Estate Lots. The initial Annual Assessment for all Estate Lots, except any Estate Lot owned by Declarant, shall be Two Thousand Three Hundred Twenty-Eight and 12/100 Dollars ($2,328.12) (or $194.01 per month) for each Estate Lot.

Annual Assessments for each Owner of Executive Lots shall include the Owner's pro rata share of both (a) Common Expenses associated with the Common Areas based on the total amount of Lots (both Estate Lots and Executive Lots) in the Project; and (b) Common Expenses associated with the Executive Common Areas based on the total amount of Executive Lots in the Project. Commencing on January 1, 2007, an Annual Assessment shall be made against each Executive Lot, except any Executive Lot owned by Declarant, for the purpose of paying (or creating a reserve for) all Common Expenses applicable to Executive Lots. The initial Annual Assessment for all Executive Lots, except any Executive Lot owned by Declarant, shall be Two Thousand Five Hundred Eleven and 60/100 Dollars ($2,511.60) (or $209.30 per month) for each Executive Lot.

The Estate Association will provide the Executive Association with details of the Common Expenses for the Common Areas so that the Executive Association will be able to properly make the Annual Assessments to the Owners of the Executive Lots. The Executive Association will be obligated to reimburse the Estate Association for that portion of the Common Expenses for the Common Areas that is owing by the Owners of the Executive Lots.

After January 1, 2007, the Annual Assessment may be increased each year in the discretion of the Board by not more than twenty percent (20%) of the Annual Assessment for the previous year.

From and after January 1, 2007, the Annual Assessment may be increased above the twenty percent (20%) per year limit by a vote of sixty percent (60%) of the Members who are voting in person or by proxy, at a meeting duly called for that purpose.

4.3 Special Assessments. In addition to the Annual Assessment authorized above, an Association may levy, except with respect to Lots owned by Declarant, in any assessment period, a Special Assessment applicable to that period only for the purpose of defraying, in whole or in part, the cost of any construction, reconstruction, repair or replacement of a capital improvement upon any Common Area or any Executive Common Area, as applicable, or for the purpose of defraying other extraordinary expenses; provided that any such assessment shall have the assent of a majority of the total number of votes held by the Members who are voting in person or by proxy at a meeting duly called for such purpose. Special Assessments for Common Areas shall be paid pro rata by the Owners of all of the Lots (both Estate Lots and Executive Lots) based on the total number of Lots (both Estate Lots and Executive Lots) in the Project. Special Assessments for Executive Common Areas shall be paid pro rata by the Owners of all of the Executive Lots based on the total number of Executive Lots in the Project. All Special Assessments must be assented to by a vote of fifty-one percent (51%) of the applicable Members who are voting in person or by proxy, at a meeting duly called for that purpose.

The Estate Association will provide the Executive Association with details of the cost of any construction, reconstruction, repair or replacement for a capital improvement upon any Common Area so that the Executive Association will be able to properly make the Annual Assessments to the Owners of the Executive Lots. The Executive Association will be obligated to reimburse the Estate Association for that portion of such cost that is owing by the Owners of the Executive Lots.

4.4 Uniform Rate of Assessment. Annual Assessments for Estate Lots shall be fixed at a uniform rate for all Estate Lots, except Estate Lots owned by Declarant, and may be collected on a yearly basis or more frequently if the Board shall so determine. Annual Assessments for Executive Lots shall be fixed at a uniform rate for all Executive Lots, except Executive Lots owned by Declarant, and may be collected on a yearly basis or more frequently if the Board shall so determine.

4.5 Establishment of Annual Assessment Period. The period for which the Annual Assessment is to be levied (the "Assessment Period") shall be the twelve month period beginning January 1, 2007. The Board, in its sole discretion from time to time, may change the Assessment Period by recording with the County an instrument specifying the new Assessment Period. The Board shall fix the amount of the Annual Assessment against each applicable Lot at least thirty (30) days in advance of the end of each Assessment Period. Written notice of the Annual Assessment shall be sent to each Member of the Association. Failure of the Association to send a bill to any Member shall not relieve the Member of liability for payment of any assessment or charge. The due dates shall be established by the Board. The Association shall, upon demand,

and for a reasonable charge, furnish a certificate signed by an officer of the Association setting forth whether the assessments on a specific Lot have been paid.

4.6 Effect of Nonpayment. Any assessment or charge or installment thereof not paid when due shall be deemed delinquent and in the discretion of the Board may bear interest from thirty (30) days after the due date until paid at the interest rate of eighteen percent (18%) per annum, and the Member shall be liable for all costs, including attorneys' fees, which may be incurred by the Association in collecting the same. The Board may also record a Notice of Delinquent Assessment or Charge (the "Notice") against any Lot as to which an assessment or charge is delinquent. The Notice shall be executed by an officer of the Association or a member of the Board, set forth the amount of the unpaid assessment, the name of the delinquent Owner, and a description of the Lot. The Board may establish a fixed fee to reimburse the Association for the Association's cost in recording such Notice, processing the delinquency, and recording a release of such lien, which fixed fee shall be treated as part of the Maintenance Charge of the Association secured by the Assessment Lien. The Association may bring an action at law against the Owner personally obligated to pay the delinquent assessment and/or foreclose the lien against such Owner's Lot. No Owner may waive or otherwise avoid liability for the assessments provided for herein by non-use of the benefits derived from assessments or abandonment of his or her Lot. Notwithstanding anything in this Declaration to the contrary, Declarant shall not be charged and is exempt from paying any assessments, whether Annual Assessment, Special Assessment, Maintenance Charges, or otherwise, with respect to Lots owned by Declarant.

4.7 Priority of Lien. The Assessment Lien provided for herein shall be subordinate to any first mortgage lien held by, or first deed of trust of which the beneficiary is, a lender who has loaned funds with a Lot as security, or held by the lender's successors and assigns, and shall also be subject and subordinate to liens for taxes and other public charges. Except as provided above, the Assessment Lien shall be superior to any and all charges, liens or encumbrances which hereafter in any manner may arise or be imposed upon each Lot. Sale or transfer of any Lot shall not affect the Assessment Lien.

4.8 Fines. Without limiting the foregoing, each Association shall have the right after written notice to a violating Member, and the Member's failure to cure such violation within ten (10) days following receipt of the written notice, to assess a fine against any violating Member in the amount of $100 per day from the date of the written notice for each violation of this Declaration. Each fine shall become part of the Assessment Lien.

ARTICLE V

MAINTENANCE

5.1 Common Areas. The Estate Association, or its duly delegated representative, shall maintain and otherwise manage all Common Areas in the Project. This maintenance will include the installation of landscaping and the appropriate upkeep and repair of all Common Areas, including, without limitation, the sweeping, mowing, watering, snow removal (excluding snow removal on any sidewalks, driveways or porches on or associated with any particular Lot), repair, replacement and maintenance. The Board of the Estate Association shall be the sole judge as to the appropriate maintenance of all Common Areas and other properties maintained by

the Estate Association. Any cooperative action necessary or appropriate to the proper maintenance and upkeep of such properties shall be taken by the Board of the Estate Association or by its duly delegated representative.

As part of the Common Areas, the Estates Association shall maintain and nurture (including watering) the utilities, fencing, trees, shrubs and other landscaping provided by Declarant on the portion of each Lot abutting a private road, as shown on the Plat, between the curbside of such roads and the closest wall, fence or building exterior located on such Lot as constructed by Declarant (such portion of each affected Estate Lot, the "Restricted Landscape Area"). The Association is hereby granted a perpetual easement over all Restricted Landscape Area for the purpose of performing such maintenance and related obligations. The cost of installing, maintaining, repairing, restoring and nurturing the Restricted Landscape Area (including watering) shall be part of the Annual Assessment relating to the Common Areas. Each Owner shall be separately responsible for watering and utilities billed separately to the Owner's Lot.

Finally, if, at any time, the property immediately adjacent to the Project to the North is developed and such development is connected by private road to the Project, the Estates Association shall erect an entry gate between the Project and such new development. The entry gate shall become part of the Common Areas.

5.2 Executive Common Areas. The Executive Association, or its duly delegated representative, shall maintain and otherwise manage all Executive Common Areas in the Project, as well as the exterior and roof of all buildings on the Executive Lots. This maintenance will include the culinary water provided to each Executive Lot, the installation of landscaping and the appropriate upkeep and repair of all Executive Common Areas, including, without limitation, all sweeping, mowing, watering, snow removal (excluding snow removal on any sidewalks, driveways or porches on or associated with any particular Lot), garbage removal, repair, replacement and maintenance. The Board of the Executive Association shall be the sole judge as to the appropriate maintenance of all Executive Common Areas and other properties maintained by the Executive Association. Any cooperative action necessary or appropriate to the proper maintenance and upkeep of such properties shall be taken by the Board of the Executive Association or by its duly delegated representative.

5.3 Assessment of Certain Costs. In the event that the need for maintenance or repair of Common Areas, the Executive Common Areas or any other areas maintained by an Association is caused through the willful or negligent act of any Owner (except Declarant), his or her family, guests or invitees, the cost of such maintenance or repairs shall be added to and become part of the Maintenance Charge to which such Owner's Lot is subject and shall be secured by the Assessment Lien.

5.4 Improper Maintenance. In the event any portion of any Lot, except Lots owned by Declarant, is so maintained or used by an Owner as to present a public or private nuisance, or as to substantially detract from the appearance or quality of the surrounding Lots or other areas of the Project which are substantially affected thereby or related thereto; or in the event any portion of a Lot, except Lots owned by Declarant, is being used in a manner which violates this Declaration; or in the event any Member, except Declarant, is failing to perform any of its

obligations under this Declaration or the architectural guidelines and standards of the Committee, the Board of the applicable Association may by resolution make a finding to such effect, specifying the particular condition or conditions which exist, and pursuant thereto give notice thereof to the offending Member that unless corrective action is taken within ten (10) days, the Board may cause such action to be taken at such Owner's cost. If at the expiration of such ten (10) day period of time the requisite corrective action has not been taken, the Board shall be authorized and empowered to cause such action to be taken and the cost thereof shall be added to and become part of the Maintenance Charge and shall be secured by the Assessment Lien.

ARTICLE VI

RIGHTS AND POWERS OF ASSOCIATION

6.1 Association's Rights. In addition to the rights and powers of each Association set forth in this Declaration, each Association shall have such rights and powers as are set forth in its Articles and Bylaws. In the event of any conflict between the Articles and Bylaws and this Declaration, the terms of this Declaration shall control.

6.2 Rights of Enforcement. Each Association, as the agent and representative of the Members, and the Declarant shall have the right to enforce the covenants, conditions, restrictions, liens, charges now and hereafter imposed by the provisions applicable to such Association set forth in this Declaration by any proceeding at law or in equity. If the Association or Declarant prevails in any proceeding at law or in equity to enforce the provisions of this Declaration, the Association or Declarant is entitled to an award of its costs and reasonable attorneys' fees associated with the action. Failure by the Association or Declarant to enforce any covenant or restriction herein contained shall in no event be deemed a waiver of the right to do so thereafter.

6.3 Insurance. Each Association may obtain in its name and keep in full force and effect at all times, insurance policies for such casualty and public liability and other insurance policies as the Association's Board deems necessary or desirable. The cost of such insurance shall be a Common Expense. The Association shall have no duty or obligation to procure or maintain insurance of any kind on any particular Lot.

ARTICLE VII

ARCHITECTURAL CONTROL COMMITTEE

7.1 Purpose. In order to create, maintain and improve the Project as a pleasant and desirable environment, to establish and preserve a consistent and harmonious design for the community and to protect and promote the value of the Property, all exterior design, landscaping and changes or alterations to existing use, landscaping and exterior design and development shall be subject to design review by the Architectural Control Committee (the "Committee").

7.2 Creation. The Architectural Control Committee shall consist of three (3) persons, the majority of which shall constitute a quorum, and the concurrence of the majority shall be necessary to carry out the provisions applicable to the Committee. In the event of death or

resignation of any of the Committee members, the surviving members of the Committee shall have full authority to appoint another person to fill the said vacancy. The initial Committee will consist of three (3) persons to be appointed by Declarant in its sole discretion for so long as it remains a Class B Member of either Association. Thereafter, the initial Committee shall be released from responsibility and a new Committee shall be selected which shall consist of three (3) members. Two (2) members will be elected by the Estate Association and one (1) member will be elected by the Executive Association. The term for which each Committee member shall serve shall be four (4) years, plus any time required to duly select a successor Committee member, unless such member shall have died or resigned prior to such time. The members on the Committee shall be elected by a two-thirds (2/3) majority vote of the Owners of each applicable Association voting in person or by proxy, at a meeting duly called for that purpose. No member may serve on the Committee for more than two (2) consecutive terms at a time.

Except for the initial Committee appointed by Declarant, all members of the Committee must be Owners at the time of their appointment. Should any Committee member move his or her residence outside of the Project, such member shall automatically be deemed to have resigned and the Committee shall declare a vacancy and a new Committee member shall be elected in accordance with the provisions above.

In the event of violation of any of the provisions of this Declaration, the Committee is authorized and empowered to take such action as may be necessary to restrain or enjoin the violations of applicable governmental codes and regulations and these covenants. All costs, including attorneys' fees, of such enforcement shall be borne by the Owners who are in violation of this Declaration.

7.3 Powers. The Committee is hereby authorized to perform (or to retain the services of one or more consulting architects, landscape architects, or urban designers, who need not be licensed to practice in the State of Utah, to advise and assist the Committee in performing) the design review functions prescribed in this Declaration and each Association's Bylaws and to carry out the provisions set forth therein.

Each Lot Owner shall be required to pay a Five Hundred Dollar ($500) Design Review Fee to the Committee before any new construction, alteration, remodeling or other construction plans shall be reviewed or approved by the Committee. The Five Hundred Dollar ($500) fee will be used by the Committee to pay the costs of architects and other professionals retained by the Committee to review home plans. Lot Owners are encouraged to submit renderings, preliminary schematic drawings to the Committee as soon as possible in order to avoid unnecessary revisions and delays in constructions.

ARTICLE VIII

COVENANTS, CONDITIONS AND RESTRICTIONS

8.1 Land Use and Building Type. No Lot shall be used for other than residential purposes. No building shall be erected, altered, placed, or permitted to remain on any Estate Lot other than one (1) single-family dwelling or on an Executive Lot other than a town home-styled dwelling, not to exceed the height limitation for the applicable zone of South Jordan City as

specified at the time of recordation of the Plat. Each dwelling must have at least a two-car and no more than a three-car garage. Carports may not be built. All such dwellings shall meet the minimum size requirements of South Jordan City as specified at the time of the recordation of the Plat. Height shall be measured as the vertical distance from average finish grade surface at the building wall to the highest point (apex) of the roof. Chimneys, flag poles and similar structures not used for human occupancy are excluded for purposes of calculating the height of a structure. Square footage of any style is excluding garages, porches, verandas, patios, basements, eaves, overhangs, and steps. Any square footage with any portion thereof beneath the top grade of the foundations will not qualify to offset the minimum square footage requirement. Any deviations from this requirement must be approved in writing by the Committee and South Jordan City. The side yard for each building shall meet the minimum requirements of South Jordan City.

8.2 Architectural Control. To maintain a degree of protection to the investment which homeowners in this area may make, homes of superior design are requisite. Designs shall be limited to those approved and constructed by Declarant, which shall be prepared by architects or by qualified residential designers of outstanding ability whose previous work may be reviewed as a part of the approval process. In the event of any reconstruction of an improvement or a house on a Lot due to a casualty, the design, quality, and appearance of the reconstructed home shall be substantially the same as the structure initially built. No landscaping, grading, excavation, building, fence, wall, residence, or other structure, or alteration of any kind, shall be commenced, erected, maintained, improved, altered, or made until the construction plans and specifications, along with a topographical plan showing the location of all improvements, including a detailed landscaping plan, have been approved in writing by the Committee. All subsequent additions to or changes or alterations in any building, fence, wall, or other structure, including exterior color scheme, and all changes in the grade on any Lot, shall be subject to the prior written approval of the Committee. Once approved by the Committee, no changes or deviations in or from the plans and specifications shall be made without the prior written approval of the Committee. Subsequent to receiving approval of the Committee and prior to the commencement of construction, each Owner will be responsible for obtaining a building permit from South Jordan City.

No construction, reconstruction or modification of a home or landscaping may commence without approval by the Committee of the working drawings including, but not limited to, the following:

(a) Plot plans to scale showing the entire site, building, garages, walks, drives, fences, lights, and retaining walls, with elevations of the existing and finished grades and contours including those at the outside corners of the buildings and at adjacent property line and street fronts and elevations of floors from a designated point on the street.

(b) Detailed floor plans showing dimensions and measurements.

(c) Detailed elevations, indicating all materials and showing existing and finished grades.

(d) Detailed sections, cross and longitudinal.

(e) Details of cornices, porches, windows, doors, garages, garden walls, steps, patios, fences, carriage lights, etc.

Specifications shall give complete descriptions and color samples of materials to be used on the exterior of the residence.

8.3 Construction Quality, Size and Cost. The Committee will base its approval of construction plans, specifications, landscaping plans, and other alterations on the acceptability and harmony of the external design of the proposed structures with respect to topography and grade, quality of materials, size, height, color, etc. All structures constructed on the Property shall be of new materials, except pre-approved used brick, and shall be of good quality workmanship and materials. Only those exterior materials which will blend harmoniously with the natural environment, with special emphasis on earth-toned colors, shall be permitted. All exterior material shall be new, except pre-approved used-brick, and consist of brick, rock, stucco, or combination approved in writing by the Committee. Aluminum soffit and fascia is acceptable. No aluminum exterior siding homes shall be permitted in the Project. No wood exterior siding shall be permitted in the Project with the exception of a masonite-type material in combination with brick, rock, and/or stucco if approved by the Committee. All exterior materials and colors are to be specified on plans and submitted for approval by the Committee. No pre-manufactured homes shall be permitted. No flat roofs shall be permitted in the Project without prior written approval of the Committee. Pitched roofs shall be at least 6/12 pitch and no greater than 12/12 without the prior written consent of the Committee. Notwithstanding the foregoing, Declarant has several plans that call for a 4/12 pitch for part of a roof and shed roofs that will be less than a 6/12 pitch, which plans are hereby deemed acceptable. A minimum of ten (10) inches shall be required on the fascia. All stacks and chimneys from fireplaces in which combustible materials other than natural gas are burned shall be fitted with spark arresters. All Owners shall strictly comply with all state laws and city ordinances pertaining to fire hazard control.

8.4 Construction Time. The Committee shall have final control for approval of all color and material plans. There is no time limit for beginning construction; however, upon commencement, the construction time for the exterior portion of any structure shall not exceed twelve (12) months from start to finish. "Start" shall be the instant any foliage is cut or removed in anticipation of the landscaping or construction to be built. All building debris, excavation, dirt, etc. associated with the building process shall be removed within the twelve (12) month period. Such debris and excavation dirt shall not be permitted on any of the streets or sidewalks within the Project.

8.5 Building Location. No building shall be located on any detached single family Lot nearer than the minimum building set-back, side street and side lot lines required by South Jordan City.

8.6 Landscaping. Any trees, lawns, shrubs, or other planting provided by Declarant, including without limitation, those provided in the Common Area, the Executive Common Area and the Restricted Landscape Area shall be properly nurtured and maintained by the applicable Association. No Owner may plant any shrub, tree or other vegetation within, or otherwise modify, alter or add to the landscaping of any Restricted Landscape Area (as defined in Section 5.2.) without the applicable Board's and the Committee's prior written consent.

Only such foliage shall be removed from each Lot as is necessary for clearing the driveway, excavating for the foundation, and for lawns and patio areas. Lawn, patio, and garden areas are subject to approval by the Committee. Owners are encouraged to plant trees and shrubs to enhance the natural beauty, provide windbreaks, and improve erosion control within the Project. The planting of trees that will have a high profile and obstruct the view from neighboring Lots is prohibited. Such trees may be pruned or removed at the discretion of the applicable Board or the Committee.

No planting or structures shall be placed or permitted which may damage or interfere with established slope ratios, create erosion, or change the direction of drainage channels. All materials used to retain and contour the slope of any Lot or improvement must conform with the natural beauty and color of the Property and must be approved by the Committee.

Each dwelling shall have installed surrounding it an outdoor sprinkler system for fire protection and irrigation.

Landscaping shall be installed and maintained by the applicable Association and may include a combination of lawns, shrubs, or ground cover. Ground cover may include vegetative vines, low-spreading shrubs, or annual or perennial flowering or foliage plants. Ground cover may also include mineral or non-living organic permeable material in not more than fifty percent (50%) of the net landscaped area. Mineral ground cover may include such materials as rocks, boulders, gravel, or brick over sand. Species, size, and placement of landscape elements shall be determined by the applicable Association in keeping with overall landscaping of the Project.

8.7 Temporary Occupancy and Temporary Buildings. No trailer, basement of any incomplete building, tent, shack, garage, or barn, and no temporary buildings or structures of any kind, shall be used at any time for a residence, either temporary or permanent. Temporary buildings or structures used during the construction of a dwelling on any property shall be removed immediately after the completion of construction.

8.8 Accessory Structures. Patio structures, trellises, sunshades, gazebos, awnings, window treatments, blinds, flags, and any other appurtenant buildings shall be constructed of materials consistent with the colors, textures, and materials approved for the dwelling and shall be integral to the architecture of the house and subject to the prior written approval of the Committee in its discretion.

8.9 Exterior Antennas, Lights, and Power Lines. Exterior antennas are prohibited without the prior written approval of the Committee. Exposed metal flues, vents, ventilator, or other metallic rooftop protrusions shall be coated or painted with a neutral color which will blend harmoniously with the surrounding Property. Satellite TV dishes will be allowed, provided they are placed or screened so they are not readily visible to neighboring Lots and streets. The location of Satellite TV dishes must be approved by the Committee. Exterior lighting that is detached from the dwelling will not be allowed unless approved by the Committee. All power lines and similar type cables shall be buried underground. No short-wave radio antennas may be constructed on any Lot or attached to any structure thereon without the prior written approval of the Committee.

8.10 Nuisances; Construction Activities. Prior to commencing construction on a Lot an Owner shall post with the applicable Association a one thousand dollar ($1,000.00) cash construction bond to cover any damage done by Owner or their contractors, subcontracts and materialmen to streets, sidewalks, curbs and utilities lines and pipes, or any clean-up expense caused by such construction activities. If no damage is done, and no repairs or clean up is required from such Owner's construction activities, the bond, or the remaining portion thereof shall be refunded to Owner within sixty days of completion of construction activities. No rubbish or debris of any kind shall be placed or permitted to accumulate upon or adjacent to any Lot, and no odors or loud noises shall be permitted to arise or emit therefrom, so as to render any such property or any portion thereof, or activity thereon, unsanitary, unsightly, offensive or detrimental to any other property in the vicinity thereof or to the occupants of such other property. No other nuisance shall be permitted to exist or operate upon any Lot so as to be offensive or detrimental to any other property in the vicinity thereof or its occupants. Normal construction activities and parking in connection with the building of improvements on a Lot shall not be considered a nuisance or otherwise prohibited by this Declaration, but Lots shall be kept in a neat and tidy condition during construction periods, trash and debris shall not be permitted to accumulate, and supplies of brick, block, lumber, and other building materials will be piled only in such areas as may be approved by the Committee. In addition, any construction equipment and building materials stored or kept on any Lot during construction of improvements may be kept only in areas approved by the Committee, which may require screening of the storage areas.

No articles, material, equipment, or vehicles of any nature shall be parked or stored on any street location within the Property. Licensed, regularly used passenger vehicles (i.e., visitor vehicles) may be parked on streets within the Property for brief periods of time (i.e., less than twenty-four (24) hours). Overnight parking of such vehicles should generally be restricted to driveway of the dwelling being visited.

The use or operation of snowmobiles on Project streets is not permitted. The use of motorcycles and other motorized recreational vehicles which may produce audible annoyance to the Owners shall be limited to ingress and egress of the Property.

No oil or gas drilling, development, operations, refining, storage, quarrying, or mining operations of any kind shall be permitted upon any Lot.

The burning of rubbish, leaves, or trash on the Property is prohibited. Trash containers shall be covered and kept screened from view from the street in suitable enclosed areas, except during collection.

No Owner shall permit anything or condition to exist upon any Lot which shall induce, breed, or harbor infectious plant diseases or noxious insects.

The Committee, in its sole discretion, shall have the right to determine the existence of any nuisance.

8.11 Signs. Except as provided in this Section 8.11, no signs of any kind shall be displayed to public view on any Lot except one sign of not more than five square feet advertising

the property for sale or rent. The placement of signs, graphics, or advertisements which are permanent in nature or represent advertisement for small business conducted in the home or on a Lot is prohibited. Banners, flags, lighting or decoration of the exterior of any dwelling for the purpose of promoting the dwelling for sale is strictly prohibited.

8.12 Animals. The Association is committed to the preservation and protection of native animal wildlife which may from time to time wander onto and through the Property. Such wildlife shall not be fed or hunted within the Project. No animal, bird, fowl, poultry, or livestock of any kind shall be raised, bred, or kept on any Lot except that domestic dogs (a maximum of two (2)), cats (a maximum of two (2)), and other household pets may be permitted by the applicable Association as long as they are maintained in accordance with this Declaration and any additional rules and regulations imposed by the Association and are not a nuisance or kept, bred, or maintained for any commercial purposes. No dog shall be allowed to roam unattended on the Project. All dogs going outdoors must be on a leash under the direct supervision and control of the Owner or confined to a dog run or kennel on the Owner's Lot. The existence and location of all dog runs or kennels is subject to approval by the Committee.

8.13 Repair of Building. No building or structure on any Lot shall be permitted to fall into disrepair, and each such building and structure shall at all times be kept in good condition and repair and adequately painted or otherwise finished. In the event any building or structure is damaged or destroyed, then, subject to the approvals required by Section 8.1 above, such building or structure shall be immediately repaired or rebuilt or shall be demolished.

8.14 Restriction on Further Subdivision, Property Restrictions, and Rezoning. No Lot shall be further subdivided or separated into smaller lots by any Owner, and no portion less than all of any such Lot, nor any easement or other interest therein, shall be conveyed or transferred by any Owner, without the prior written approval of the applicable Board, which approval must be evidenced on the Plat or other instrument creating the subdivisions, easement, or other interest. No further covenants, conditions, restrictions, or easements shall be recorded by any Owner or other person against any Lot without the provisions thereof having been first approved in writing by the applicable Board, and any covenants, conditions, restrictions, or easements recorded without such approval being evidenced thereon shall be null and void. No application for rezoning of any Lot and no applications for variances or use permits shall be filed with any governmental authority unless the proposed uses of the Lot has been approved by the applicable Board and the Committee and the proposed use otherwise complies with this Declaration.

8.15 Non-Residential Use. No gainful occupation, profession, or other non-residential use shall be conducted on any Lot, and no persons shall enter onto any Lot for engaging in such uses or for the purpose of receiving products or services arising out of such usage.

8.16 Fuel Storage. No tank for storage of fuel may be maintained above the surface of the ground without the prior written consent of the Committee.

8.17 Building Material Storage. No building material of any kind or character shall be placed or stored upon any Lot until the Owner thereof is ready to commence improvements, and then the material shall be placed within the property lines of the Lot upon which the

improvements are to be erected and shall not be placed in the streets or between the curb and the property line.

8.18 Easements. Easements for installation of and maintenance of utilities, drainage facilities, water tank access and lines, detention basin, wildlife trail, and nature trail are reserved as shown on the recorded Plat. Within these easements, no structure, planting, or other materials shall be placed or permitted to remain which may damage or interfere with the installation and maintenance of utilities or water tank lines or which may change the direction of flow of drainage channels in the areas or which may obstruct or retard the flow of water through drainage channels in the easements. The easement area of each of the Lots and all improvements in it shall be maintained continuously by the applicable Association, except for those improvements for which a public authority or utility company is responsible.

8.19 Paving. Driveways may only be concrete or stamped concrete. Other flat paved areas may only be concrete, stamped concrete, or asphalt.

8.20 Solar Equipment. Solar panels are to be integrated into roof design. Panels and frames must be compatible with roof colors, all equipment must be screened from view, and prior written approval must be obtained from the Committee.

8.21 Pools, Spas, Fountains, Game Courts. Pools, spas, fountains, and game courts must be approved by the Committee and shall be located to avoid impacting adjacent properties with light or sound. Pool heaters and pumps must be screened from view and sound insulated from neighboring houses. Nothing herein shall be construed as permitting the construction of skateboard areas and/or similar area ramps, which structures shall be prohibited.

8.22 Fences and Walls. Fencing and walls shall be masonry, stone, vinyl, or wrought iron. Fences and walls are to be color coordinated with the approved dwelling colors. Use of landscaping materials for hedges and fencing is encouraged. No structures or fences shall be permitted in any areas designated by South Jordan City as non-buildable. Fences, walls, or hedges shall not exceed six (6) feet in height; provided, however, that no wall, fence, or opaque hedge or screening materials (other than pre-construction natural vegetation) shall be maintained within: (i) a required front yard; (ii) in any portion of a rear yard which is highly visible from any Project street or non-adjoining Lot because of the elevation or slope of the portion of the rear yard concerned unless specifically permitted by the Committee; and (iii) any portion of the Lot having a slope greater than thirty percent (30%). Fencing on Executive Lots shall be restricted to the "court yard" associated with each particular set of three (3) Executive Lots only and must be vinyl in a color approved by the Committee. All fences and walls require a building permit from South Jordan City and must have prior written approval of the Committee.

8.23 Parking and Storage. No major mechanical work or repairs are to be conducted in streets or front yards. No inoperative vehicle shall be placed or remain on any Lot adjacent street for more than forty-eight (48) hours. No commercial-type vehicles and no trucks shall be parked or stored on the front yard setback of any Lot or within the side yard buildings setback on the street side of a corner Lot, or on the residential street except while engaged in transportation. Trailers, mobile homes, trucks over three quarter ton capacity, boats, campers not on a truck bed, motor homes, buses, tractors, and maintenance or commercial equipment of any kind shall be

parked or stored behind the front yard setback in an enclosed area screened from street view as approved by the Committee. Sufficient side yard gate access should be planned and provided for in the design of the home to permit ingress, egress, and storage of trailers and recreational type vehicles on the side and rear yards. The storage or accumulation of junk, trash, manure, or other offensive or commercial materials is prohibited. No pads used for the storage of vehicles or other material either temporarily or permanently shall be constructed within the side or the front yard set back requirements of a given Lot. This open space shall remain unoccupied and unobstructed by building, vehicles, and/or hard surfaces such as asphalt, concrete, and paved surfaces from this time hence forth and forever.

8.24 Water Discharge. It shall be unlawful for any person owning, occupying, or having control of any premises to suffer or permit irrigation or water from the roof or eaves of any house, building, or other structure or from any source under the control of such person, to be discharged and spread upon the surface of any sidewalk, street, or adjoining Lot. This is intended to require that the Owner maintains water on his Lot.

8.25 Declarant's Exemption. Nothing contained in this Declaration shall be construed to prevent the erection or maintenance by Declarant, or its duly authorized agents, of temporary structures, trailers, improvements or signs necessary or convenient to the development, marketing, or sale of property within the Project.

ARTICLE IX
AMENDMENTS.

9.1 Term: Method of Termination. This Declaration shall be effective upon the date of recordation hereof and, as amended from time to time, shall continue in full force and effect for a term of thirty (30) years from the date of recordation. From and after such date, this Declaration, as amended, shall be automatically extended for successive periods of ten (10) years each, unless there is an affirmative vote to terminate this Declaration by the then Members casting seventy-five percent (75%) of the total votes cast at an election held for such purpose within six (6) months prior to the expiration of the initial effective period hereof or any ten (10) year extension. The Declaration may be terminated at any time if at least ninety-five percent (95%) of the votes cast by all Owners shall be cast in favor of termination at an election held for such purpose. If the necessary votes are obtained, each Board shall cause to be recorded in the office of the Salt Lake County Recorder a "Certificate of Termination," duly signed by the President and Vice President and attested by the Secretary or Assistant Secretary of the applicable Association, with their signatures acknowledged. Thereupon, the covenants herein contained shall have no further force and effect, and the Associations shall be dissolved pursuant to the terms set forth in their respective Articles.

9.2 Amendments. This Declaration may be amended by recording in the office of the Salt Lake County Recorder a "Certificate of Amendment," duly signed and acknowledged as required for a Certificate of Termination. The Certificate of Amendment shall set forth in full the amendment adopted and shall certify that at an election duly called and held pursuant to the provisions of the Articles and Bylaws of the Associations, the Owners casting seventy-five percent (75%) of the votes at the election voted affirmatively for the adoption of the amendment.

9.3 Expansion of Project. Declarant shall have the right in its sole discretion upon recording a Certificate of Amendment signed by Declarant to expand the Project to include additional Phases and Lots, and/or to add to the development known as The Village at Riverwalk, all of which additional property shall, upon recording such Certificate of Amendment, be subject to this Declaration.

ARTICLE X

PARTY WALLS

10.1 General Rules of Law to Apply. Each wall built as a part of the original construction of a building on an Executive Lot placed between two (2) separate dwellings or garage units intended for use and occupancy as a residence by a single family or appurtenant garage shall constitute a party wall, and to the extent not inconsistent with the provisions of this Article X the general rules of law regarding party walls and liability for property damage due to negligence or willful acts or omissions shall apply thereto.

10.2 Sharing of Repair and Maintenance. The cost of reasonable repair and maintenance of a party wall shall be shared equally by the Owners who make use of the wall. Mechanical equipment and appurtenances located within any one dwelling or garage unit, or located outside said dwelling or garage unit, but designated and designed to serve only that dwelling or garage unit; including, but not in any way limited to, electrical receptacles and outlets, air conditioning, heating, and other ventilation apparatus, fixtures and the like, pipes, wires, conduits, or other public utility lines or installations, shall be considered part of the dwelling or garage unit; and to the extent such equipment and appurtenances penetrate, are attached to, or located between the party wall, the Owner of the particular dwelling or garage unit shall be responsible for their repair and maintenance. In the event that any such equipment and appurtenances service more than one dwelling or garage unit, the cost for the repair of any damage or adverse condition created thereby, and the maintenance of such shall be shared equally between the Owners of the dwellings or garage units jointly serviced thereby.

10.3 Destruction by Fire or Other Casualty. If a party wall is destroyed or damaged by fire or other casualty, then to the extent that such damage is not covered by insurance and repaired out of the proceeds of same, any Owner who has used the wall may restore it, and if the Owners thereafter make use of the wall, they shall contribute to the cost of restoration thereof in equal proportions without prejudice subject, however, to the right of any of such Owners to call for a larger contribution from the others under any rule of law regarding liability for negligence or willful acts or omissions. The word 'used" as referred to herein means ownership of dwelling or garage unit on an Executive Lot which incorporates such wall or any part thereof.

10.4 Weatherproofing. Notwithstanding any other provisions of this Article, to the extent that such damage is not covered and paid by the insurance provided for herein, an Owner who by his or her negligence or willful act causes the party wall to be exposed to the elements shall bear the whole cost of any and all repairs and maintenance resulting there from, as well as the cost of furnishing the necessary protection against such elements.

10.5 Right to Contribution Runs With Land. The right of an Owner to contribution from any other Owner under this Article shall be appurtenant to the land and shall pass to such Owner's successors in title.

10.6 Arbitration. In the event of any dispute arising concerning a party wall, under the provisions of this Article, each party shall choose one arbitrator, and the decision shall be by a majority of all the arbitrators. Should any party refuse to appoint an arbitrator within ten (10) days after written request therefore, the Board of the Executive Association shall select an arbitrator for the refusing party.

10.7 Encroachment. If any portion of a party wall or other part of a building or structure now or hereafter constructed upon said property encroaches upon any part of the Common Areas, Executive Common Areas or upon the Lot or Lots used or designated for use by another Owner, an easement for the encroachment and for the maintenance of same is granted and reserved and shall exist and be binding upon the Declarant and upon all present and future Owners of any part of said property for the benefit of the present and future Owners of such encroaching building or structure for the purpose of occupying and maintaining the same; in the event a structure consisting of more than one dwelling or garage unit becomes partially or totally destroyed or in need of repair or replacement, mutual and reciprocal easements are granted and reserved upon the Common Areas, the Executive Common Areas and in and upon each dwelling or garage unit on the Lot for the benefit of the applicable Association and the adjacent Owner or Owners to the extent reasonably necessary or advisable to make repair and replacements, or both, and the maintenance thereof are hereby granted and reserved for the benefit of the present and future Owners thereof. The easements for encroachment herein granted and reserved shall run with the land.

ARTICLE XI

MISCELLANEOUS

11.1 Interpretation of the Covenants. Except for judicial construction, each Association, by its Board, shall have the exclusive right to construe and interpret the provisions of this Declaration applicable to such Association. In the absence of any adjudication to the contrary by a court of competent jurisdiction, the Association's construction or interpretation of the provisions hereof shall be final, conclusive, and binding as to all persons and property benefited or bound by the covenants and provisions hereof.

11.2 Severability. Any determination by any court of competent jurisdiction that any provision of this Declaration is invalid or unenforceable shall not effect the validity or enforceability of any of the other provisions hereof.

11.3 Rule Against Perpetuities. Each provision contained in this Declaration which is subject to the laws or rules sometime referred to as the rule against perpetuities or the rule prohibiting unreasonable restraints or alienation shall continue and remain in full force and effect for the period of twenty-one (21) years following the death of the last survivor of the issue of John Gust and the now living children of such issue, or until this Declaration is terminated as

herein provided, whichever first occurs. All other provisions contained in this Declaration shall continue and remain in full force and effect in accordance with Section 9.1 hereof.

11.4 Rules and Regulations. In addition to the right to adopt rules and regulations on the matters expressly mentioned elsewhere in this Declaration, each Association shall have the right to adopt rules and regulations with respect to all other aspects of the Association's rights, activities, and duties, provided such rules and regulations are not inconsistent with the provisions of this Declaration.

11.5 General Reservations. Declarant reserves the right to grant, convey, sell, establish, amend, release, and otherwise deal with easements, reservations, exceptions, and exclusions with respect to the Property which do not materially interfere with the best interests of Owners and/or an Association including, but not limited to, access and utility easements, road easements, pedestrian and equestrian easements, pedestrian and hiking trails, and easements and drainage easements.

11.6 Run with the Land. Declarant for itself, its successors, and assigns, hereby declares that all of the Property shall be held, used, and occupied subject to the provisions of this Declaration, and to the covenants and restrictions contained herein, and that the provisions hereof shall run with the land and be binding upon all persons who hereafter become the Owner of any interest in the Property.

IN WITNESS WHEREOF, Declarant has executed this Declaration this 23rd day of October, 2006.

ARBOR GARDNER, L.C., a Utah limited liability company

By: _____

Name: John Crust

Title: Manager

STATE OF UTAH)
: ss.
COUNTY OF Salt Lake)

The foregoing instrument was acknowledged before me this 23rd day of October, 2006, by John Crust, the Manager of Arbor Gardner, L.C., a Utah limited liability company.

_____
Notary Public

My Commission Expires: 4/19/08

Notary Public
KRISTEN THOMAS
3375 South 8480 West
Magna, Utah 84044
My Commission Expires
April 19, 2008
State of Utah

COMMON AREAS, PRIVATE ROADS AND LOTS 1 THROUGH 52, THE VILLAGE AT RIVERWALK A PLANNED RESIDENTIAL DEVELOPMENT AS RECORDED IN THE OFFICE OF THE SALT LAKE COUNTY RECORDER IN BOOK 2005P AT PAGE 278 AS ENTRY NO. 9478426.

ALSO BEING DESCRIBED AS FOLLOWS:

BEGINNING AT A POINT WHICH IS N0°04'29"E 98.24 FEET AND S89°44'17"E 2005.28 FEET AND N22°38'54"W 110.83 FEET FROM THE SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN;

RUNNING THENCE N00°28'10"W 695.31 FEET; THENCE N08°24'59"W 389.91 FEET; THENCE N89°31'50"E 16.32 FEET TO A POINT ON THE WEST LINE OF THE JORDAN RIVER PARKWAY AS SURVEYED BY FLOYD LYLE PAGE (LS NO.4614) OF THE UTAH DEPARTMENT OF TRANSPORTATION (SALT LAKE COUNTY SURVEYORS OFFICE RECORD OF SURVEY (S89-07-0333); THENCE SOUTHERLY ALONG THE WEST LINE OF SAID RIVER PARKWAY THE FOLLOWING SIX (6) COURSES AND DISTANCES: (1) S55°22'54"E 194.64 FEET; (2) S08°23'17"E 30.88 FEET; (3) S55°22'54"E 123.13 FEET TO A POINT OF CURVATURE; (4) THENCE SOUTHEASTERLY 145.51 FEET ALONG THE ARC OF A 351.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS S43°30'21"E 144.47 FEET) TO A POINT OF TANGENCY; (5) S31°37'46"E 1061.22 FEET TO A POINT OF CURVATURE; (6) SOUTHERLY 139.56 FEET ALONG THE ARC OF A 316.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS S18°58'38"E 138.43 FEET) TO A POINT OF TANGENCY; THENCE S06°19'29"E 569.16 FEET TO A POINT ON AN EXISTING OLD ESTABLISHED FENCE LINE; THENCE WESTERLY ALONG SAID OLD ESTABLISHED FENCE LINE THE FOLLOWING TEN (10) COURSES AND DISTANCES: (1) S89°43'10"W 11.03 FEET; (2) N87°45'24"W 65.32 FEET; (3) N87°56'44"W 150.00 FEET; (4) N87°36'23"W 73.09 FEET; (5) S89°49'44"W 47.95 FEET; (6) N87°32'40"W 49.14 FEET; (7) N88°41'06"W 99.83 FEET; (8) N88°47'31" WEST 107.39 FEET; (9) N88°45'37"W 252.61 FEET; (10) N88°26'22"W 236.52 FEET; THENCE N89°15'58"W 140.87 FEET; THENCE N88°55'57"W 69.25 FEET; THENCE N89°06'34"W 43.87 FEET; THENCE S89°15'03"W 74.17 FEET; THENCE S88°17'43"W 122.49 FEET; THENCE N06°00'46"E 2.86 FEET; THENCE SOUTHWESTERLY 22.66 FEET ALONG THE ARC OF A 60.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS S44°37'38"W 22.52 FEET); THENCE SOUTHERLY 165.24 FEET ALONG THE ARC OF A 286.00 FOOT RADIUS CURVE TO THE LEFT, (CHORD BEARS S17°15'28"W 162.95 FEET); THENCE S00°42'23"W 346.22 FEET; THENCE SOUTHERLY 137.61 FEET ALONG THE ARC OF A 514.00 FOOT RADIUS CURVE TO THE RIGHT (CHORD BEARS S08°22'33"W 137.20 FEET); THENCE S16°02'44"W 74.50 FEET; THENCE SOUTHERLY 35.02 FEET ALONG THE ARC OF A 486.00 FOOT RADIUS CURVE TO THE LEFT (CHORD BEARS S13°58'53"W 35.01 FEET); THENCE N88°01'19"E 204.72 FEET; THENCE S60°01'17"E 25.56 FEET; THENCE S23°47'01"E 555.53 FEET; THENCE S84°37'04"W 283.25 FEET; THENCE N05°42'39"E 128.07 FEET; THENCE N89°27'14"W 317.12 FEET; THENCE N03°30'59"W 405.39 FEET; THENCE N88°01'19"E 62.18 FEET; THENCE N00°42'34"E 180.80 FEET; THENCE S89°17'26"E 111.85 FEET; THENCE ON A 486.00 FOOT RADIUS CURVE TO THE LEFT 65.91 FEET, (CHORD BEARS N04°35'29"E 65.86 FEET); THENCE N00°42'23"E 346.22 FEET; THENCE NORTHERLY 226.34 FEET ALONG THE ARC OF 314.00 FOOT RADIUS CURVE TO THE RIGHT, (CHORD BEARS N21°21'25"E 221.47 FEET); THENCE NORTHEASTERLY 35.16 FEET ALONG THE ARC OF A 60.00 RADIUS CURVE TO THE LEFT (CHORD BEARS N25°13'18"E 34.66 FEET); THENCE NORTHERLY 17.37 FEET ALONG THE ARC OF A 50.00 RADIUS CURVE TO THE RIGHT (CHORD BEARS N18°23'18"E 17.28 FEET); THENCE N06°00'46"E 37.45 FEET; THENCE N89°17'36"W 309.93 FEET; THENCE N00°42'23"E 127.00 FEET; THENCE N89°17'37"W 4.78 FEET; THENCE N00°10'59"E 256.59 FEET; THENCE S89°17'37"E 9.51 FEET; THENCE N04°08'44"W 133.06 FEET; THENCE N09°02'05"W 176.44 FEET; THENCE N87°59'03"E 134.03 FEET; THENCE S27°51'17"E 5.02 FEET; THENCE S89°09'37"E 750.70 FEET TO THE POINT OF BEGINNING. CONTAINS 49.73 ACRES.

(CONTINUED)

LESS AND EXCEPTING ALL OF UNITS 1,2 AND 3 IN BUILDINGS 1 THROUGH 24, THE VILLAGE AT RIVERWALK A PLANNED RESIDENTIAL DEVELOPMENT AS RECORDED IN THE OFFICE OF THE SALT LAKE COUNTY RECORDER IN BOOK 2005P AT PAGE 278 AS ENTRY NO. 9478426.

SAID UNITS AND BUILDINGS ALSO BEING DESCRIBED AS:

BEGINNING AT A POINT WHICH IS NORTH 0°04' 29" EAST 98.24 FEET AND SOUTH 89°44'17"EAST 2005.28 FEET AND SOUTH 22°38'54"WEST 110.83 FEET FROM THE SOUTH QUARTER CORNER OF SECTION 11, TOWNSHIP 3 SOUTH, RANGE 1 WEST, SALT LAKE BASE AND MERIDIAN;

RUNNING THENCE NORTH 00°28'10"WEST 367.48 FEET; THENCE EAST 304.61 FEET; THENCE SOUTH 22° 40'36" EAST 571.95 FEET; THENCE SOUTH 10°11'39" EAST 128.01 FEET; THENCE SOUTHERLY 124.58 FEET ALONG THE ARC OF A NON-TANGENT CURVE TO THE RIGHT, (CHORD BEARS SOUTH 44° 48'23" EAST 117.26 FEET); THENCE SOUTH 10° 29'22" EAST 234.64 FEET; THENCE SOUTH 02°51'26" EAST 93.65 FEET; THENCE SOUTH 88°42'05" EAST 143.94 FEET; THENCE SOUTH 01°17'55" WEST 132.22 FEET TO A POINT ON AN EXISTING FENCE LINE; THENCE ALONG SAID FENCE LINE THE FOLLOWING EIGHT (8) COURSES AND DISTANCES (1) NORTH 87°56'44" WEST 58.66 FEET; (2) NORTH 87°36'23" WEST 73.09 FEET; (3) SOUTH 89°49'44"WEST 47.95 FEET; (4) NORTH 87°32'40" WEST 49.14 FEET; (5) NORTH 88°41'06" WEST 99.83 FEET; (6) NORTH 88°47'31" WEST 107.39 FEET; (7) NORTH 88°45'37" WEST 252.61 FEET; (8) NORTH 88°26'22" WEST 114.36 FEET; THENCE NORTH 24°43'25" EAST 221.13 FEET; THENCE WESTERLY 27.96 FEET ALONG THE ARC OF A 44.00 FOOT NON-TANGENT RADIUS CURVE TO THE RIGHT, (CHORD BEARS NORTH 77°51'17"WEST 27.49 FEET); THENCE NORTHWESTERLY ALONG THE ARC OF 255.00 FOOT NON-TANGENT RADIUS CURVE TO THE RIGHT, (CHORD BEARS NORTH 52° 00'48" WEST 67.79 FEET); THENCE NORTHWESTERLY 38.13 FEET ALONG THE ARC OF A 109.86 FOOT NON-TANGENT CURVE TO THE RIGHT, (CHORD BEARS NORTH 34° 25'51" WEST 37.94 FEET); THENCE NORTH 30°23'26" WEST 20.23 FEET; THENCE NORTH 29°08'07" EAST 147.02 FEET; THENCE NORTH 20°41'51" EAST 71.13 FEET; THENCE NORTH 93.25 FEET; THENCE NORTH 21°23'24" WEST 98.16 FEET; THENCE NORTH 21°23'24" WEST 32.09 FEET; THENCE NORTH 22°38'50" WEST 110.83 FEET TO THE POINT OF BEGINNING.

ALSO LESS AND EXCEPTING THAT PORTION KNOWN AS PARCEL "A" OPEN SPACE, AS REFERENCED ON THE AFFOREMENTIONED PLAT MAP FOR THE VILLAGE AT RIVERWALK A PLANNED RESIDENTIAL DEVELOPMENT.

SIDWELL Nos. 27-14-276-026, 27-11-476-025, 27-14-226-019, 27-14-226-020, 27-14-226-021, 27-14-226-022, 27-14-203-024, 27-14-203-028, 27-11-451-018, 27-11-476-019, 27-14-203-030, 27-14-203-020.

GARY W. OTT
RECORDER, SALT LAKE COUNTY, UTAH
750 RAY QUINNEY & NEBEKER
PO BOX 45385
SLC UT 84145-0385
9887649
Book 9370 Pages 6729-6753
10/25/2006 03:06 PM 69.00

SALT LAKE COUNTY RECORDER OFFICE
750 RAY QUINNEY & NEBEKER
Date: 10/25/2006 Time: 15:07
By: EPH Source: WI
Rec#: 30633575

From: 9887649 To: 9887649
040 RECORDING FEE
1 @ 69.00 69.00

TOTAL: $ 69.00

CHK 69.00
CHANGE: 0.00

THANK YOU!

Shane Greenwood

From: Jed Bell
Sent: Tuesday, July 17, 2007 11:07 AM
To: Shane Greenwood
Subject: Anna Florin

Shane,
I was told to inform you on the history/out come of the fence issue with Anna Florin so you can update the project chart.

7-2-07 I was informed by Greg Schindler that Anna Florin wanted the existing fence moved to the property line adjacent to the new Vinyl fence.
7-4-07 I spoke with Gary Whatcott and was told the City has met the requirements of the agreement with her and the City will not move the fence.
7-9-07 I spoke with Rick Horst and he said before we respond on whether SJC will move the fence , see if she will except a letter stating she will not lose the 10' of property between the chain link and the vinyl fence.
7-9-07 I spoke with Anna and she was going to talk with her husband about accepting a letter from the City.
7-1107 I called Anna back to check the status on the letter and she stated that they didn't need a letter and would move the fence their selves. She requested an access from Baxter Dr. and permission to install a gate on the vinyl fence. I told her I would look into it and get back to her.
7-12-07 After discussing her request with Rick Horst I informed her that the road is private and the City could not authorize an access from it or give her permission to install a gate. She asked if we could survey her property corners for her and I told her if she wanted to get the coordinates from the County I would help her with that. I also told her that she may want to have a licensed surveyor install her stakes and that the City could not guaranty the accuracy. She said she would get back to me if she needed my help.

Thanks for your time and consideration,

Jed A.Bell
City of South Jordan
Construction Manager

e-mail jbell@sjc.utah.gov
Office (801) 253-0615
Fax (801) 253-0617

April 3, 2006

Arbor Development
Attn: Mike Maddox
45 West 10000 South, Suite 301
Sandy, UT 84070

Re: Keystone Retaining Wall along Jordan Creek Drive

Dear Mike,

The City has received and reviewed a copy of the IGES letter sent to Arbor Homes dated February 28, 2006. The City understands that IGES has many concerns with the Keystone retaining wall built for the Jordan Creek Drive roadway in The Village at Riverwalk development.

Several times during the construction of the wall, the City requested that Arbor contract a geo-technical engineer (IGES) to perform MSE construction observations. Yet despite the City's repeated requests, Arbor continued to move forward performing their own monitoring and documentation of the work as well as relying on the contractor's expertise.

Based on this understanding, the City is requesting some information from Arbor Development. What is Arbor's intent in mitigating the stability concerns with the MSE wall presented in the report by IGES? Has Arbor supplied additional documentation to IGES for further assessment of the present stability of the structure?

If you have any questions please feel free to contact me at your earliest convenience.

Sincerely,

Shane Greenwood
Senior Engineer

cc: Brad Klavano
John Geilmann

Mayor	William Kent Money
Council Member	Brian C. Butters
Council Member	David W. Colton
Council Member	Bradley G. Marlor
Council Member	Larry Short
Council Member	Leona Winger

SOUTH JORDAN
U T A H

City Manager	Ricky A. Horst
Deputy City Manager	Gary Whatcott
Assistant City Manager, Municipal Services	I. Robert Wall
Director, Operations	Don Bruey
City Engineer/Director, Engineering	Brad Klavano
Director, Community Development	Brian Preece
Director, Strategic Planning & Budgets	Cliff Strachan

MUNICIPAL SERVICES
1600 West Towne Center Drive/ South Jordan, UT 84095/ Telephone (801) 254-3742 / Fax (801) 253-5235
e-mail: info@sjc.utah.gov, www..sjc.utah.gov

IGES
4153 South Commerce Drive, Salt Lake City, Utah 84107
Ph: 801.270.9400 Fax: 801.270.9401

TRANSMITTAL

TO: South Jordan City c/o Jeremy Nielson 10996 South Redwood Road South Jordan, UT 84095	DATE: February 28, 2006 IGES JOB #:00789-001 SENT VIA: US Mail

We are sending you the following:

Copies	Date	Description
1	2/28/06	Construction Observations for Jordan River Drive Retaining Wall

☐ For approval	☐ Approved as submitted	☐ Resubmit	☐ Copies for approval
☐ For your use	☐ Approved as noted	☐ Submit	☐ Copies for distribution
☐ As requested	☐ Returned for corrections	☐ Return	☐ Corrected prints
☐ For your review and comment	☐ Other _____		

Remarks:

Jeremy-

Let me know if you have any questions.

SIGNED: Jared

IGES
Intermountain GeoEnvironmental Services, Inc.
4153 South Commerce Drive - Salt Lake City, Utah 84107 - T: (801) 270-9400 - F: (801) 270-9401

February 28, 2006

Arbor Homes
c/o Mike Maddox
45 West 10000 South, Suite 301
Sandy, UT 84070

Subject: Construction Observations
Keystone Retaining Wall
Jordan River Drive near Mulligan's Golf Course
South Jordan, Utah

Mr. Maddox

On October 17, 2005 IGES, Inc. was contacted by Arbor Homes to perform observation of retaining wall construction for the proposed Jordan River Drive in South Jordan, Utah. In September 2004 IGES completed the initial Geotechnical Investigation Report (IGES Job # 00605-001) for South Jordan City and outlined our recommendations for proposed construction including design of a Mechanically Stabilized Earth (MSE) wall using Keystone® modular blocks.

At the time of Arbor Homes request for observation, construction of the retaining wall was largely complete; the retaining wall had nearly reached design elevation through most of the proposed alignment when we conducted our initial construction observation on October 21, 2005. It is our understanding that during the course of excavation for retaining wall construction, a significant quantity of waste was encountered near the design maximum section of the wall. Arbor Homes reported to us that the removal of the waste required overexcavation of approximately 10-12 feet below the original design grade for the wall foundation. Geotextile fabric was placed over the top of native soil along the entire length of the retaining wall and engineered fill was used to bring the site back to near the original grade where overexcavation had occurred.

During an October 2005 survey of the constructed wall it was determined that the constructed maximum height of the wall would be greater than the 15.33 ft design maximum wall section in order to reach the proposed road grade. At the time of our October 2005 observation, the maximum constructed section was approximately 16 feet; in subsequent discussions you indicated that the maximum wall height would eventually be ~19.5 feet.

ideas for a changing world

As we have discussed, the increased wall height is likely to have resulted from insufficient replacement of fill during removal/replacement of waste. Regardless of the cause, the increased height was not accounted for in our design and the current modified construction, may not meet the design standard safety factors that were utilized in the original design.

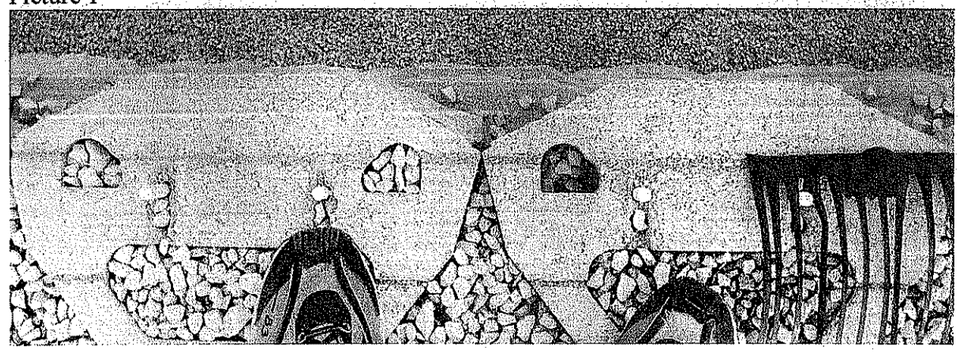
The actual depth of overexcavation was not documented by Arbor Homes; without knowing the depth and quality of fill replacement prior to construction of the wall, IGES could not construct a representative model to assess the present stability of the wall.

We did, however, recommended that a 26 ft length of geogrid reinforcement be placed between each modular block lift for the remaining height of the wall; i.e. the uppermost 4-6 feet. It is our understanding that the toe of the wall will be backfilled to compensate for the debris related overexcavation. As a result of this proposed action, the free-standing height of the wall will be nearer to the design maximum of 15.33 ft.

IGES is concerned that the placement of additional backfill may increase the consolidation settlement of native fine-grained soils below the wall and proposed road. IGES was informed that the volume of additional fill material placed due to overexcavation was recorded. However, after several months this information has not been provided to aid in our analysis of the potential for increased settlement, or the impact fill placement may have on the stability of the retaining wall.

Observed conditions during our initial construction observation site visit (October 21, 2005) were photographed and documented. Because much of the MSE backfill placement had been completed prior to our site visit, areas of concern such as reinforcement length/overlap and quality of backfill could not be observed. IGES can only assume that observations made at the time of our site visit are indicative of construction practices at lower elevations in the wall. Some of the pictures have been included in this letter to illustrate areas of concern.

Picture 1

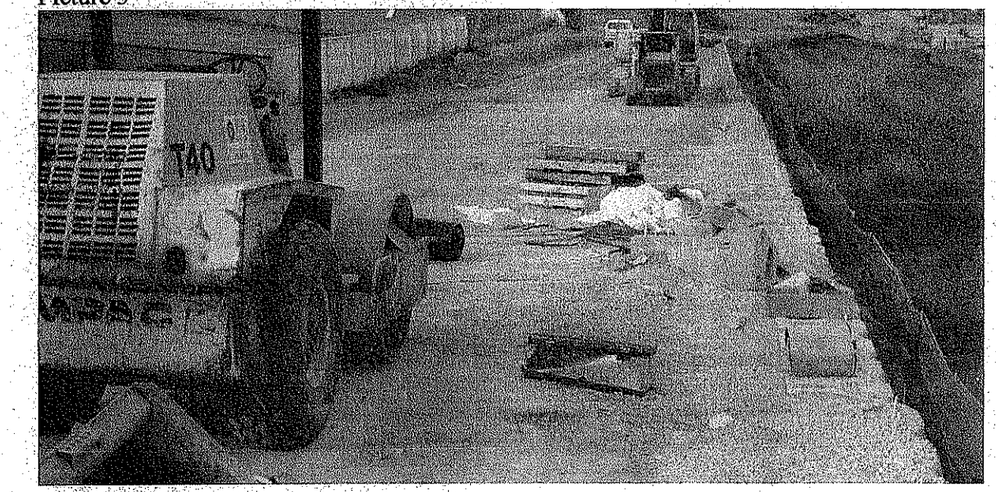


As shown in Picture 1 the retaining wall was constructed without the recommended "back-batter." In general, this would not adversely impact the overall stability of the wall; however, if slight movements occur the wall may appear to be tipping forward. Larger movements associated with settlements potentially generated by proposed toe berm fill, however, may result in unacceptable reverse wall batter and potential destabilization of the block face.

Picture 2

Geogrid reinforcement should be continuous throughout each course of the wall construction. The manufacturer's installation details provided with our report clearly show and describe the need to overlap panels on curves to maintain the continuous reinforcement. The majority of the reinforcement was installed and covered prior to our site visit; however, 3-6 inch gaps were observed between exposed geogrid panels, we can only assume that this method of placement is representative of installation performed prior to our observations. This is of particular concern where the wall curves/bends and a gap between adjacent grids at the wall grows toward the back of the reinforcement.

Picture 3



As recommended in our design report only hand compaction equipment should have been used within 3 feet of the back of the wall. During our visit no hand compaction equipment was observed on site.

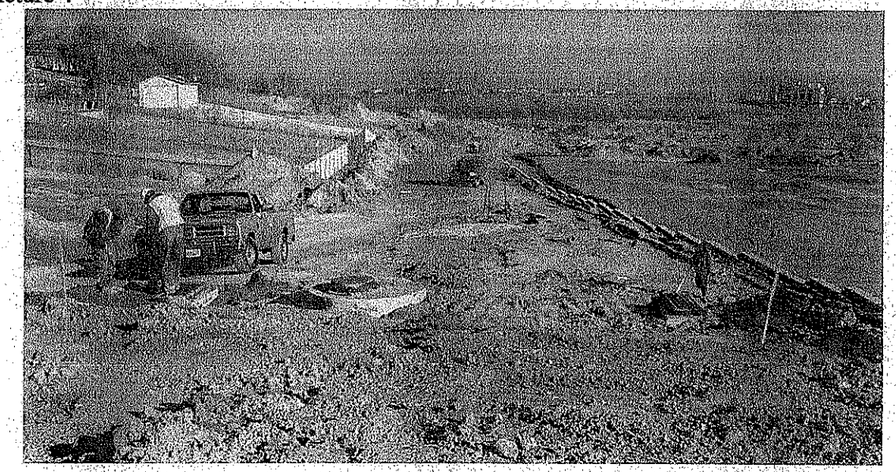
In addition to these observations, the design of the retaining wall assumed an appropriate amount of testing would be performed during construction to verify appropriate compaction of backfill soils. IGES requested documentation from Arbor Homes and was informed that the wall subcontractor could provide it; however, this documentation has not been made available to IGES.

As mentioned previously, IGES has requested information regarding the volume of additional required backfill in order to determine the impacts on the wall design, if any. At the time of this letter, the information has not been provided by Arbor Homes and additional evaluation of the wall has not been performed. Other than telephone contact with Arbor Homes IGES was not involved in completion of wall construction since the time of our initial site visit in October 2005.

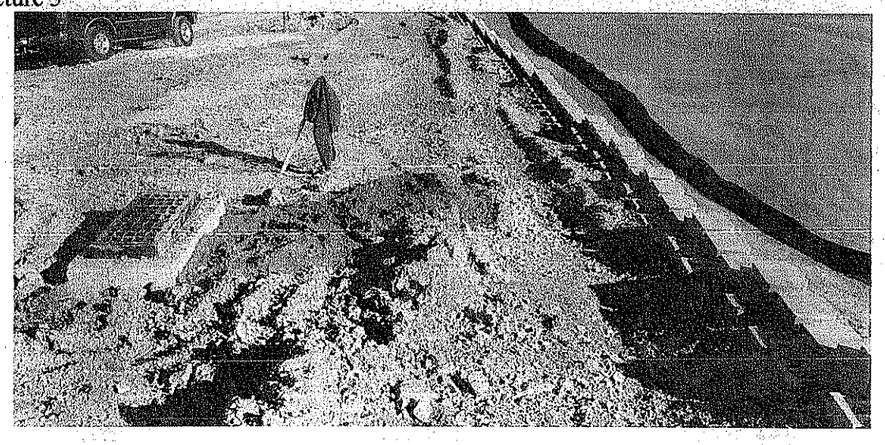
On February 8, 2006 IGES was again contacted by Arbor Homes and notified that excavation during utility installation had disturbed some of the upper layers of geogrid reinforcement. Based on the description of the installation we contacted a representative of the geogrid manufacturer (Tensar) to coordinate a site visit. This was done so that Tensar could be involved in selecting a repair strategy compatible with their product. The utility installation in question consists of two storm drain catch basins and a storm drain collector which are located near the maximum wall section. The following pictures show the installed storm

drain features in relation to the constructed wall, these photographs were taken on February 13, 2006.

Picture 4



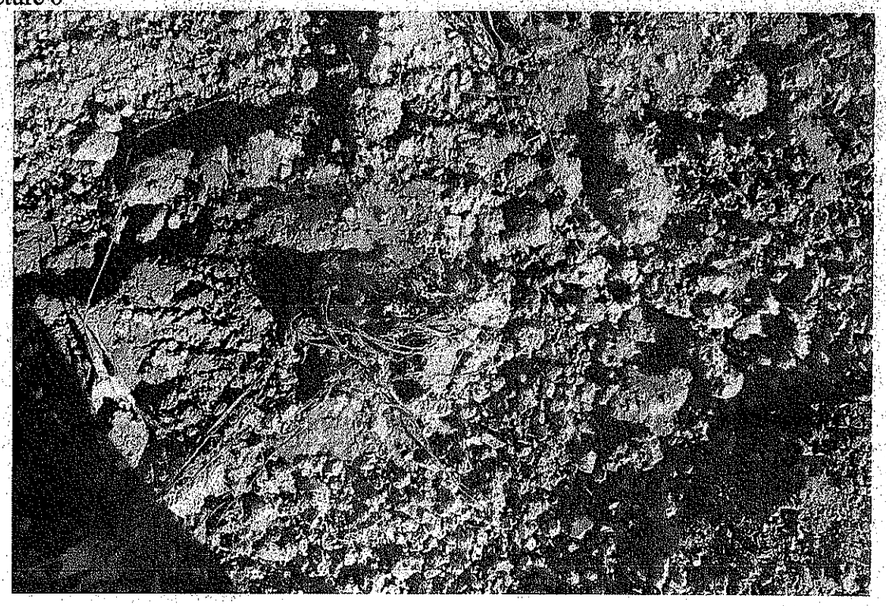
Picture 5



Excavation for the catch basins extended to ~3.5-4 feet below the top of the completed wall. The basin located nearest the wall is approximately 10 ft from the back of the wall. The top layers of geogrid reinforcement placed between each 8 in. block/lift should have been at least 26 feet long, because they have been cut at this section the top 4-6 layers of geogrid are now less than half of that length.

IGES spoke with representatives of Earth Movers (the utility installation contractor) who were completing backfill around the storm drain facilities. Their site personnel were not aware that the geogrid they cut through was part of the wall reinforcement; they also stated that an inspector from South Jordan City was on-site during excavation and did not indicate that there was anything wrong with cutting the reinforcement. IGES also observed that the upper portions of soil backfill immediately uphill of the storm drain facilities were rutted from equipment traffic which appears to have been used during utility installation. Some geogrid had been brought to the surface as shown in the following pictures.

Picture 6



Picture 7

Based on these limited observations it is unclear how extensive the damage to this reinforcement has been and how much the effectiveness of this geogrid has been compromised as a result of utility installation.

Also observed during our site visit on February 13, 2006 was water collecting in a depression where a spring was observed during our field investigation and previous site visits.

Picture 8

As stated in our report, flow from this spring was to have been transmitted through a closed pipe to minimize hydrostatic pressures behind the wall. During previous site visits spring water was always observed to be flowing from the depression into a pipe through which it was transported to wetland areas in the golf course below the wall. We are unsure what measures, if any, were taken to improve this bypass. The fact that water was ponding in a low area indicates that new measures are not adequate, or that the existing pipe has been damaged and is not transmitting water as previously observed.

CONCLUSIONS

During the construction of the wall, site conditions dictated a modification be made to IGES's original design. These changes, though not unnecessary, were made without consulting IGES, Inc. or another engineer in order to account for their impacts to road construction and the wall design. Based on our observations and discussions with Arbor Homes and various subcontractors at the site, the retaining wall, in general, resembles our design, but we cannot verify that it was constructed as designed. The resulting wall may not meet commonly accepted safety factors for MSE walls.

In our original design report, IGES indicated the potential for damage during utility installation/ maintenance behind the wall. Recommendations to limit potential damages were also presented, but it is apparent that these recommendations were neither followed by South Jordan City in planning for utility installation, nor were they relayed to contractors and subcontractors who are performing the work.

In as much as IGES was not involved during a majority of the MSE wall construction or design modification made by others during construction, IGES is not in a position to either say the wall, as it presently exists, is stable, safe or in general conformance with the original intent of our design.

The opinions presented herein are based on a limited review of only the data presently made available to IGES and limited site observations. Further investigation and review of construction documentation would be required to facilitate any further assessment of the present stability of the structure. No representation, warrantees or other opinions are made relative to the current condition of the subject wall or its ability to function as its original design intended.

Should you have any questions regarding this letter, please do not hesitate to contact us at your convenience (801) 270-9400.

Sincerely,
IGES, Inc.

Jared A. Hawes, P.E.
Staff Engineer

Reviewed by

John F. Wallace, P.E.
Principal

REGISTERED PROFESSIONAL ENGINEER
JOHN F. WALLACE
157837
STATE OF UTAH

cc: Jeremy Nielson, South Jordan City
Branden Reall, P.E., Tensar

Municipal Services Group

August 23, 2006

Arbor Development
Attn: Mike Maddox
45 West 10000 South, Suite 301
Sandy, UT 84070

Re: Geotechnical Review of Keystone Retaining Wall along Jordan Creek Drive

Dear Mike,

The City has received and reviewed a copy of the Geotechnical Design Services Inc. report sent to Arbor Homes dated May 28, 2006. The report is a Geotechnical review of the Keystone Retaining Wall structure along Jordan Creek Drive at the Village at Riverwalk Subdivision, South Jordan.

Based on the information in the report, the City accepts and approves the wall. It is the City's position that Arbor Development shall be responsible for any repairs due to any future settling or failures of the wall. In addition to the fact that The Village at Riverwalk is a private development, the Home Owners Association shall be responsible for the wall maintenance.

If you have any questions please feel free to contact me at your earliest convenience.

Sincerely,

Shane Greenwood
Senior Engineer

Emailed to Mike 9/14/06

Please sign and return acknowledging receipt of this letter.

Arbor Maddox

cc: Brad Klavano
John Geilmann

Council Member-Brian C. Butters
Council Member-David W. Colton
Council Member-Bradley G. Marlor
Council Member-Larry Short
Council Member-Leona Winger

SOUTH JORDAN
UTAH

Mayor-William Kent Money

City Manager-Ricky A. Horst

1600 West Towne Center Drive / South Jordan, UT 84095/ Telephone (801) 254-3742 / Fax (801) 253-5235
e-mail: info@sjc.utah.gov http://sjc.utah.gov

GEOTECHNICAL DESIGN SERVICES INC.
6000 South Fashion Blvd, Murray, Utah 84107
(801)262-0191 phone/ 262-3336 fax

September 13, 2006
GDS Job No. 010-06-129

EXTRA
REC'D SEP 1 9 2006
COST CODE
DATED

Arbor Gardner
45 West 10000 South
Sandy, Utah 84070

Attention: Mr. Mike Maddox

Re: Geotechnical Review of Keystone Retaining Wall
Jordan Creek Drive at Riverwalk Subdivision
South Jordan, Utah

Gentlemen:

Introduction

In accordance with your request, GDS has reviewed the completed Keystone Retaining Wall for the above referenced project. This letter summarizes the results of our review and our opinions concerning the condition and expected performance of this wall.

Information provided for this review by Arbor Gardner included the following documents:

1. Geotechnical Investigation, The Village At River Walk Development, Approximately 700 West 10200 South, South Jordan, Utah, Prepared for Arbor Commercial/Residential, 45 West 10000 South, Suite 301, Sandy, Utah 84070, AGEC Project No. 1040659, August 24, 2004.

2. Site Geotechnical Investigation, Jordan River Drive, South Jordan, UT, prepared for South Jordan City, c/o Jeremy Nielson, 1600 West Towne Center Drive, South Jordan, Ut 84095, by IGES Inc., 4153 South Commerce Drive, Salt Lake City, Utah 84107, September 24, 2004.

3. Geotechnical Consultation, MSE Retaining Walls, The Village at Riverwalk, Approximately 10200 South 700 West, South Jordan, Utah, AGEC Project No. 1050873, dated September 9, 2005.

4. Daily Reports of Observations, Special Inspection and Testing, with accompanying Fill Observation and Testing Reports, dated 8/29/2005 to 10/31/2005, by AGEC, East Sandy Parkway, Sandy, Ut. 84070.

5. Construction Observations, Keystone Retaining Wall, Jordan River Drive near Mulligan's Golf Course, South Jordan, Utah, for Arbor Homes, 45 West 10000 South, Suite 301, Sandy, Utah 84070, by IGES Inc., 4153 South Commerce Drive, Salt Lake City, Utah 84107, February 28, 2006.

6. Printouts of digital photos presenting different stages of the construction of the modular block retaining wall supporting Jordan River Drive.

7. Invoice Nos. 615398, 624480, 624481, 624482, 620284, 620283, and 620287 from Geneva Rock Products, for 1 1/2-inch minus rock, 3/4-minus rock, 3-inch minus fill, 3/4-inch UDOT road base materials delivered to the project site between September 7, 2005 and September 30, 2005.

Situation

Arbor Homes began development of the Riverwalk project in 2005 (see Reference 1, above). As part of this construction, it was necessary to build a road into this area from 106th South. This access road (Jordan Creek Drive) included the construction of a Keystone Retaining Wall for support of a portion of the road. This wall had been previously designed for this road alignment by IGES for City of South Jordan, as outlined in Reference No. 2, above.

During the construction of this road, some trash fill materials were encountered in the foundation of wall near the maximum section. These materials were over-excavated and replaced and the wall completed over the top of this zone. Subsequent to the wall construction, utilities, including storm drains were installed in the roadway. Quality assurance testing of the wall is presented in Reference 4, above.

In October of 2005, the original wall designers, IGES, were requested to observe the wall, so that a report could be provided to South Jordan City regarding the wall construction and compliance with project requirements. As discussed in their letter (see Reference 5 noted above), IGES has noted some concerns with the wall construction, which are outlined as follows:

1. The total constructed height of the maximum section of the wall ended up being 19.5 feet instead of the originally designed 15.33 feet. The total exposed height of the completed wall after construction was subsequently identified as 15.33 feet, due to some fill placement at the toe.

2. The actual depth of the over-excavation beneath the wall could not be verified for record purposes.

3. The placement of additional backfill may increase consolidation and/or affect stability of the wall.

4. Spaces between the geogrid panels on the order of three to six inches (shown in photographs) are apparent as well as wider spacing between panels diverging along inside radius curves. IGES noted that this implies under-reinforcement in these areas.

5. The retaining wall was not constructed with the recommended face batter of 7.1 degrees. This may result in a visual affect of the wall tipping forward, should any additional settlement occur.

6. Utility placement in February of 2006 was conducted, which included placement of two storm drain catch basins and a collector pipe near the maximum wall section. The top layers of geogrid placed at these locations were to have been 26 feet long, but were cut in the process of excavation to a length of 10 feet from the wall face.

7. Rutting in the road during February by construction equipment exposed the top layer of geogrid at some locations, raising the question of potential geogrid damage.

8. IGES stated that pertinent quality assurance reports outline fill placement conditions and depth of over-excavation was promised but not provided to them.

Based upon the many questions which these observations raised, IGES alleged that the wall as constructed is different from their original design. IGES stated that it is not possible for them to determine whether the wall as constructed will meet current minimum factors of safety or perform to the intent of their design.

Subsequent to the IGES letter, Arbor Homes requested that Geotechnical Design Services Inc. (GDS) review the project data and the condition of the wall with the intent of determining if the wall would meet industry standard factors of safety and perform satisfactorily. GDS was provided with the documents outlined above and requested to observe the completed wall.

Geotechnical Design Services observed the conditions at the wall on or about March 15, 2006. At this time, it was observed that the wall face disclosed no significant distortions indicative of either differential settlement or pullout or internal failure. No cracking was observed behind the wall face. In general, the wall appeared to be performing in accordance with the project intent. The wall had by this time been completed for about four months.

Analysis of Retaining Wall

A review of the planned cross-section of the wall indicates that the minimum UX1400SB mat lengths of 10.5 feet at the base of the cross-section and the maximum lengths of 26 feet at the top are more than sufficient to maintain a cross-section height of 15.33 feet. As an example, a simple "KEYWALL" analysis (KeyStone Retaining Wall Wall Systems, Ver 1a, July, 1997, design software) requires only a 9.5 foot mat for a 15 foot wall and an 11.5 foot mat for an 18 foot wall. The inclusion of longer mats at the top allows the grid to more uniformly reinforce the base of the roadway, as well.

Further, typical walls designed for variable base applications (usually done with shorter mats on the bottom and longer mats for the top one-third to one-half of the cross-section) usually allow the base to be shortened up to 40% of the height (as low as 7 feet in this case). This is done only if the top segment is lengthened to 80 to 100 percent of the height (as long as 15 feet, in this instance).

By either criteria, the final wall cross-section appears to be adequate for mat length, even in the case of the storm drain catch basins. At these locations, mats were cut to ten feet long behind the block face. Because this only occurs in a short segment (roughly six feet), it is not expected that mats slightly shorter than required would initiate pullout. This is partly because of the buttressing provided by deeper wall segments on either side as well as the fact that the storm drain structure partially relieves the lateral pressure against the back of the wall.

As significant as the mat lengths is the material placement. Typical granular material appears to have been imported and placed to relatively high, in-place densities, according to the AGEC records made available to GDS (see Reference No.4, above). The test results appear to have been consistent with good practice throughout. No notes were presented that indicated the wall contractor was having difficulty with the materials on site.

Concerns about the small spacings between geogrid panels are also probably not an issue. The IGES design report (Reference No. 2) specifically allows for adjacent panels to have no panels added for mats on inside curves, as long as the interior angle between the mats does not exceed 20 degrees. In no case on this wall do any inside curves begin to approach this condition, therefore the inside curves on this project are not, by definition, required to have additional mats placed. As for the 3- to 6-inch spacing present along straight portions of the wall, there is sufficient redundancy in the system and arching between the mats so as to more than bridge this gap and provide uniform support to the wall. It has been our experience on a large number of projects that this type of construction joint is very common and we have not observed any deviant wall behavior that could be attributed to such a gap in the reinforcing.

The wall face was constructed with the nominal batter of 3.1 degrees. It is our opinion that this will have no affect on the serviceability of the wall. It may be that some settlement will occur to plumb up the face; this is entirely a perception and facade issue and will not affect the wall serviceability, regardless, unless so much settlement occurs as to begin toppling of the face block. In that case, it is unlikely that the deviation in the angle as designed and the angle used in the field will make any difference in the end.

The over-excavation at the base of the maximum section was not plotted or carefully surveyed out during the process of fill placement. This is not an uncommon procedure. Typically the contractor is required by the geotechnical engineer to remove all deleterious material to a depth of at least four feet (see Reference No. 3) below pavement areas, but this is done on-site, as it is encountered. Fill Observation and Testing Records indicate that material was removed and replaced to a depth of as much as 12 feet in the area between Stations 21+00 to 24+50. Replacement fill was adequately compacted to support the retaining wall. Photographs and material quantities trucked to the site indicate a substantial effort was performed (see Reference Nos. 5, 6, and 7, above).

Potential geogrid damage during rutting, while possible, is usually not significant. Geogrids placed at the top are under the least stress of all the layers, and consequently have the most reserve strength. It is not expected that sufficient damage would be likely as to impact the wall performance.

Finally, while some added consolidation settlement may occur due to the increased overall section height, it should be recognized that the driving force in consolidation is the net change in load. The additional weight adds only a small percentage and is not likely to make much difference in the total settlement.

All of these considerations and observations are made from the standpoint of overall serviceability and wall suitability. It was not possible for GDS to observe any portion of the wall cross-section during construction, and so our conclusions are subject to some qualification. Some localized anomalies are expected. In such instances, each problem must be dealt with as they occur, and considered as a separate, on-going maintenance issue. Reinforced soil is, in general, a very resilient and versatile technique, and it is expected that many, if not most of any internal deficiencies which may be present, will be absorbed by the performance of the wall in its entirety.

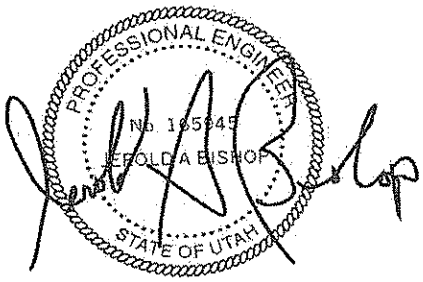
In general, however, based solely on the information available, it is our opinion that the Keystone Retaining Wall constructed for support of Jordan Creek Drive meets or exceeds current industry standards and will perform to the intent of the design.

Should conditions change, or additional information become available, GDS should be informed, so that our conclusions can be revised, if necessary. No warranties are expressed or implied, only that this analysis and accompanying observations and conclusions were made consistent with engineering standards at this time.

Arbor Gardner
GDS Job No. 010–6-129
September 13, 2006

This concludes our assessment of the modular block wall constructed for support of Jordan Creek Drive. We appreciate the opportunity to be of service. If you have questions or desire additional information, please do not hesitate to call.

Respectfully Submitted,
GEOTECHNICAL DESIGN SERVICES, Inc.



Jerold A. Bishop
Professional Engineer No. 165945
State of Utah

GEOTECHNICAL DESIGN SERVICES INC.
6000 South Fashion Blvd, Murray, Utah 84107
(801)262-0191 phone/ 262-3336 fax

May 28, 2006
GDS Job No. 010-06-129

Arbor Gardner
45 West 10000 South
Sandy, Utah 84070

Attention: Mr. Mike Maddox

Re: Geotechnical Review of Keystone Retaining Wall
Jordan River Drive at Riverwalk Subdivision
Sandy, Utah

Revised

Gentlemen:

Introduction

In accordance with your request, GDS has reviewed the completed Keystone Retaining Wall for the above referenced project. This letter summarizes the results of our review and our opinions concerning the condition and expected performance of this wall.

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6. Printouts of digital photos presenting different stages of the construction of the modular block retaining wall supporting Jordan River Drive.

7. Invoice Nos. 615398, 624480, 624481, 624482, 620284, 620283, and 620287 from Geneva Rock Products, for 1 1/2-inch minus rock, 3/4-minus rock, 3-inch minus fill, 3/4-inch UDOT road base materials delivered to the project site between September 7, 2005 and September 30, 2005.

Situation

Arbor Homes began development of the Riverwalk project in 2005 (see Reference 1, above). As part of this construction, it was necessary to build a road into this area from 106th South. This access road (Jordan River Drive) included the construction of a Keystone Retaining Wall for support of a portion of the road. This wall had been previously designed for this road alignment by IGES for City of South Jordan, as outlined in Reference No. 2, above.

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1. The total constructed height of the maximum section of the wall ended up being 19.5 feet instead of the originally designed 15.33 feet. The total exposed height of the completed wall after construction was subsequently identified as 15.33 feet, due to some fill placement at the toe.

2. The actual depth of the over-excavation beneath the wall could not be verified for record purposes.

3. The placement of additional backfill may increase consolidation and/or affect stability of the wall.

4. Spaces between the geogrid panels on the order of three to six inches (shown in photographs) are apparent as well as wider spacing between panels diverging along inside radius curves. IGES noted that this implies under-reinforcement in these areas.

5. The retaining wall was not constructed with the recommended face batter of 7.1 degrees. This may result in a visual affect of the wall tipping forward, should any additional settlement occur.

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7. Rutting in the road during February by construction equipment exposed the top layer of geogrid at some locations, raising the question of potential geogrid damage.

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Geotechnical Design Services observed the conditions at the wall on or about March 15, 2006. At this time, it was observed that the wall face disclosed no significant distortions indicative of either differential settlement or pullout or internal failure. No cracking was observed behind the wall face. In general, the wall appeared to be performing in accordance with the project intent. The wall had by this time been completed for about four months.

Analysis of Retaining Wall

A review of the planned cross-section of the wall indicates that the minimum UX1400SB mat lengths of 10.5 feet at the base of the cross-section and the maximum lengths of 26 feet at the top are more than sufficient to maintain a cross-section height of 15.33 feet. As an example, a simple "KEYWALL" analysis (KeyStone Retaining Wall Wall Systems, Ver 1a, July, 1997, design software) requires only a 9.5 foot mat for a 15 foot wall and an 11.5 foot mat for an 18 foot wall. The inclusion of longer mats at the top allows the grid to more uniformly reinforce the base of the roadway, as well.

Further, typical walls designed for variable base applications (usually done with shorter mats on the bottom and longer mats for the top one-third to one-half of the cross-section) usually allow the base to be shortened up to 40% of the height (as low as 7 feet in this case). This is done only if the top segment is lengthened to 80 to 100 percent of the height (as long as 15 feet, in this instance).

By either criteria, the final wall cross-section appears to be adequate for mat length, even in the case of the storm drain catch basins. At these locations, mats were cut to ten feet long behind the block face. Because this only occurs in a short segment (roughly six feet), it is not expected that mats slightly shorter than required would initiate pullout. This is partly because of the buttressing provided by deeper wall segments on either side as well as the fact that the storm drain structure partially relieves the lateral pressure against the back of the wall.

As significant as the mat lengths is the material placement. Typical granular material appears to have been imported and placed to relatively high, in-place densities, according to the AGEC records made available to GDS (see Reference No.4, above). The test results appear to have been consistent with good practice throughout. No notes were presented that indicated the wall contractor was having difficulty with the materials on site.

Concerns about the small spacings between geogrid panels are also probably not an issue. The IGES design report (Reference No. 2) specifically allows for adjacent panels to have no panels added for mats on inside curves, as long as the interior angle between the mats does not exceed 20 degrees. In no case on this wall do any inside curves begin to approach this condition, therefore the inside curves on this project are not, by definition, required to have additional mats placed. As for the 3- to 6-inch spacing present along straight portions of the wall, there is sufficient redundancy in the system and arching between the mats so as to more than bridge this gap and provide uniform support to the wall. It has been our experience on a large number of projects that this type of construction joint is very common and we have not observed any deviant wall behavior that could be attributed to such a gap in the reinforcing.

The wall face was constructed with the nominal batter of 3.1 degrees. It is our opinion that this will have no affect on the serviceability of the wall. It may be that some settlement will occur to plumb up the face; this is entirely a perception and facade issue and will not affect the wall serviceability, regardless, unless so much settlement occurs as to begin toppling of the face block. In that case, it is unlikely that the deviation in the angle as designed and the angle used in the field will make any difference in the end.

The over-excavation at the base of the maximum section was not plotted or carefully surveyed out during the process of fill placement. This is not an uncommon procedure. Typically the contractor is required by the geotechnical engineer to remove all deleterious material to a depth of at least four feet (see Reference No. 3) below pavement areas, but this is done on-site, as it is encountered. Fill Observation and Testing Records indicate that material was removed and replaced to a depth of as much as 12 feet in the area between Stations 21+00 to 24+50. Replacement fill was adequately compacted to support the retaining wall. Photographs and material quantities trucked to the site indicate a substantial effort was performed (see Reference Nos. 5, 6, and 7, above).

Potential geogrid damage during rutting, while possible, is usually not significant. Geogrids placed at the top are under the least stress of all the layers, and consequently have the most reserve strength. It is not expected that sufficient damage would be likely as to impact the wall performance.

Finally, while some added consolidation settlement may occur due to the increased overall section height, it should be recognized that the driving force in consolidation is the net change in load. The additional weight adds only a small percentage and is not likely to make much difference in the total settlement.

All of these considerations and observations are made from the standpoint of overall serviceability and wall suitability. It was not possible for GDS to observe any portion of the wall cross-section during construction, and so our conclusions are subject to some qualification. Some localized anomalies are expected. In such instances, each problem must be dealt with as they occur, and considered as a separate, on-going maintenance issue. Reinforced soil is, in general, a very resilient and versatile technique, and it is expected that many, if not most of any internal deficiencies which may be present, will be absorbed by the performance of the wall in its entirety.

In general, however, based solely on the information available, it is our opinion that the Keystone Retaining Wall constructed for support of Jordan River Drive meets or exceeds current industry standards and will perform to the intent of the design.

Should conditions change, or additional information become available, GDS should be informed, so that our conclusions can be revised, if necessary. No warranties are expressed or implied, only that this analysis and accompanying observations and conclusions were made consistent with engineering standards at this time.

This concludes our assessment of the modular block wall constructed for support of Jordan River Drive. We appreciate the opportunity to be of service. If you have questions or desire additional information, please do not hesitate to call.

Respectfully Submitted,

GEOTECHNICAL DESIGN SERVICES, Inc.

Jerold A. Bishop
Professional Engineer No. 165945
State of Utah

GEOTECHNICAL DESIGN SERVICES INC.
6000 South Fashion Blvd, Murray, Utah 84107
(801)262-0191 phone/ 262-3336 fax

JOB
EXTRA
REC'D SEP 14 2006
COST CODE
CATEG

September 13, 2006
GDS Job No. 010-06-129

Arbor Gardner
45 West 10000 South
Sandy, Utah 84070

Attention: Mr. Mike Maddox

Re: Geotechnical Review of Keystone Retaining Wall
Jordan Creek Drive at Riverwalk Subdivision
South Jordan, Utah

Gentlemen:

Introduction

In accordance with your request, GDS has reviewed the completed Keystone Retaining Wall for the above referenced project. This letter summarizes the results of our review and our opinions concerning the condition and expected performance of this wall.

Information provided for this review by Arbor Gardner included the following documents:

1. Geotechnical Investigation, The Village At River Walk Development, Approximately 700 West 10200 South, South Jordan, Utah, Prepared for Arbor Commercial/Residential, 45 West 10000 South, Suite 301, Sandy, Utah 84070, AGEC Project No. 1040659, August 24, 2004.

2. Site Geotechnical Investigation, Jordan River Drive, South Jordan, UT, prepared for South Jordan City, c/o Jeremy Nielson, 1600 West Towne Center Drive, South Jordan, Ut 84095, by IGES Inc., 4153 South Commerce Drive, Salt Lake City, Utah 84107, September 24, 2004.

3. Geotechnical Consultation, MSE Retaining Walls, The Village at Riverwalk, Approximately 10200 South 700 West, South Jordan, Utah, AGEC Project No. 1050873, dated September 9, 2005.

4. Daily Reports of Observations, Special Inspection and Testing, with accompanying Fill Observation and Testing Reports, dated 8/29/2005 to 10/31/2005, by AGEC, East Sandy Parkway, Sandy, Ut. 84070.

5. Construction Observations, Keystone Retaining Wall, Jordan River Drive near Mulligan's Golf Course, South Jordan, Utah, for Arbor Homes, 45 West 10000 South, Suite 301, Sandy, Utah 84070, by IGES Inc., 4153 South Commerce Drive, Salt Lake City, Utah 84107, February 28, 2006.

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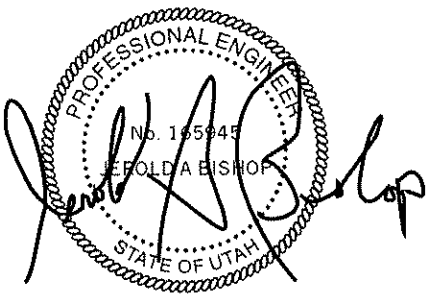


Jerold A. Bishop
Professional Engineer No. 165945
State of Utah

PARKS AND TRAILS						
Sod & Sprinkler	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Trail Regrind	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Asphalt Trail	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Tot Lot	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Parking	LF	0.00	$10.00	$0.00	$0.00	$0.00
Fencing	SQFT	0.00	$1.50	$0.00	$0.00	$0.00
Trail Improvements	LF	0.00	$30.00	$0.00	$0.00	$0.00
Pedestrian Path w/Fence	LS	0.00	$50,000.00	$0.00	$0.00	$0.00
Playground/Park Amenities		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00		
Blank						
10% Contingency				*$0.00*		
PARKS AND TRAILS SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FINISH ITEMS						
Meter Boxes	EA	76.00	$120.00	$9,120.00	$0.00	$0.00
Concrete Pad, Valves & Hydrants	EA	44.00	$175.00	$7,700.00	$0.00	$0.00
Secondary Service Risers	EA	0.00	$300.00	$0.00	$0.00	$0.00
Storm Drain Inlet Grate	EA	40.00	$300.00	$12,000.00	$0.00	$0.00
Raise Manhole	EA	28.00	$400.00	$11,200.00	$0.00	$0.00
Street Signs	EA	21.00	$200.00	$4,200.00	$0.00	$0.00
Survey Monuments	EA	0.00	$300.00	$0.00	$0.00	$0.00
Electronic Format of As-builts (.dxf)	EA	1.00	$500.00	$500.00	$0.00	$0.00
As-built Drawings (Mylar)	EA	2.00	$1,000.00	$2,000.00	$0.00	$0.00
Relocate Utility Underground	LF	0.00	$120.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank						
10% Contingency				*$4,672.00*		
FINISH ITEMS SUB-TOTAL				**$51,392.00**	**$0.00**	**$0.00**

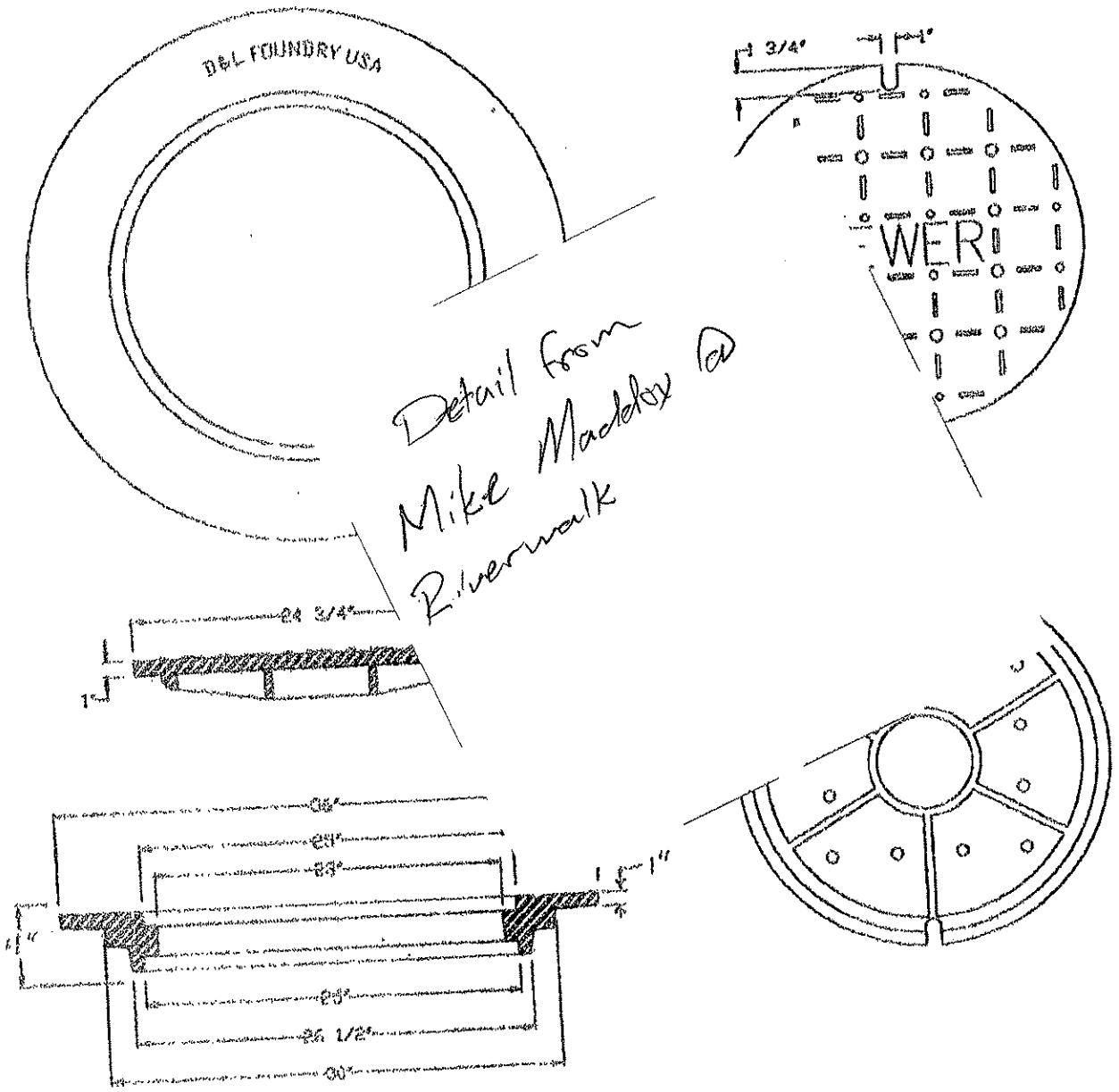
PROJECT SUB-TOTAL	$2,771,106.25
2" MILL & OVERLAY RETENTION THROUGH WARRENTY PERIOD	$99,310.40
TOTAL PROJECT BONDING AMOUNT	**$2,870,416.65**

TOTAL AMOUNT THIS BOND RELEASE	$396,298.00
AMOUNT REMAINING	$2,474,118.65

***NOTE TO DEVELOPER**

The Unit Prices, Quantities, Sub-Totals, Bond Release amounts and Project Total on this Document are ESTIMATES ONLY and are intended only to establish the Bond Amount as set forth in the Bond Agreement of which this document is an exhibit. The estimates shall not limit Developer's financial responsibility to fully complete and warrant all Improvements as required by South Jordan City ordinances and the Bond Agreement. The Developer shall be obligated to compensate the City for all costs, including incidental costs, related to the completion and warranty of the Improvements should the Bond Amount provided to the City, for whatever reason be inadequate.

B-5343 Manhole Ring and Cover



Note: Cover is interchangeable with A-1180

CAST IRON to conform to ASTM A-48, CLASS 35B H-20 Wheel Loading	D&L No. B-5343	D&L Supply — D&L Foundry, P.O.Box 1319, Moses Lake, WA 98837 — Phone: (509) 765-7952 — Fax: (509) 765-6124
	Est. weight 390 lbs.	Scale 1" = 9 3/4" — Sheet Number 1 — Total Sheets 1
Designation B-5343 — Date of Drawing MAR 1994	Prepared by D&L Supply	

EXHIBIT _____

SOUTH JORDAN CITY
BOND ESTIMATES

Date Prepared:	June 7, 2006
Prepared By:	SHANE GREENWOOD
Prepared For:	VILLAGE AT RIVERWALK
Number of Lots	76
Total Acreage:	49.73

Site Address:	10100 SOUTH 770 WEST, SOUTH JORDAN
Developer:	ARBOR RESIDENTIAL
Address:	45 WEST 10000 SOUTH, SUITE 301, SANDY UTAH 84070
Phone #:	(801) 561-8594

REVISED 6/6/06

Street Lights: 42

Fee Zone:

DESCRIPTION	UNIT of MEASUREMENT	QUANTITY	UNIT PRICE	TOTAL PRICE	BOND RELEASE	PREVIOUS RELEASES
WATER SYSTEM						
16" Water Main	LF	2200.00	$45.00	$99,000.00	$0.00	$0.00
12" Water Main	LF	0.00	$35.00	$0.00	$0.00	$0.00
10" Water Main	LF	0.00	$30.00	$0.00	$0.00	$0.00
8" Water Main	LF	7,400.00	$20.00	$148,000.00	$0.00	$0.00
14" Water Main	LF	0.00	$40.00	$0.00	$0.00	$0.00
24" Water Main	LF	0.00	$80.00	$0.00	$0.00	$0.00
16" Butterfly Valve	EA	2.00	$2,200.00	$4,400.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,200.00	$0.00	$0.00	$0.00
8" Valve	EA	25.00	$830.00	$20,750.00	$0.00	$0.00
14" Valve	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
24" Valve	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Fire Hydrant	EA	17.00	$2,500.00	$42,500.00	$0.00	$0.00
Blowoff Assembly	EA	3.00	$950.00	$2,850.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Service Connections	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Sample Stations	EA	0.00	$500.00	$0.00	$0.00	$0.00
PRV Station	EA	0.00	$28,000.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Connect to Existing System (Hot Tap)	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Meter Box	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				*$39,350.00*		
WATER SYSTEM SUB-TOTAL				**$432,850.00**	**$0.00**	**$0.00**
ROAD WORK						
Excavation	CY	11,498.00	$4.00	$45,992.00	$0.00	$0.00
Road Export	CY	0.00	$10.00	$0.00	$0.00	$0.00
Road Import/Fill	CY	4,562.00	$12.00	$54,744.00	$0.00	$0.00
Granular Fill	SQ FT	0.00	$0.55	$0.00	$0.00	$0.00
6" Road Base	SQ FT	290,440.00	$0.50	$145,220.00	$0.00	$0.00
4" Road Base	SQ FT	60,000.00	$0.30	$18,000.00	$0.00	$0.00
Curb and Gutter	LF	18,580.00	$12.00	$222,960.00	$0.00	$0.00
Waterway	LF	885.00	$28.00	$24,780.00	$0.00	$0.00
Sidewalk	SQFT	56,250.00	$2.50	$140,625.00	$0.00	$0.00
4' Sidewalk w/Road Base	LF	0.00	$11.00	$0.00	$0.00	$0.00
5' Sidewalk w/Road Base	LF	0.00	$12.00	$0.00	$0.00	$0.00
3" Asphalt	SQ FT	248,276.00	$1.00	$248,276.00	$0.00	$0.00
4" Asphalt	SQ FT	0.00	$1.35	$0.00	$0.00	$0.00
3" Asphalt with Roadbase	SQ FT	0.00	$1.50	$0.00	$0.00	$0.00
Subdivision Street Light	EA	42.00	$2,000.00	$84,000.00	$0.00	$0.00
Collector Street Light 71' R/W	EA	0.00	$3,300.00	$0.00	$0.00	$0.00
Collector Street Light 85'-111' R/W	EA	0.00	$3,800.00	$0.00	$0.00	$0.00
Temporary Access	SF	0.00	$1.50	$0.00	$0.00	$0.00
Temporary Turnaround	SF	0.00	$1.50	$0.00	$0.00	$0.00
Asphalt Cutting	LF	0.00	$0.95	$0.00	$0.00	$0.00
Handicap Ramp	EA	31.00	$200.00	$6,200.00	$0.00	$0.00
Traffic Circle	EA	0.00	$10,000.00	$0.00	$0.00	$0.00
Striping	LF	0.00	$0.81	$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				*$99,079.70*		
ROAD WORK SUB-TOTAL				**$1,089,876.70**	**$0.00**	**$0.00**

ARBOR Commercial / Residential

June 6, 2006

South Jordan City
Public Services
10996 south Redwood Road
South Jordan City, Utah 84094

Attention: Todd Heitman

Subject: The Village at Riverwalk

Gentlemen:

In consideration of work completed on water and storm systems, request a reduction on bond.

Best regards;
Mike Maddox

Mike Maddox

Project Manager

45 WEST 10000 SOUTH, SUITE 301 SANDY, UTAH 84070 Phone: (801) 561-8594 * Fax: (801) 561-8647

STORM DRAINAGE						
42" RCP	LF	1,475.00	$60.00	$88,500.00	$88,500.00	$0.00
36" RCP	LF	0.00	$55.00	$0.00	$0.00	$0.00
30" RCP	LF	875.00	$50.00	$43,750.00	$43,750.00	$0.00
24"RCP,import granular backfill	LF	1,950.00	$40.00	$78,000.00	$78,000.00	$0.00
21" RCP	LF	0.00	$38.00	$0.00	$0.00	$0.00
18" RCP,import granular backfill	LF	1,200.00	$36.00	$43,200.00	$43,200.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
12" RCP	LF	0.00	$30.00	$0.00	$0.00	$0.00
TV Storm Drain Line	LF	5,500.00	$1.00	$5,500.00	$5,500.00	$0.00
Inlet Box	EA	40.00	$1,500.00	$60,000.00	$60,000.00	$0.00
Cleanout Box	EA	28.00	$1,900.00	$53,200.00	$53,200.00	$0.00
Combination Box	EA	0.00	$2,700.00	$0.00	$0.00	$0.00
Energy Disipator Box	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
4' x 8' Storm Drain Vault	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Retention Pond Landscaping	SQ FT	98,010.00	$1.75	$171,517.50	$0.00	$0.00
Retention Basin	CY	6,037.00	$4.00	$24,148.00	$24,148.00	$0.00
Oil/Water Separator	EA	0.00	$175.00	$0.00	$0.00	$0.00
Grease Trap	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Underdrain 8"	LF	0.00	$12.00	$0.00	$0.00	$0.00
Manhole	EA	0.00	$2,500.00	$0.00	$0.00	$0.00
Side and Backyard Drainage Swale	LF	0.00	$12.00	$0.00	$0.00	$0.00
Rip Rap Channel	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Berm	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$56,781.55*		
STORM DRAINAGE SUB-TOTAL				**$624,597.05**	**$396,298.00**	**$0.00**

SECONDARY WATER SYSTEM						
8" Main Line	LF	0.00	$20.00	$0.00	$0.00	$0.00
8" Valve	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Drain Assembly	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
12" PVC Waterline (Irrigation)	LF	0.00	$26.00	$0.00	$0.00	$0.00
10" PVC Waterline (Irrigation)	LF	0.00	$24.00	$0.00	$0.00	$0.00
16" Valve	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,150.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
SECONDARY WATER SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

IRRIGATION SYSTEM						
18" RCP,import granular backfill	LF	0.00	$36.00	$0.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
Clean Out Box	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
Head Wall	EA	0.00	$800.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
IRRIGATION SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FENCE AND LANDSCAPE						
Six Foot Chain Link	LF	2,950.00	$12.00	$35,400.00	$0.00	$0.00
Six Foot Vinyl Fence	LF	1,475.00	$30.00	$44,250.00	$0.00	$0.00
Six Foot Block Wall	LF	1,650.00	$60.00	$99,000.00	$0.00	$0.00
Six Foot Concrete Panel Fence	LF	3,700.00	$60.00	$222,000.00	$0.00	$0.00
Collector Street Fencing	LF	0.00	$75.00	$0.00	$0.00	$0.00
Parkstrip Improvements	SQFT	19,780.00	$2.25	$44,505.00	$0.00	$0.00
Landscaping Tree/Irrigation/Sod	LF	0.00	$10.00	$0.00	$0.00	$0.00
Stamped Concrete	SQFT	4,725.00	$8.00	$37,800.00	$0.00	$0.00
Dyed Concrete	LF	0.00	$9.00	$0.00	$0.00	$0.00
Parkstrip Trees	EA	100.00	$300.00	$30,000.00	$0.00	$0.00
Anti-graffiti seal for concrete walls	LF	3,700.00	$2.00	$7,400.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$52,035.50*		
FENCING SUB-TOTAL				**$572,390.50**	**$0.00**	**$0.00**

ARBOR Commercial / Residential

June 6, 2006

South Jordan City
Public Services
10996 south Redwood Road
South Jordan City, Utah 84094

Attention: Todd Heitman

Subject: The Village at Riverwalk

Gentlemen:

In consideration of work completed on water and storm systems, request a reduction on bond.

Best regards;
Mike Maddox

Mike Maddox

Project Manager

45 WEST 10000 SOUTH, SUITE 301 SANDY, UTAH 84070 Phone: (801) 561-8594 * Fax: (801) 561-8647

EXHIBIT _____

SOUTH JORDAN CITY
BOND ESTIMATES

Date Prepared:	OCTOBER 31,2005
Prepared By:	SHANE GREENWOOD
Prepared For:	VILLAGE AT RIVERWALK
Number of Lots	76
Total Acreage:	49.73

Site Address:	10100 SOUTH 770 WEST, SOUTH JORDAN
Developer:	ARBOR RESIDENTIAL
Address:	45 WEST 10000 SOUTH, SUITE 301, SANDY UTAH 84070
Phone #:	(801) 561-8594

Fee Zone:

Street Lights: 42

DESCRIPTION	UNIT of MEASUREMENT	QUANTITY	UNIT PRICE	TOTAL PRICE	BOND RELEASE	PREVIOUS RELEASES
WATER SYSTEM						
16" Water Main	LF	2200.00	$45.00	$99,000.00	$0.00	$0.00
12" Water Main	LF	0.00	$35.00	$0.00	$0.00	$0.00
10" Water Main	LF	0.00	$30.00	$0.00	$0.00	$0.00
8" Water Main	LF	7,400.00	$20.00	$148,000.00	$0.00	$0.00
14" Water Main	LF	0.00	$40.00	$0.00	$0.00	$0.00
24" Water Main	LF	0.00	$80.00	$0.00	$0.00	$0.00
16" Butterfly Valve	EA	2.00	$2,200.00	$4,400.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,200.00	$0.00	$0.00	$0.00
8" Valve	EA	25.00	$830.00	$20,750.00	$0.00	$0.00
14" Valve	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
24" Valve	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Fire Hydrant	EA	17.00	$2,500.00	$42,500.00	$0.00	$0.00
Blowoff Assembly	EA	3.00	$950.00	$2,850.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Service Connections	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Sample Stations	EA	0.00	$500.00	$0.00	$0.00	$0.00
PRV Station	EA	0.00	$28,000.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Connect to Existing System (Hot Tap)	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Meter Box	EA	76.00	$500.00	$38,000.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				$39,350.00		
WATER SYSTEM SUB-TOTAL				$432,850.00	$0.00	$0.00

39,350.00

ROAD WORK						
Excavation	CY	11,498.00	$4.00	$45,992.00	$0.00	$0.00
Road Export	CY	0.00	$10.00	$0.00	$0.00	$0.00
Road Import/Fill	CY	4,562.00	$12.00	$54,744.00	$0.00	$0.00
Granular Fill	SQ FT	0.00	$0.55	$0.00	$0.00	$0.00
6" Road Base	SQ FT	290,440.00	$0.50	$145,220.00	$0.00	$0.00
4" Road Base	SQ FT	60,000.00	$0.30	$18,000.00	$0.00	$0.00
Curb and Gutter	LF	18,580.00	$12.00	$222,960.00	$0.00	$0.00
Waterway	LF	885.00	$28.00	$24,780.00	$0.00	$0.00
Sidewalk	SQFT	56,250.00	$2.50	$140,625.00	$0.00	$0.00
4' Sidewalk w/Road Base	LF	0.00	$11.00	$0.00	$0.00	$0.00
5' Sidewalk w/Road Base	LF	0.00	$12.00	$0.00	$0.00	$0.00
3" Asphalt	SQ FT	248,276.00	$1.00	$248,276.00	$0.00	$0.00
4" Asphalt	SQ FT	0.00	$1.35	$0.00	$0.00	$0.00
3" Asphalt with Roadbase	SQ FT	0.00	$1.50	$0.00	$0.00	$0.00
Subdivision Street Light	EA	42.00	$2,000.00	$84,000.00	$0.00	$0.00
Collector Street Light 71' R/W	EA	0.00	$3,300.00	$0.00	$0.00	$0.00
Collector Street Light 85'-111' R/W	EA	0.00	$3,800.00	$0.00	$0.00	$0.00
Temporary Access	SF	0.00	$1.50	$0.00	$0.00	$0.00
Temporary Turnaround	SF	0.00	$1.50	$0.00	$0.00	$0.00
Asphalt Cutting	LF	0.00	$0.95	$0.00	$0.00	$0.00
Handicap Ramp	EA	31.00	$200.00	$6,200.00	$0.00	$0.00
Traffic Circle	EA	0.00	$10,000.00	$0.00	$0.00	$0.00
Striping	LF	0.00	$0.81	$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
Blank				$0.00	$0.00	$0.00
10% Contingency				$99,079.70		
ROAD WORK SUB-TOTAL				$1,089,876.70	$0.00	$0.00

~~99,079.7~~

PARKS AND TRAILS						
Sod & Sprinkler	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Trail Regrind	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
10' Asphalt Trail	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Tot Lot	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Parking	SQFT	0.00	$0.00	$0.00	$0.00	$0.00
Fencing	LF	0.00	$10.00	$0.00	$0.00	$0.00
Trail Improvements	SQFT	0.00	$1.50	$0.00	$0.00	$0.00
Pedestrian Path w/Fence	LF	0.00	$30.00	$0.00	$0.00	$0.00
Playground/Park Amenities	LS	0.00	$50,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
PARKS AND TRAILS SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FINISH ITEMS						
Meter Boxes	EA	76.00	$120.00	$9,120.00	$0.00	$0.00
Concrete Pad, Valves & Hydrants	EA	44.00	$175.00	$7,700.00	$0.00	$0.00
Secondary Service Risers	EA	0.00	$300.00	$0.00	$0.00	$0.00
Storm Drain Inlet Grate	EA	40.00	$300.00	$12,000.00	$0.00	$0.00
Raise Manhole	EA	28.00	$400.00	$11,200.00	$0.00	$0.00
Street Signs	EA	21.00	$200.00	$4,200.00	$0.00	$0.00
Survey Monuments	EA	0.00	$300.00	$0.00	$0.00	$0.00
Electronic Format of As-builts (.dxf)	EA	1.00	$500.00	$500.00	$0.00	$0.00
As-built Drawings (Mylar)	EA	2.00	$1,000.00	$2,000.00	$0.00	$0.00
Relocate Utility Underground	LF	0.00	$120.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$4,672.00*		
FINISH ITEMS SUB-TOTAL				**$51,392.00**	**$0.00**	**$0.00**

PROJECT SUB-TOTAL	$2,771,106.25
2" MILL & OVERLAY RETENTION THROUGH WARRENTY PERIOD	$99,310.40
TOTAL PROJECT BONDING AMOUNT	**$2,870,416.65**

TOTAL AMOUNT THIS BOND RELEASE	$0.00
AMOUNT REMAINING	$2,870,416.65

***NOTE TO DEVELOPER**

The Unit Prices, Quantities, Sub-Totals, Bond Release amounts and Project Total on this Document are ESTIMATES ONLY and are intended only to establish the Bond Amount as set forth in the Bond Agreement of which this document is an exhibit. The estimates shall not limit Developer's financial responsibility to fully complete and warrant all Improvements as required by South Jordan City ordinances and the Bond Agreement. The Developer shall be obligated to compensate the City for all costs, including incidental costs, related to the completion and warranty of the Improvements should the Bond Amount provided to the City, for whatever reason be inadequate.

STORM DRAINAGE						
42" RCP	LF	1,475.00	$60.00	$88,500.00	$0.00	$0.00
36" RCP	LF	0.00	$55.00	$0.00	$0.00	$0.00
30" RCP	LF	875.00	$50.00	$43,750.00	$0.00	$0.00
24"RCP,import granular backfill	LF	1,950.00	$40.00	$78,000.00	$0.00	$0.00
21" RCP	LF	0.00	$38.00	$0.00	$0.00	$0.00
18" RCP,import granular backfill	LF	1,200.00	$36.00	$43,200.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
12" RCP	LF	0.00	$30.00	$0.00	$0.00	$0.00
TV Storm Drain Line	LF	5,500.00	$1.00	$5,500.00	$0.00	$0.00
Inlet Box	EA	40.00	$1,500.00	$60,000.00	$0.00	$0.00
Cleanout Box	EA	28.00	$1,900.00	$53,200.00	$0.00	$0.00
Combination Box	EA	0.00	$2,700.00	$0.00	$0.00	$0.00
Energy Disipator Box	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
4' x 8' Storm Drain Vault	EA	0.00	$4,000.00	$0.00	$0.00	$0.00
Retention Pond Landscaping	SQ FT	98,010.00	$1.75	$171,517.50	$0.00	$0.00
Retention Basin	CY	6,037.00	$4.00	$24,148.00	$0.00	$0.00
Oil/Water Separator	EA	0.00	$175.00	$0.00	$0.00	$0.00
Grease Trap	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Underdrain 8"	LF	0.00	$12.00	$0.00	$0.00	$0.00
Manhole	EA	0.00	$2,500.00	$0.00	$0.00	$0.00
Side and Backyard Drainage Swale	LF	0.00	$12.00	$0.00	$0.00	$0.00
Rip Rap Channel	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Berm	EA	0.00	$6,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$56,781.55*		
STORM DRAINAGE SUB-TOTAL				**$624,597.05**	**$0.00**	**$0.00**

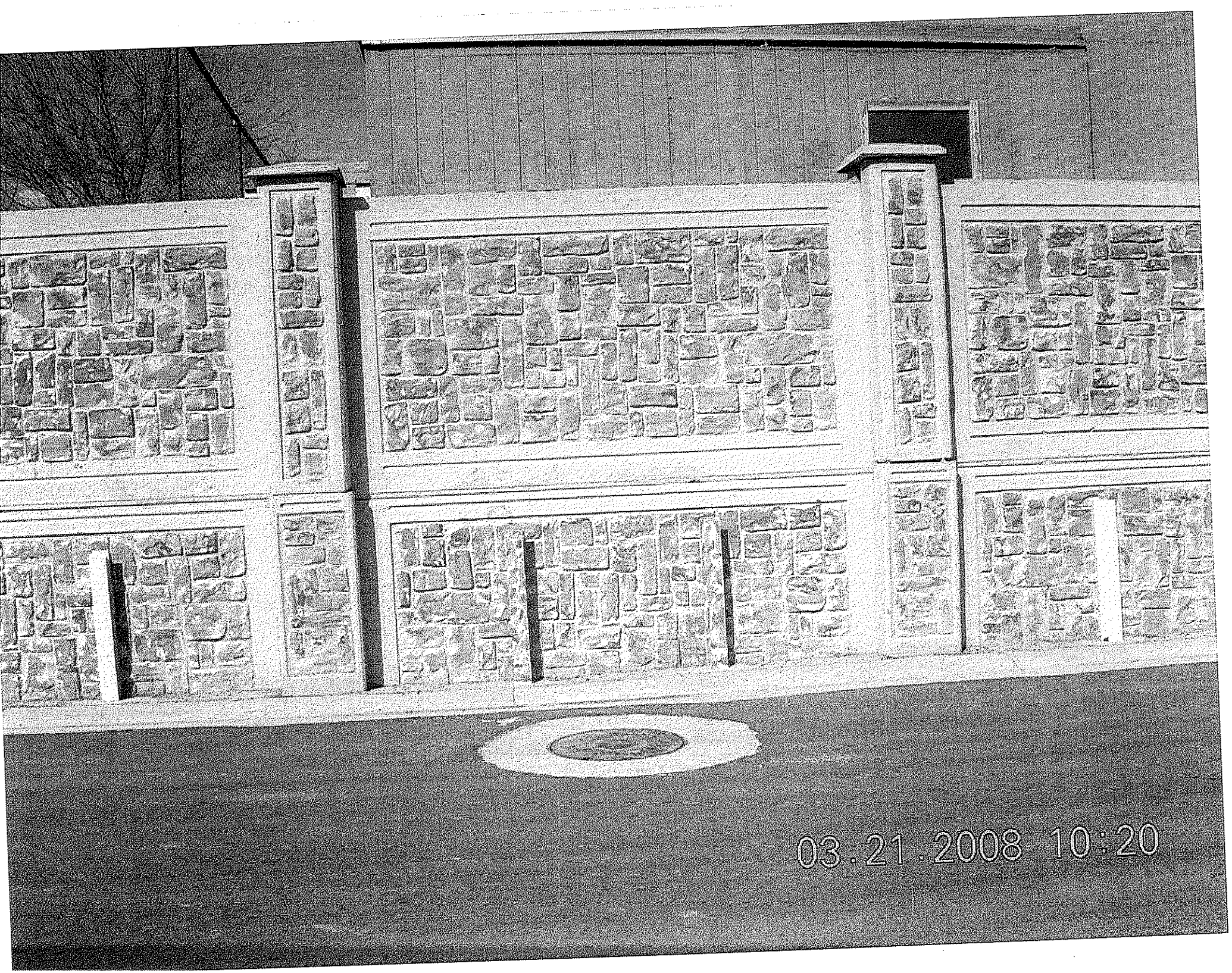
56,781.55

SECONDARY WATER SYSTEM						
8" Main Line	LF	0.00	$20.00	$0.00	$0.00	$0.00
8" Valve	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
Air/Vac Assembly	EA	0.00	$3,250.00	$0.00	$0.00	$0.00
Drain Assembly	EA	0.00	$1,000.00	$0.00	$0.00	$0.00
12" PVC Waterline (Irrigation)	LF	0.00	$26.00	$0.00	$0.00	$0.00
10" PVC Waterline (Irrigation)	LF	0.00	$24.00	$0.00	$0.00	$0.00
16" Valve	EA	0.00	$2,200.00	$0.00	$0.00	$0.00
12" Valve	EA	0.00	$1,700.00	$0.00	$0.00	$0.00
10" Valve	EA	0.00	$1,150.00	$0.00	$0.00	$0.00
Jack & Bore	EA	0.00	$30,000.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
SECONDARY WATER SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

IRRIGATION SYSTEM						
18" RCP,import granular backfill	LF	0.00	$36.00	$0.00	$0.00	$0.00
15" RCP,import granular backfill	LF	0.00	$31.00	$0.00	$0.00	$0.00
Clean Out Box	EA	0.00	$2,000.00	$0.00	$0.00	$0.00
Head Wall	EA	0.00	$800.00	$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$0.00*		
IRRIGATION SYSTEM SUB-TOTAL				**$0.00**	**$0.00**	**$0.00**

FENCE AND LANDSCAPE						
Six Foot Chain Link	LF	2,950.00	$12.00	$35,400.00	$0.00	$0.00
Six Foot Vinyl Fence	LF	1,475.00	$30.00	$44,250.00	$0.00	$0.00
Six Foot Block Wall	LF	1,650.00	$60.00	$99,000.00	$0.00	$0.00
Six Foot Concrete Panel Fence	LF	3,700.00	$60.00	$222,000.00	$0.00	$0.00
Collector Street Fencing	LF	0.00	$75.00	$0.00	$0.00	$0.00
Parkstrip Improvements	SQFT	19,780.00	$2.25	$44,505.00	$0.00	$0.00
Landscaping Tree/Irrigation/Sod	LF	0.00	$10.00	$0.00	$0.00	$0.00
Stamped Concrete	SQFT	4,725.00	$8.00	$37,800.00	$0.00	$0.00
Dyed Concrete	LF	0.00	$9.00	$0.00	$0.00	$0.00
Parkstrip Trees	EA	100.00	$300.00	$30,000.00	$0.00	$0.00
Anti-graffiti seal for concrete walls	LF	3,700.00	$2.00	$7,400.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
Blank		0.00		$0.00	$0.00	$0.00
10% Contingency				*$52,035.50*		
FENCING SUB-TOTAL				**$572,390.50**	**$0.00**	**$0.00**

03.21.2008 10:19
I-Beam style
okay'd 3/24/08
Brad Ulvano
Greg. Schindler
Judy Hansen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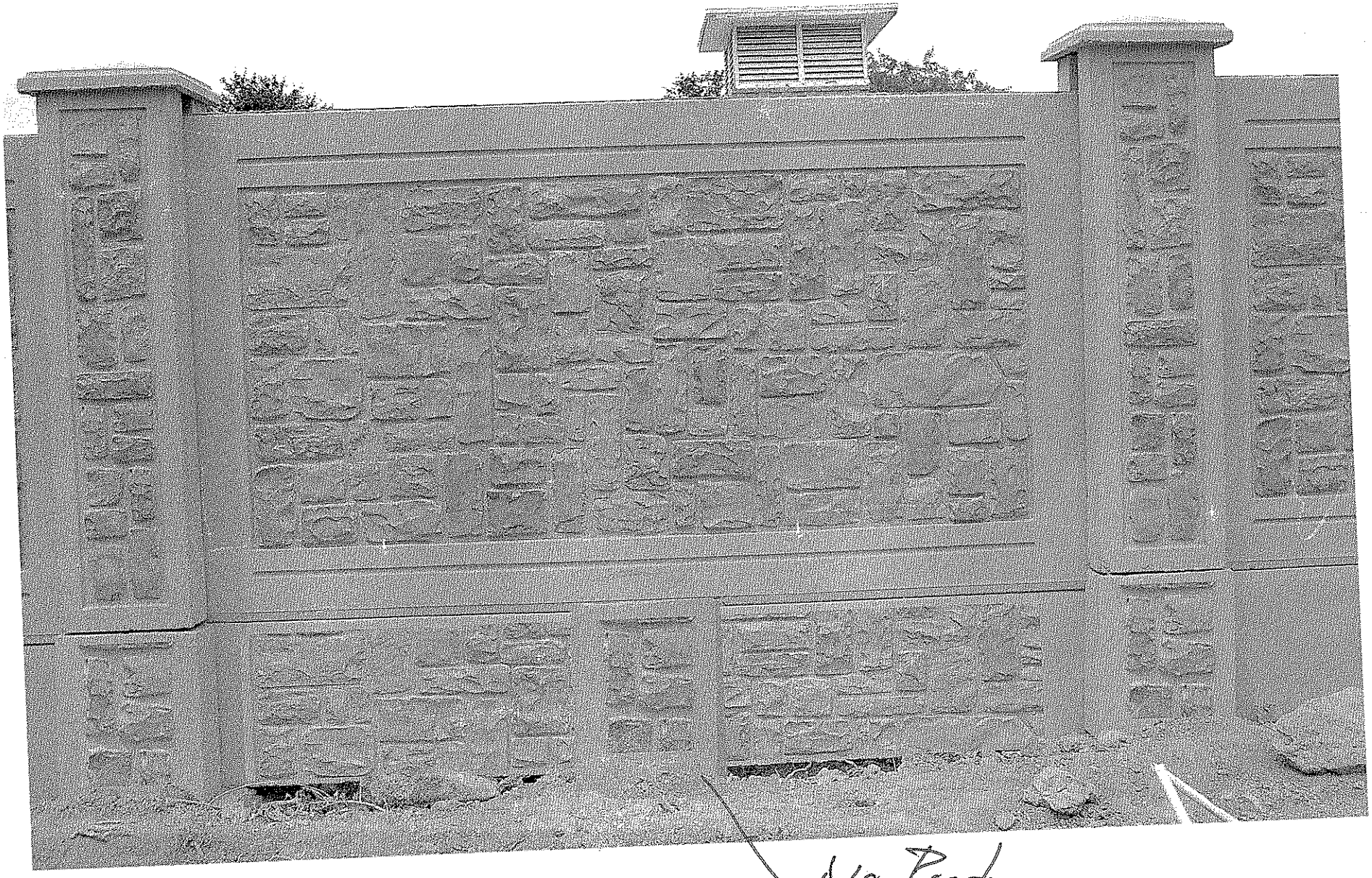


No Picture
FRAME

Shane Greenwood

From: Brad Klavano
Sent: Thursday, July 26, 2007 10:04 AM
To: Shane Greenwood
Cc: Jeremy Nielson; Greg Schindler; Ty Montalvo
Subject: FW: Pre-cast walls - Arbor's developments

Shane:

Per Rick's approval lets go with this solution. Please add this e-mail as an attachment to the Development Project Chart for both the Groves and the Village at Riverwalk.

Thanks

From: Rob Wall
Sent: Thursday, July 26, 2007 9:11 AM
To: Brad Klavano
Subject: FW: Pre-cast walls - Arbor's developments

Brad,
I passed the Riverwalk/Groves e-mail along to Rick. Here is his response. Rob.

Assistant City Manager
1600 Towne Center
South Jordan, UT 84095
(801) 254-3742
"Disciplined Thought...Disciplined People...Disciplined Action"

From: Ricky A. Horst
Sent: Thursday, July 26, 2007 9:07 AM
To: Rob Wall
Subject: RE: Pre-cast walls - Arbor's developments

Although not perfect, acceptable per Shane's recommendation.

Thank you for your consideration.

Ricky A. Horst
City Manager
South Jordan City

Disciplined Thought...Disciplined People...Disciplined Action

---

From: Rob Wall
Sent: Thursday, July 26, 2007 8:54 AM
To: Ricky A. Horst
Subject: FW: Pre-cast walls - Arbor's developments

Rick,
FYI. You may remember the pre-cast walls at the Village at Riverwalk and the Groves Subdivisions. The structural design as well as the aesthetics leave some to be desired. Staff has raised the issues numerous times with John G. and group and as you might guess, they are proposing what appears will work structurally per engineering but as you can see is a "fix" aesthetically.

Assistant City Manager
1600 Towne Center
South Jordan, UT 84095
(801) 254-3742
"Disciplined Thought... Disciplined People... Disciplined Action"

From: Shane Greenwood
Sent: Wednesday, July 25, 2007 1:16 PM
To: Brad Klavano
Cc: Rob Wall
Subject: Pre-cast walls - Arbor's developments

Brad,

As you may recall, the City has required Arbor Development provide structural calculations for some of the structurally stressed pre-cast concrete walls in The Village at Riverwalk and The Groves subdivisions. Two reports have been submitted for two different situations (see attached report conclusions). According to the reports, some of the wall panels will require 1 or 2 additional footings and steel columns supporting the half and third point locations. Per our request for a conceptual drawing showing the wall modifications, Arbor has submitted a rendering showing an additional support at the half point. Arbor intends to cover the support columns with rock textured concrete column covers. The rendering shows the short column with a picture frame casted in the concrete, which will not be the case. The short columns will only have rock texture so as to blend with the rest of the wall. Judy Hansen and I have reviewed and okay with the modifications. After you have had a chance to review the attachments, will you let me know if they can proceed with these wall modifications?

Thank you for your time and consideration,

Shane Greenwood, P.E.
Senior Engineer
South Jordan City

Phone: (801) 254-3742
FAX: (801) 253-5235

Shane Greenwood

From: Brad Klavano
Sent: Thursday, July 26, 2007 7:11 AM
To: Shane Greenwood
Cc: Jed Bell; Greg Schindler; Jeremy Nielson; Ty Montalvo
Subject: RE: Pre-cast walls - Arbor's developments

It looks good to me. Lets make sure that all of the panels that need this support/supports are identified and give to the Jed Bell for inspection. Also, make sure Jed is clear on the looks and that we document all of this really well and place in the file and also attach to the development project chart. This may require the structural report with an inspection report and a short memo explaining all that has gone into this.

Thanks

From: Shane Greenwood
Sent: Wednesday, July 25, 2007 1:16 PM
To: Brad Klavano
Cc: Rob Wall
Subject: Pre-cast walls - Arbor's developments

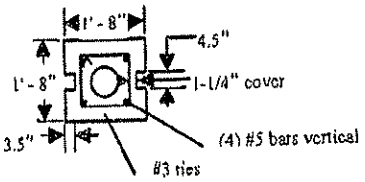
Brad,

As you may recall, the City has required Arbor Development provide structural calculations for some of the structurally stressed pre-cast concrete walls in The Village at Riverwalk and The Groves subdivisions. Two reports have been submitted for two different situations (see attached report conclusions). According to the reports, some of the wall panels will require 1 or 2 additional footings and steel columns supporting the half and third point locations. Per our request for a conceptual drawing showing the wall modifications, Arbor has submitted a rendering showing an additional support at the half point. Arbor intends to cover the support columns with rock textured concrete column covers. The rendering shows the short column with a picture frame casted in the concrete, which will not be the case. The short columns will only have rock texture so as to blend with the rest of the wall. Judy Hansen and I have reviewed and okay with the modifications. After you have had a chance to review the attachments, will you let me know if they can proceed with these wall modifications?

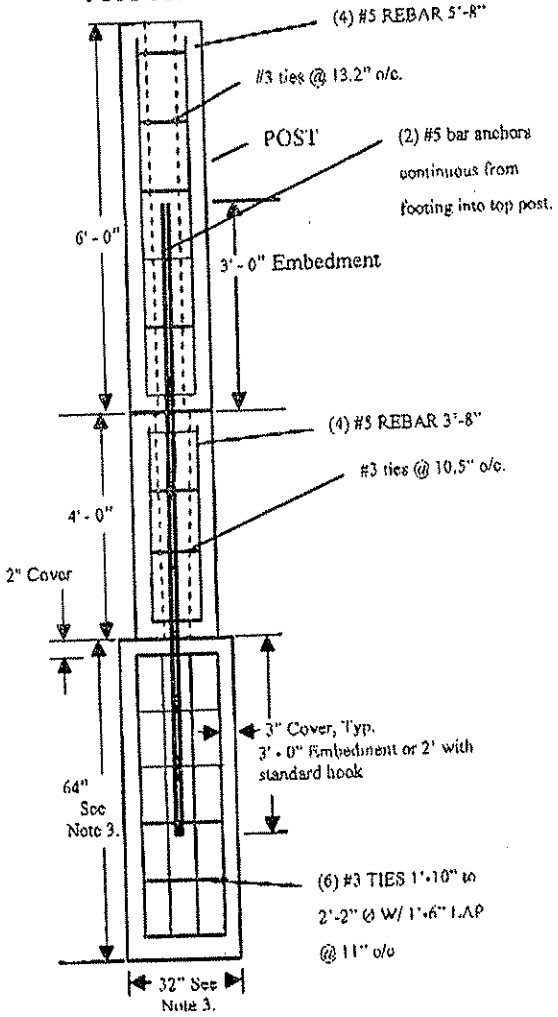
Thank you for your time and consideration,

Shane Greenwood, P.E.
Senior Engineer
South Jordan City

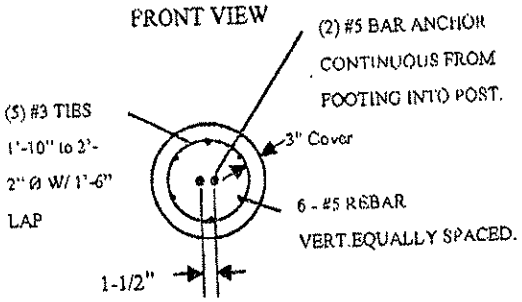
Phone: (801) 254-3742
FAX: (801) 253-5235



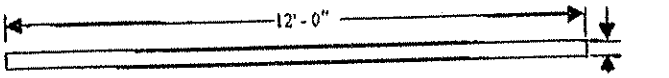
POST TOP VIEW



FRONT VIEW

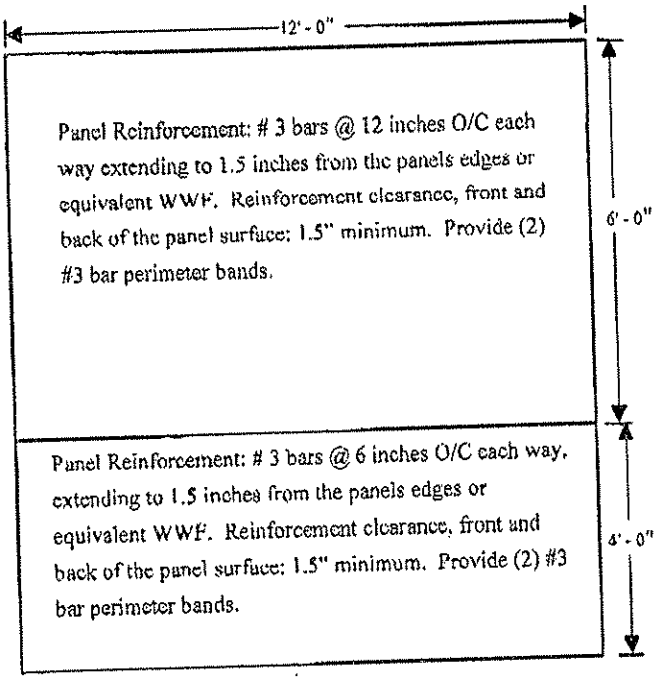


FOOTING TOP VIEW



FENCE PANEL TOP VEIW

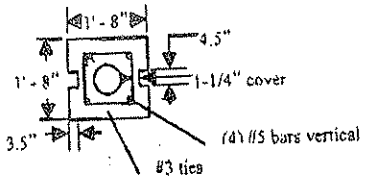
4.0 top panel-5.5" bottom panel



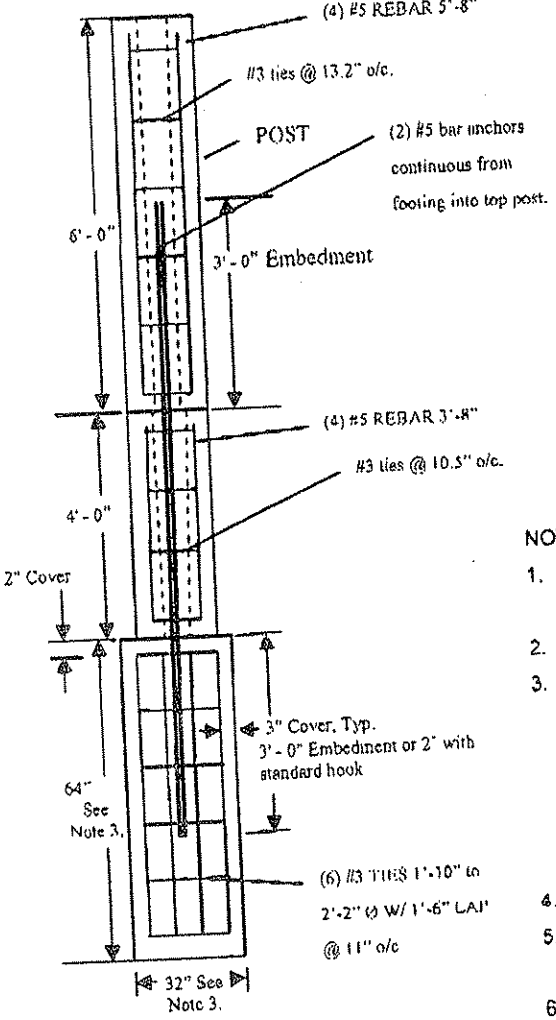
FENCE PANEL FRONT VEIW

NOTES:

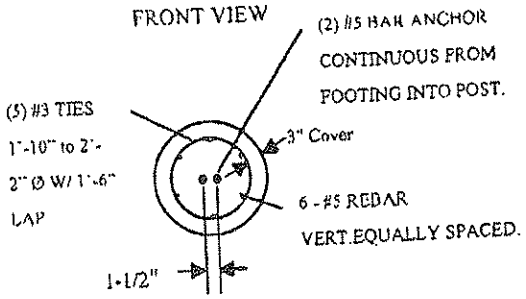
1. F'_c = 4,000 PSI MINIMUM FOR POST AND PANEL CONCRETE, 4,000 PSI FOR CELL GROUT.
2. F'_c = 3,000 PSI MINIMUM FOR FOOTINGS.
3. PROVIDE AVERAGE FOOTING DIAMETER OF 32" FOR SOIL BEARING ALLOWABLE GREATER THAN OR EQUAL TO 2,500 PSF WITH F'_c = 2,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM, GC AND CL (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL, CLAYEY GRAVEL AND INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY) IS 64 INCHES.
4. WIND: V = 90 MPH. EXPOSURE B.
5. SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_s = 1.31 OR LESS; SITE CLASSES A, B, C, OR D; IMPORTANCE FACTOR, I_p = 1.0.
6. PROVIDE LATERAL SUPPORT AT MIDSPAN OF BOTTOM 4' PANELS BY INSTALLING W4X13 STEEL POST IN 24" DIAMETER BY 62" DEEP CONCRETE FOOTINGS. STEEL POSTS MUST CONTACT THE PANEL SURFACE OPPOSITE THE SOIL SIDE AND EXTEND 18 INCHES MIN. UP FROM THE BOTTOM OF THE PANEL. THE TOP OF THE FOOTING MUST BE IN CONTACT WITH THE BOTTOM OF THE PANELS. BOTTOM PANEL CAN RETAIN UP TO 4' OF COURSE GRANULAR SOIL, TYPES GW, GP, SW, OR SP PER TABLE 1610.1.



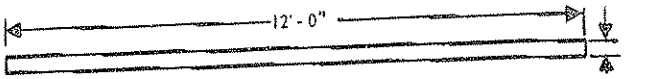
POST TOP VIEW



FRONT VIEW

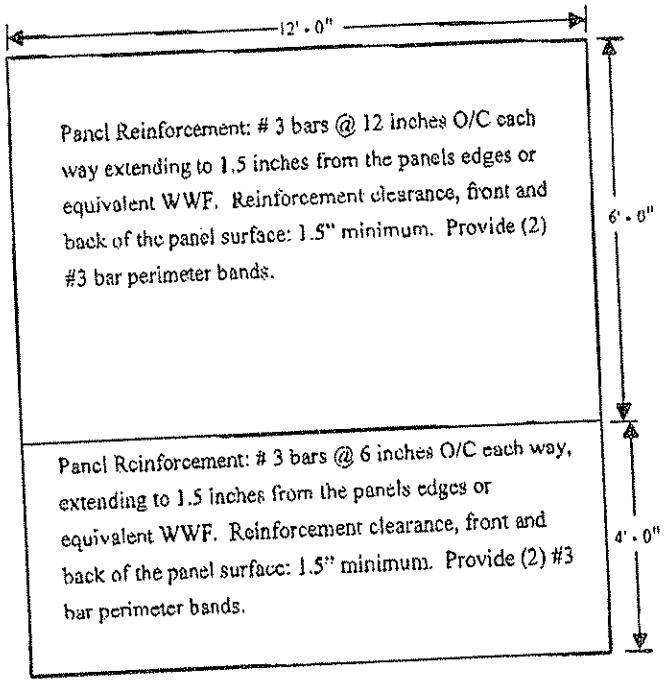


FOOTING TOP VIEW



FENCE PANEL TOP VEIW

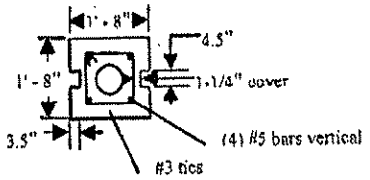
4.0 top panel-5.5" bottom panel



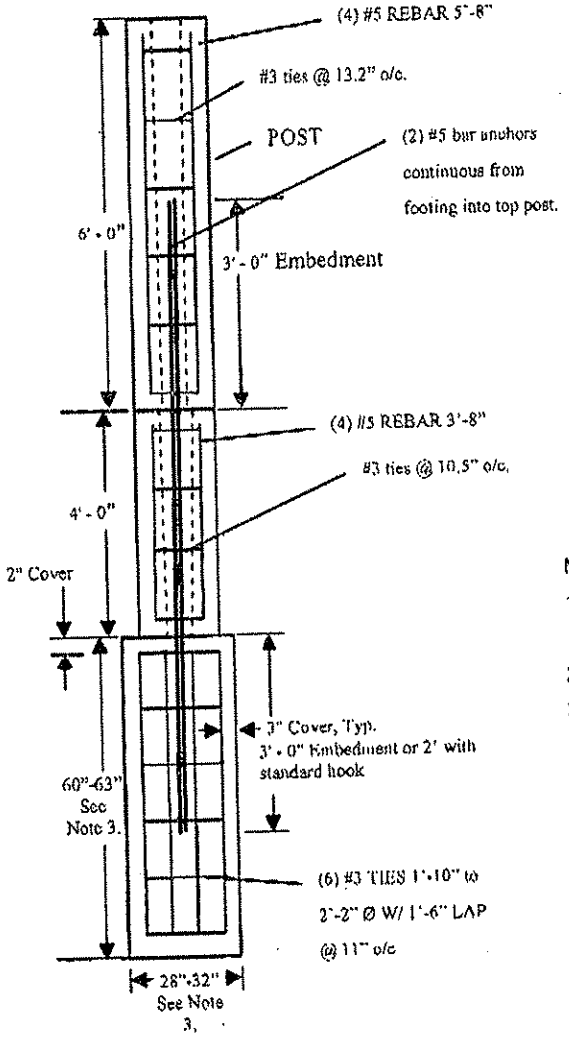
FENCE PANEL FRONT VEIW

NOTES:

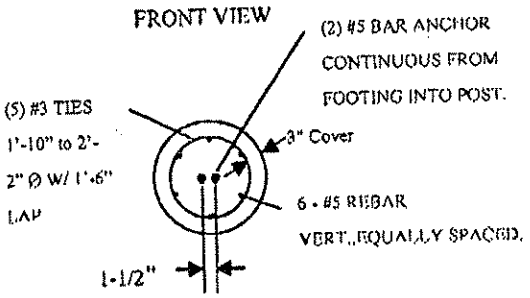
1. F'_c = 4,000 PSI MINIMUM FOR POST AND PANEL CONCRETE, 4,000 PSI FOR CELL GROUT.
2. F'_c = 3,000 PSI MINIMUM FOR FOOTINGS.
3. PROVIDE AVERAGE FOOTING DIAMETER OF 32" FOR SOIL BEARING ALLOWABLE GREATER THAN OR EQUAL TO 2,500 PSF WITH F'_c = 2,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM, GC AND CL (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL, CLAYEY GRAVEL AND INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY) IS 64 INCHES.
4. WIND: V = 90 MPH, EXPOSURE B.
5. SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_s = 1.31 OR LESS; SITE CLASSES A, B, C, OR D; IMPORTANCE FACTOR, I_p = 1.0.
6. PROVIDE LATERAL SUPPORT AT ONE-THIRD SPAN AND AT TWO-THIRDS SPAN OF BOTTOM 4' PANELS BY INSTALLING W4X13 STEEL POST IN 24" DIAMETER BY 70" DEEP CONCRETE FOOTINGS. STEEL POSTS MUST CONTACT THE PANEL SURFACE OPPOSITE THE SOIL SIDE AND EXTEND 18 INCHES MIN. UP FROM THE BOTTOM OF THE PANEL. THE TOP OF THE FOOTING MUST BE IN CONTACT WITH THE BOTTOM OF THE PANELS. BOTTOM PANEL CAN RETAIN UP TO 4' OF CLAYEY SOIL TYPES SC, ML-CL OR CL PER TABLE 1610.1.



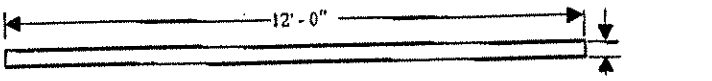
POST TOP VIEW



FRONT VIEW

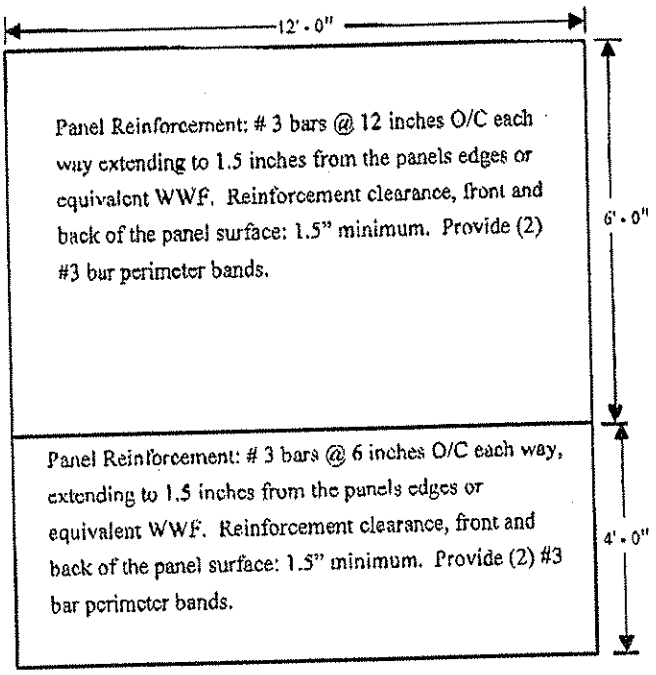


FOOTING TOP VIEW



FENCE PANEL TOP VEIW

4.0" top panel-5.5" bottom panel



FENCE PANEL FRONT VEIW

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4. WIND: V = 90 MPH, EXPOSURE B.
5. SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_S = 1.31 OR LESS; SITE CLASSES A, B, C, OR D; IMPORTANCE FACTOR, I_P = 1.0.

David Keith Engineering PLLC

679 E. 220 N. • American Fork, Utah 84003 • 801-763-0907 • Fax: 801-756-1533

June 12, 2007

Subject: Precast Concrete Fence Installation at The Groves and River Walk Developments in South Jordan

Referenced Reports:

1. "Structural Analysis of Segmented Ten Foot High Precast Concrete Fence with Bottom 2 Feet of 4 Foot High Panel below Grade and Top of 4 Foot Panel Retaining Two Feet of Clayey Soil at The Groves, 13th West, South Jordan", prepared for All Five, June 6, 2007, by David Keith Engineering, PLLC, American Fork, Utah.
2. "Structural Analysis of Segmented Ten Foot High Precast Concrete Fence with Bottom 4 Foot High Segment Laterally Supported by Two Intermediate Steel Posts in Footings and Retaining Four Feet of Clayey Soil at Riverwalk, South Jordan", prepared for All Five, June 9, 2007, by David Keith Engineering, PLLC, American Fork, Utah.
3. "Structural Analysis of Segmented Ten Foot High Precast Concrete Fence with Bottom 4 Foot High Segment Laterally Supported by Intermediate Steel Posts in Footings and Retaining Four Feet Of Course Granular Soil at Riverwalk, South Jordan", prepared for All Five, June 11, 2007, by David Keith Engineering, PLLC, American Fork, Utah.

To Whom It May Concern:

At the request of Shelley Robertson and Shane Greenwood, South Jordan Building Department Engineers and Clyde Allen, All Five LLC, I inspected the precast concrete fence at the referenced sites on April 12, May 14 and May 30, 2007. Below are listed the concerns and additional requirements/remedies for each site.

<u>The Groves, 13th West</u>

Concern: The bottom 4' panel of the fence was designed to retain 2 feet of course granular fill and the actual grade is at the top of the 4' bottom panel on the west side of the fence and 2' from the bottom of the panel on the east side. The fence was backfilled with what appears to be native clayey-sand type soil.

Remedy: The fence was reanalyzed to reflect current conditions. The assumptions, results and specifications are detailed in reference 1 above. The fence is adequate provided its construction complies with the assumptions and specifications of Reference 1. The referenced analysis assumed soil type SC and is not representative of soil types OL, MH, CH or OH per IBC Table 1610.1.

<u>The Groves, Barn Area</u>

Concern: Back fill height, type of backfill and proximity to toe of slope/barn.

Remedy: The barn has been removed. The bottom 4' panel can be backfilled up to 4' with intermediate columns provided the fence construction, intermediate columns and footings, and soil conditions comply with the assumptions and specifications of Reference 2 or 3. The bottom of the backfill plane extends from the base of the fence panel at 30° from horizontal to the backfill height. Also, the distance from the fence to the toe of the slope behind the fence can not be less than one-half the vertical distance from the grade behind the fence to the grade at the top of the slope, per IBC Figure 1805.3.1. Add 4" minimum diameter weep holes at 5' to 10' o.c. horizontally and 18" to 24" from the bottom of the bottom panels or a 6" min. diameter perforated drain pipe running parallel to the fence on the bottom of the backfilled panels.

Riverwalk

Concerns: Fence section erected on the west end of the project. Part of the bottom 4' section of the fence was backfilled with what appears to be native clayey-sand type soil rather that course granular fill. The grade on the east side of the fence is at least 2' below the top of the footings. The bottom section of the fence was backfilled before installing intermediate footings and support columns. Vertical mid-span stress cracking in some of the bottom panels has occurred. Lawn and garden irrigation on the west side of the fence could potentially create a situation where the fence is retaining a considerable amount of water.

Remedy: The fence was reanalyzed to reflect current conditions. The assumptions, results and specifications are detailed in References 2 and 3 above. The fence is adequate provided its construction complies with the assumptions and specifications of one of those reports and the following requirements:

1. Reference 3 analysis assumed soil type SC and is not representative of soil types OL, MH, CH or OH per IBC Table 1610.1.
2. On the east side of the fence (toe side) establish the grade to at least the bottom of the 4' high bottom panels by compacting granular fill to an in-place unit weight equal to 95% of the maximum density as determined by ASTM D1557, latest issue. Soil densities shall be monitored by an independent soil testing firm. This grade needs to extend from the fence a distance of one-third the vertical distance from the bottom of the fence panel to the toe of the hill slope per IBC Figure 1805.3.1.
3. When complying with the fence described in Reference 3, backfill with granular noncohesive sand and gravel.
4. Add 4" minimum diameter weep holes at 5' to 10' o.c. horizontally and 18" to 24" from the bottom of the bottom panels.
5. The slope on the west side of the fence (backfilled side) can not be more than 10%.
6. The bottom of the backfill plane extends from the base of the fence panel at 30° from horizontal to the backfill height.

Signed,

David O. Keith, PE

REGISTERED PROFEESSIONAL ENGINEER
164702-2202
DAVID O.
KEITH
6/12/07
STATE OF UTAH

STRUCTURAL ANALYSIS OF SEGMENTED TEN FOOT HIGH PRECAST CONCRETE FENCE WITH BOTTOM 4 FOOT HIGH SEGMENT LATERALLY SUPPORTED BY INTERMEDIATE STEEL POSTS IN FOOTINGS AND RETAINING FOUR FEET OF COURSE GRANULAR SOIL AT RIVERWALK, SOUTH JORDAN

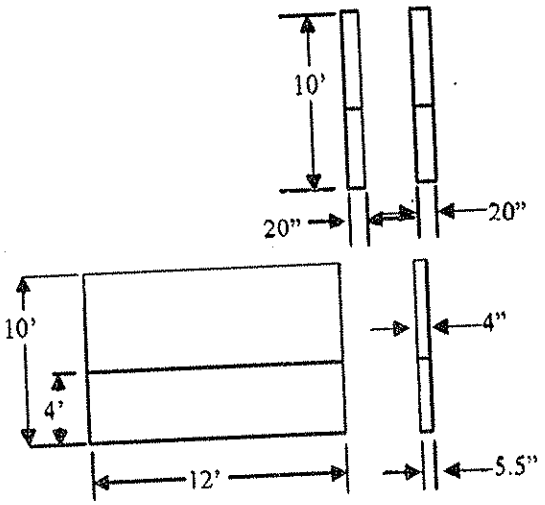
PREPARED FOR
ALL FIVE
CLYDE ALLEN

JUNE 11, 2007

REGISTERED PROFESSIONAL ENGINEER
164702-2202
DAVID O.
KEITH
6/11/07
STATE OF UTAH

PREPARED BY
DAVID KEITH ENGINEERING PLLC
AMERICAN FORK, UTAH

Ten Foot High Precast Concrete Fence



Posts

Height: 4 ft. & 6 ft.
Breadth: 20 in.
Width: 20 in.
Weight = 10 x 20/12 x 20/12 x 150 =4,167 lb.
Spacing: 13' – 0"

Intermediate Posts: W4x13 steel columns embedded in 24" diameter by 62" deep concrete footing. Steel posts must contact the panel surface opposite the soil side and extend 36 inches minimum up from the bottom of the panel. The top of the footing must be in contact with the bottom of the panels. Bottom panel can retain up to 4' of course granular soil, types GW, GP, SW, or SP per table 1610.1.

Panels

Height:	6 ft.	4ft
Breadth:	12 ft.	12 ft
Thickness:	4 in.	5.5 in.

Weight = 6 x 12 x 4/12 x 150 = 3,600 lb.
4 x 12 x 5.5/12 x 150 = 3,300 lb.

Lateral Forces (2006 IBC) and Anchor Loads

Soil:

F = 30 psf x 4' x 4'/2 x 6.5' = 1560 lb.
Overturning Moment = 1560 x 1/3x4 = 2080 ft-lb.

Wind:

V – 90 mph, Exposure B
Z = 10 ft
Structure Category = I
$K_z = 2.01(15/z_g)^{2/\alpha} = 0.575$
Where, $\alpha = 9.5$ and $z_g = 900$ ft.
$K_{zt} = 1$, h<60'
$K_d = 0.85$
I = 0.87
$C_f = 1.44$, G = 0.85
$q_z = 0.00256 K_z K_{zt} K_d V^2 I = 12.4$ psf
$F = q_z G C_f A_f$
F = 12.4 x 0.85 x 1.44 x 13 x 6 = 1,184 lb.
Overturning Moment = 1184 x 7 – 8,287 ft-lb.

Seismic:

$Fp = MAX(0.4IS_{DS}W_p, 0.1W_p)$ Use $Fp = 0.4IS_{DS}W_p$
W_p = weight of portion
I = 1.0
Short period spectral acceleration, $S_s = 1.311$;
Site Class D assumed. $F_a = 1.0$

$S_{ds} = 2/3 F_a S_s = 0.874$
$W_p = 3600/2 + 2500 + 1667 + 3300/2 = 7617$ lb.
$F_p = 0.35 \times 7617 = 2666$ lb. (bottom 4' = 1066, top 6' = 1560)
Overturning Moment = 2666 x 5 = 13330 ft-lb.

Combined Factored Loads

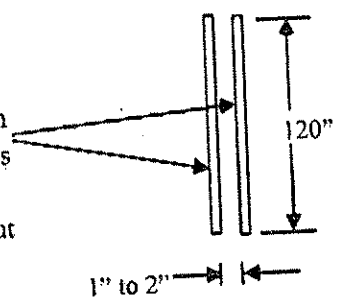
Resisting Moment = (3600) 2/12 + (3300)2.75/12+ (4167) 10/12 = 4829 ft-lb.
Required hold down force, F_h
Wind and Soil: (2080+8287)-4829 = F_h (10/12)
F_h = 6646 lb
Apply safety factors:
V_u = (2080+1184) x 1.6 = 5222 lb.
N_u = 6646 x 1.6 = 9969 lb.
Earthquake and Soil: (2080 x 1.6+13330)-4829 = F_h (10/12)
F_h = 14195 lb
Apply safety factors:
V_u = 2080 x 1.6 + 2666 = 5994 lb.
N_u = 14195 lb.

Post Hold Down

Description:

(2) #5 bars embedded into footing and post.

#5 Deformed Bar, ASTM A615 Grade 60, embedded 36" min. or 24" with a hook into footing and 36" min. into post and centered in footing and post core. The core is 8" diameter at the top and 6" diameter at the bottom. The grout shall have an f'_c of 4,000 psi,



Anchors shall have edge reinforcement of a No. 4 bar or greater between anchor and edge and with the edge reinforcement enclosed within hoops spaced at not more than 13.2 inches.

Anchor Strength in Post

1. Steel Strength of Anchor in Tension
   $N_s = nA_{se}f_y$ = 2 x 0.301 x 60ksi =36k per two bars

2. Steel Strength of Anchor in Shear
   $V_s = nA_{se}f_y$ = 2 x 0.301 x 60ksi =36k per two bars

3. Concrete Breakout Strength of Anchor in Tension
   $N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{4000} \times 6.67^{1.5} = 26.147$ k
   $N_{cbg} = A_N/An_o \psi_2 \psi_3 N_b$ = 400/400 x 0.9 x 1.25 x 26.128 = 29.4 k

4. Concrete Breakout Strength of Anchor in Shear
   $V_b = 7(l/d_o)^{0.2} \sqrt{d_o} \sqrt{f'_c}\, c_1^{1.5} = 7(6/0.5)^{0.2} \times \sqrt{0.5} \times \sqrt{4000} \times 6.67^{1.5} = 13.5$ k
   $V_{cbg} = A_v/Av_o \psi_6 \psi_7 V_b$ = 200/200 x 0.9 x 1.4 x 10.003 = 17 k

5. Pullout Strength of Anchor in Tension
   Rebar embedded 60 inches to develop full strength.
   N_{pn} = 2 x 0.301 x 60ksi =36k per two bars

6. Concrete Pry out Strength of Anchor in Shear
$V_{cp} = k_{cp} N_{cb} = 1 \times 29.4 = 29.4$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: $0.75 \times 29.4 = 22 > 9.969$ OK

$\varphi V_n \geq V_u$: $0.75 \times 17 = 12.75 > 5.222$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$9969/22000 + 5222/12750 = 0.45 + 0.41 =$ 0.9 OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: $0.75 \times 0.85 \times 29.4 = 18.7 > 14.195$ OK

$0.75\varphi V_n \geq V_u$: $0.75 \times 0.85 \times 17 = 10.8 > 5.994$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$14195/24991 + 5994/14451 = 0.57 + 0.42 =$ 1.0 OK

Anchor Strength in Footing

7. Steel Strength of Anchor in Tension
$N_s = nA_{sc}f_y = 2 \times 0.301 \times 60$ksi $=36$k per two bars

8. Steel Strength of Anchor in Shear
$V_s = nA_{sc}f_y = 2 \times 0.301 \times 60$ksi $=36$k per two bars

1. Concrete Breakout Strength of Anchor in Tension
$N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{3000} \times 7.85^{1.5} = 28.9$ k
$N_{cbg} = A_v/Av_o \psi_1\psi_2\psi_3 N_b = 555/555 \times 1 \times 0.90 \times 1.25 \times 36 =$ 32.5 k

2. Concrete Breakout Strength of Anchor in Shear
$V_b = 7(l/d_o)^{0.2} \sqrt{d_o}\, \sqrt{f'_c}\, c_1^{1.5} = 7(4/0.625)^{0.2} \times \sqrt{0.625} \times \sqrt{3000} \times 7.85^{1.5} = 15$ k
$V_{cbg} = A_v/Av_o \psi_5\psi_6\psi_7 V_b = 278/278 \times 1 \times 0.9 \times 1.4 \times 19.622 =$ 18.9 k

3. Pullout Strength of Anchor in Tension
Rebar embedded minimum of 11 inches hooked to develop full strength.
$N_{pn} = 2 \times 0.301 \times 60$ksi $=36$k per two bars

4. Concrete Pryout Strength of Anchor in Shear
$V_{cp} = k_{cp} N_{cb} = 1 \times 32.5 = 32.5$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: $0.75 \times 32.5 = 24.4 > 9.969$ OK

$\varphi V_n \geq V_u$: 0.75 x 18.9 = 14.2 > 5.222 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
9969/24400 + 5222/14175 = 0.41 + 0.37 = 0.8 OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: 0.75 x 0.85 x 32.5 = 20.7 > 14.195 OK

$0.75\varphi V_n \geq V_u$: 0.75 x 0.85 x 18.9 = 12 > 5.994 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
14195/20700 + 5994/12000 = 0.686 + 0.500 = 1.2 OK

Post Footings

Soil and wind loads:
Soil moment = 1560 x 1/3x4 = 2080 ft-lb.
Wind moment = 1184 x 7 = 8,287 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&w}$
2080+8287-2897 = $F_{s\&w}$ (7)
$F_{s\&w}$ = 1067 lb.

Soil and earthquake loads:
Soil moment = 1560 x 1/3x4 = 2080 ft-lb.
Earthquake moment = 1560 x 7 + 1066 x 2 = 13052 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&e}$
2080+.7(13052)-2897 = $F_{s\&e}$ (7)
$F_{s\&e}$ = 1189 lb.

For footing design use $F_{s\&e}$ = 1189 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 32" in diameter for a minimum soil bearing allowable of 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM, GC and CL (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel, clayey gravel and inorganic clays of low to medium plasticity) is 64.

Vertical load:
$[4167 + 6000 + (150 \times 63/12 \times \pi r^2)]/\pi r^2$ = (4167+6000+4398)/5.585 = 2,608 psf < 2,660* OK
*Value has been increased one-third per IBC Table 1804.2, Note d.

Intermediate Post Footings

Intermediate post footings resist only soil loads.
Soil loads: 1560 lb. at 4'/3 = 16" above footing.
For footing design use F_s = 1560 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 24" in diameter for soil bearing allowable greater than or equal to 2,000 psf with $f'_c = 3{,}000$ psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM, GC and CL (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel, clayey gravel and inorganic clays of low to medium plasticity) is 62 inches.

Fence Panel Loads

Wind load = $q_z G C_f$ = 15 x 0.85 x 1.58 = 20.15 psf x 1.6 = 32.2 psf

Seismic load = 0.3(150 x 4/12) = 15.0 psf or .3(150 x 5.5/12) = 20.6 psf

Soil load = Cwh = 0.3x100x3 = 90 psf (average for bottom 2 feet) and .3x100x1 = 30psf (top 2 feet)

Load combinations:

1.0E + 1.6H = 165 psf, 1.6W = 32.2 psf

CONCRETE FENCE PANEL DESIGN & ANALYSIS

DESCRIPTION >> Fence Panels
>> Soil Wind

---------- GENERAL --------		--Span 1-	--Span 2-	--Span 3-	--Span 4-
ALL SPANS SIMPLE SUPPORT ?	y/n	y			
SPAN LENGTH	ft	6.5	12	0	0
END FIXITY.....	Lft	1	1	1	1
Fix,Pin,Free = 2,1,0	Rt	1	1	1	1
BEAM WIDTH	in	24	12	0	0
BEAM DEPTH	in	5.5	4	0	0
---- CALCULATED VALUES ----					
Left: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Center: Max Mu	ft-k	1.7	0.6	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
..Dist. to Mu	ft	3.25	6.00	0.00	0.00
Right: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Max Vu: Left	k	1.07	0.19	0.00	0.00
Rt	k	1.07	0.19	0.00	0.00
Reactions: Left: Dead	k	0.94	0.00	0.00	0.00
..(service) Live	k	0.13	0.19	0.00	0.00
Total	k	1.07	0.19	0.00	0.00
Right:Dead	k	0.94	0.00	0.00	0.00
Live	k	0.13	0.19	0.00	0.00
Total	k	1.07	0.19	0.00	0.00
Max. Defl @ Mid Span	in	-0.011	-0.065	0.000	0.000
X-Dist	ft	3.25	6.00	0.00	0.00
----- BEAM DESIGN DATA ----					
f'c	psi	4,000	4,000	3,000	3,000
Fy	psi	60,000	60,000	60,000	60,000
LEFT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
CENTER: As-BOTTOM	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
RIGHT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
------ APPLIED LOADS ------					
USE LL THIS SPAN?	Y/N	Y	Y	Y	Y
UNIFORM..... Soil	klf	0.288	0	0	0
ST	klf	0.0412	0.0322	0	0

DESIGN OF FOOTINGS FOR CANTILEVERED POST

DESCRIPTION >> Posts @ 13'O.C.w/1 intermediate,retaining 4'
>> CL,ML,MH CL,ML,MH

ALLOW PASSIVE	psf	200	200	200	0	0
MAX PASSIVE	psf	3,000	3,000	3,000	0	0
LOAD DURATION FACTOR		1.33	1.33	1.33	0	0
POINT LOAD	lbs	1,189	1,560	0	0	0
LOAD Ht.	ft	7.00	1.33	0.00	0.00	0.00
DIST. LOAD	#/ft	0	0	347	0	0
START HT.	ft	0.00	0.00	0.00	0.00	0.00
END HT.	ft	0.00	0.00	4.00	0.00	0.00
WIDTH/DIAMETER	in	32	24	24	0	0
CIRCULAR ?	y/n	Y	Y	Y	Y	Y
RESTRAINED ?	y/n	N	N	N	N	N
------ SUMMARY -------						
Moments @ Surface:						
Point Load	ft-#	8,323	2,075	0	0	0
Uniform Load	ft-#	0	0	2,776	0	0
... Total Moment	ft-#	8,323	2,075	2,776	0	0
Total Lateral Load	#	1,189	1,560	1,388	0	0
--- NON-RESTRAINED ----				RESULTS		
Min. Req'd Embedment						
A(1+(1+4.36h /A)^.5)/2						
A=2.34P/(S 1 b)	ft	5.35	5.13	5.11	0.00	0.00
Press @ 1/3 Embed.:						
Actual	psf	473	456	454	0	0
Allowable	psf	474	455	453	0	0

RECTANGULAR CONCRETE COLUMN DESIGN

DESCRIPTION >> 6' high fence post
>> posts at 13' 90 mph wind

DESIGN DATA

f'c	=	4,000 psi
Fy	=	60,000 psi
SEISMIC ZONE (0=wind):		0 0-4
COMBINE LL & ST	?	Y y/n
EFF. LENGTH FACTOR	=	1
IS COLUMN UNBRACED	?	Y y/n
IF UNBRACED, Delta:S	=	0
Total Reinf. Area	=	1.24 in^2
% Steel	=	0.31 %

Note: 1% Min < Actual < 8% Max

COLUMN DATA

DEPTH	=	20 in
WIDTH	=	20 in
COLUMN HEIGHT	=	6 ft
CALC P:M DIAGRAM	?	N y/n

REBARS:	COUNT	BAR #	"d"
SET #1 :	2	5	4 in
SET #2 :	2	5	16 in
SET #3 :	0	0	0 in
SET #4 :	0	0	0 in
SET #5 :	0	0	0 in

APPLIED LOADS

AXIAL: DL	=	0.111 k
LL	=	0.111 k
ST	=	0 k
Ecc.	=	0 in

MOMENTS:		Top		Bottom
DL	=	0	ft-k	0
LL	=	0	ft-k	0
SHORT	=	0	ft-k	0

		DEAD	LIVE	SHORT		SLoc	ELoc
DISTRIBUTED :	#1 =	0	0	0.42375 klf	@ x=	0	6 ft
	#2 =	0	0	0 klf	@ x=	0	0 ft
POINT :	#1 =	0	0	0 k	@ x=	0 ft	
	#2 =	0	0	0 k	@ x=	0 ft	

SUMMARY

		ACI Equation 9-1	9-2	9-3	
Pu : Max. Factored	=	0.3441	0.2580	0.0999	k
Pn * Phi : Capacity @ Design Ecc.	=	800.903	5.0126	1.7371	k
		OK	OK	OK	
Mc = Delta:B*M2b + Delta:S*M2S	=	0.03	2.43	2.48	kft
Final Ecc.: Axial*Ecc + Moments	=	1.20	113.05	297.77	in
Magnification Factor	=	1.000	1.000	1.000	in
Design Eccentricity	=	1.20	113.05	297.77	in
Po * .80 : (short column)	=	1144.14	1144.1	1144.1	k
P : Balanced	=	539.177	539.17	539.17	k
Ecc: Balanced	=	6.80	6.80	6.80	in

SLENDERNESS EFFECTS

Actual kLu/r	=	12.00	Elastic Modulus	= 4E+06 psi
Beta	=	0.85		

		9-1	9-2	9-3	
Neutral Axis Distance from Edge	=	20.90	1.41	1.33	in
Phi	=	0.700	0.706	0.702	

Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.452	0.452	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max[(.2*Ec*Ig+Es*Is)/(1+Beta) -or- .4 Ec Ig/(1+Beta)]/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	2.43	2.48	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	113.05	297.77	in
Design Ecc. = Ecc * Delta	=	1.20	113.05	297.77	in

RECTANGULAR CONCRETE COLUMN DESIGN

DESCRIPTION >> 4'high fence post retaining 4' of soil w/ 6' post on top
>> posts at 13' 90 mph wind

DESIGN DATA

f'c	=	4,000 psi
Fy	=	60,000 psi
SEISMIC ZONE (0=wind):		0 0-4
COMBINE LL & ST	?	Y y/n
EFF. LENGTH FACTOR	=	1
IS COLUMN UNBRACED	?	y y/n
IF UNBRACED, Delta:S	=	0
Total Reinf. Area	=	1.24 in^2
% Steel	=	0.31 %

Note: 1% Min < Actual < 8% Max

COLUMN DATA

DEPTH	=	20 in
WIDTH	=	20 in
COLUMN HEIGHT	=	4 ft
CALC P:M DIAGRAM	?	N y/n

REBARS:	COUNT	BAR #	"d"
SET #1 :	2	5	4 in
SET #2 :	2	5	16 in
SET #3 :	0	0	0 in
SET #4 :	0	0	0 in
SET #5 :	0	0	0 in

APPLIED LOADS

AXIAL: DL	=	2.5 k
LL	=	0.111 k
ST	=	0 k
Ecc.	=	0 in

MOMENTS:		Top		Bottom
DL	=	0	ft-k	0
LL	=	0	ft-k	0
SHORT	=	-4.7731	ft-k	0

		DEAD	LIVE	SHORT		SLoc	ELoc
DISTRIBUTED :	#1 =	0	0	0.3948 klf	@ x=	2	4 ft
	#2 =	0	0	1.1844 klf	@ x=	0	2 ft
POINT :	#1 =	0	0	1.59104 k	@ x=	4 ft	
	#2 =	0	0	0 k	@ x=	0 ft	

SUMMARY

		ACI Equation 9-1	9-2	9-3	
Pu : Max. Factored	=	3.6887	2.7665	2.25	k
Pn * Phi : Capacity @ Design Ecc.	=	800.903	29.473	21.312	k
		OK	OK	OK	
Mc = Delta:B*M2b + Delta:S*M2S	=	0.37	6.09	6.21	kft
Final Ecc.: Axial*Ecc + Moments	=	1.20	26.40	33.09	in
Magnification Factor	=	1.000	1.000	1.000	in

Design Eccentricity	=	1.20	26.40	33.09	in
Po * .80 : (short column)	=	1144.14	1144.1	1144.1	k
P : Balanced	=	539.177	539.17	539.17	k
Ecc: Balanced	=	6.80	6.80	6.80	in

SLENDERNESS EFFECTS

Actual kLu/r = 8.00 Elastic Modulus = 4E+06 psi

Beta = 0.85

		9-1	9-2	9-3	
Neutral Axis Distance from Edge	=	20.90	1.98	1.80	in
Phi	=	0.700	0.735	0.726	
Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.949	0.949	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max[(.2*Ec*Ig+Es*Is)/(1+Beta) -or- .4 Ec Ig/(1+Beta)]/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	6.09	6.21	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	26.40	33.09	in
Design Ecc. = Ecc * Delta	=	1.20	26.40	33.09	in

```
-----------------------------------------------------------------------
                        STEEL  COLUMN  DESIGN
-----------------------------------------------------------------------
 DESCRIPTION >> Fence
            >> Post at mid span for 12' panels, supporting bottom 4'
--------- COLUMN DATA ----------     ---------- DESIGN DATA ----------
 AISC SECTION  ------>>W4x13          FY                    =     36 ksi
 TOTAL COLUMN HT.     =   1.33 ft     LOAD DURATION FACTOR =       1
                                      COMBINE LL & ST     ?       N  y/n
 SUPPORT FIXITY   --->>     5 <<
 1=Pin/Pin, 2=Fix/Fix, 3=Pin/Fix      SIDESWAY      1:Restrained, 0:Free
  4=Fix/Pin, 5=Fix/Free                 X-X AXIS          =      1
     (Bottom/Top)                       Y-Y AXIS          =      1
 UNBRACED LENGTHS:                    EFFECTIVE LENGTH FACTORS:
    X-X AXIS          =      0 ft       X-X AXIS          =      1
    Y-Y AXIS          =   1.33 ft       Y-Y AXIS          =      1
-------------------------- APPLIED LOADS ----------------------------
 AXIAL DEAD LOAD      =    0.1 kips    ECC. for X-X MOMENTS =      0 in
   "   LIVE LOAD      =    0.1 kips      "   "  Y-Y    "    =      0 in
   "   SHORT TERM     =      0 kips
                                Dead    Live   Short   SLoc   ELoc
                               ------- ------- ------- ------ -------
 X-X AXIS MOMENTS:    TOP     =      0       0       0 k-ft
                    BOTTOM    =      0       0       0 k-ft
                  BTWN ENDS   =      0       0       0      0 ft
 Y-Y AXIS MOMENTS:    TOP     =      0       0       0 k-ft
                    BOTTOM    =      0       0       0 k-ft
                  BTWN ENDS   =      0       0       0      0 ft
 POINT LOADS: (k)     X-X     =      0       0    1.56   1.33 ft
                      Y-Y     =      0       0       0      0 ft
 UNIFORM:  (k/ft)     X-X     =      0       0       0      0      0 ft
                      Y-Y     =      0       0       0      0      0 ft
|-------------------------- SUMMARY ------------------------------|
| USE : W4X13,  Max Stress Ratio = 0.19                            |
|              Load Comb...>>  Dead    Live     D+L   DL+ST        |
|  Formula  1.6 - 1a       =   0.000   0.000   0.000  0.000   OK  |
|  Formula  1.6 - 1b       =   0.000   0.000   0.000  0.000   OK  |
|  Formula  1.6 - 2        =   0.001   0.001   0.003  0.194   OK  |
|                                                                  |
| Actual & Allowable Stresses...                                   |
|  Fa : Allowable          =   20.84   20.84   20.84  20.84 ksi    |
|    fa : Actual           =    0.03    0.03    0.05   0.03 ksi    |
|  Fb:xx : Allow [1.6-1a]  =   23.76   23.76   23.76  23.76 ksi    |
|  "     " [1.6-1b & 1.6-2] =  23.76   23.76   23.76  23.76 ksi    |
|    fb:xx  Actual         =    0.00    0.00    0.00   4.58 ksi    |
|  Fb:yy : Allow [1.6-1a]  =   27.00   27.00   27.00  27.00 ksi    |
|  "     " [1.6-1b & 1.6-2] =  27.00   27.00   27.00  27.00 ksi    |
|    fb:yy  Actual         =    0.00    0.00    0.00   0.00 ksi    |
|                                                                  |
|  Max X-X Axis Deflection =   -0.006 in    @    1.33 ft from base |
```

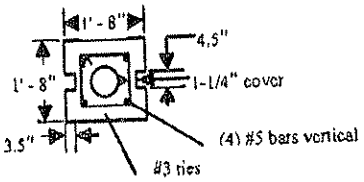
Max Y-Y Axis Deflection = 0.000 in @ 0.00 ft from base

STEEL SECTION DATA

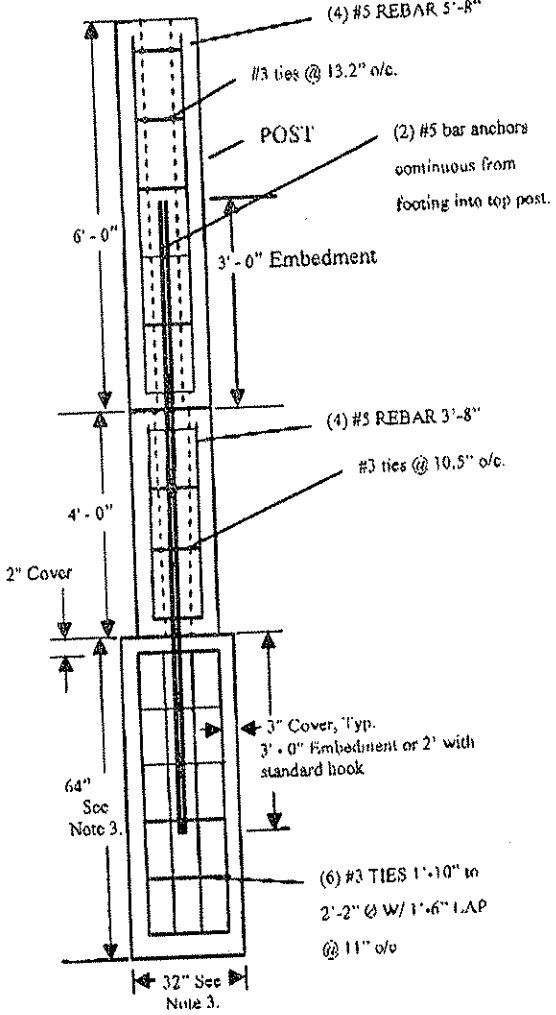
DEPTH	=	4.16 in	I-xx	=	11.300 in^4
WIDTH	=	4.060 in	S-xx	=	5.4326 in^3
FLANGE THICKNESS	=	0.345 in	R-xx	=	1.718 in
WEB THICKNESS	=	0.280 in	I-yy	=	3.8599 in^4
AREA	=	3.83 in^2	S-yy	=	1.90 in^3
WEIGHT	=	13.00 #/ft	R-yy	=	1.004 in
r-T	=	1.100			

INTERMEDIATE STRESS CALCULATION VALUES

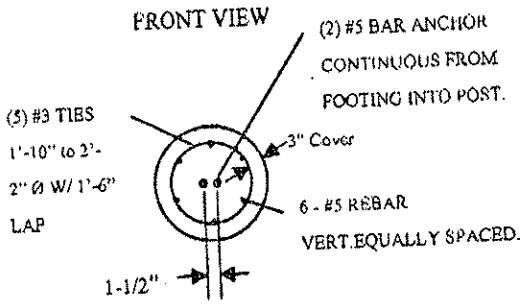
F'ex (DL+LL)	=	1E+08 psi	F'ex (DL+LL+ST)	=	1E+08 psi
F'ey (DL+LL)	=	590845 psi	F'ey (DL+LL+ST)	=	590845 psi
Cm:x (DL+LL)	=	0.60	Cm:x (DL+LL+ST)	=	1.00
Cm:y (DL+LL)	=	0.60	Cm:y (DL+LL+ST)	=	0.60
Cb:x (DL+LL)	=	1.75	Cb:x (DL+LL+ST)	=	1.00
Cb:y (DL+LL)	=	1.75	Cb:y (DL+LL+ST)	=	1.75



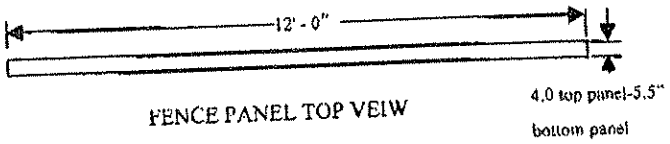
POST TOP VIEW



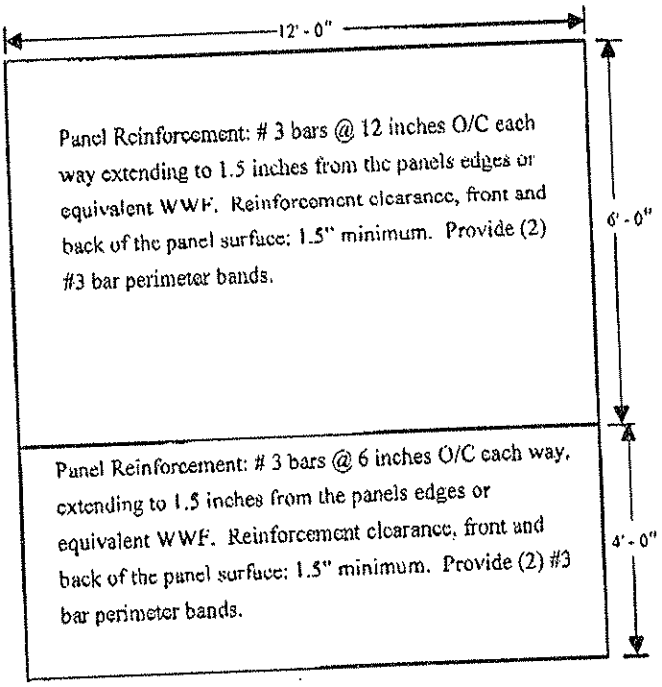
FRONT VIEW



FOOTING TOP VIEW



FENCE PANEL TOP VEIW



FENCE PANEL FRONT VEIW

NOTES:

1. F'_c = 4,000 PSI MINIMUM FOR POST AND PANEL CONCRETE, 4,000 PSI FOR CELL GROUT.
2. F'_c = 3,000 PSI MINIMUM FOR FOOTINGS.
3. PROVIDE AVERAGE FOOTING DIAMETER OF 32" FOR SOIL BEARING ALLOWABLE GREATER THAN OR EQUAL TO 2,500 PSF WITH F'_c = 2,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM, GC AND CL (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL, CLAYEY GRAVEL AND INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY) IS 64 INCHES.
4. WIND: V = 90 MPH, EXPOSURE B.
5. SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_s = 1.31 OR LESS; SITE CLASSES A, B, C, OR D; IMPORTANCE FACTOR, I_P = 1.0.
6. PROVIDE LATERAL SUPPORT AT MIDSPAN OF BOTTOM 4' PANELS BY INSTALLING W4X13 STEEL POST IN 24" DIAMETER BY 62" DEEP CONCRETE FOOTINGS. STEEL POSTS MUST CONTACT THE PANEL SURFACE OPPOSITE THE SOIL SIDE AND EXTEND 18 INCHES MIN. UP FROM THE BOTTOM OF THE PANEL. THE TOP OF THE FOOTING MUST BE IN CONTACT WITH THE BOTTOM OF THE PANELS. BOTTOM PANEL CAN RETAIN UP TO 4' OF COURSE GRANULAR SOIL, TYPES GW, GP, SW, OR SP PER TABLE 1610.1.

STRUCTURAL ANALYSIS OF SEGMENTED TEN FOOT HIGH PRECAST CONCRETE FENCE WITH BOTTOM 4 FOOT HIGH SEGMENT LATERALLY SUPPORTED BY TWO INTERMEDIATE STEEL POSTS IN FOOTINGS AND RETAINING FOUR FEET OF CLAYEY SOIL AT RIVERWALK, SOUTH JORDAN

PREPARED FOR
ALL FIVE
CLYDE ALLEN

JUNE 9, 2007

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6/9/07
STATE OF UTAH

PREPARED BY
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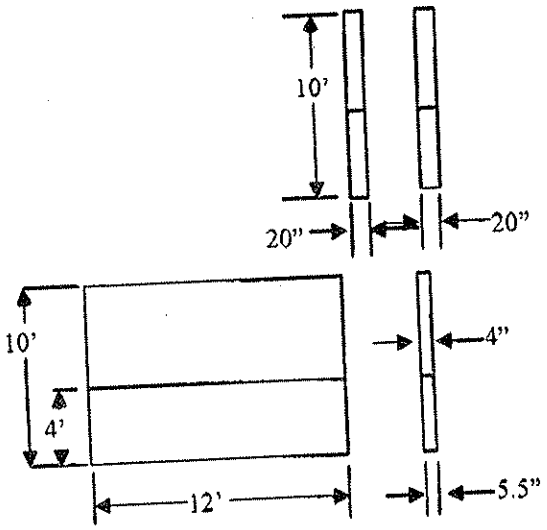
Ten Foot High Precast Concrete Fence



Posts

Height: 4 ft. & 6 ft.
Breadth: 20 in.
Width: 20 in.
Weight = 10 x 20/12 x 20/12 x 150 =4,167 lb.
Spacing: 13' – 0"

Intermediate Posts: W4x13 steel columns embedded in 24" diameter by 70" deep concrete footing. Steel posts must contact the panel surface opposite the soil side and extend 36 inches minimum up from the bottom of the panel. The top of the footing must be in contact with the bottom of the panels. Bottom panel can retain up to 4' of clayey sand or mixture of organic silt and clay type soils, types SC, ML-CL or CL per table 1610.1. Soil types OL, MH, CH AND OH may not be used.

Panels

Height:	6 ft.	4ft
Breadth:	12 ft.	12 ft
Thickness:	4 in.	5.5 in.

Weight = 6 x 12 x 4/12 x 150 = 3,600 lb.
4 x 12 x 5.5/12 x 150 = 3,300 lb.

Lateral Forces (2006 IBC) and Anchor Loads

Soil:

F = 60 psf x 4' x 4'/2 x 4.33' = 2080 lb.
Overturning Moment = 2080 x 1/3x4 = 2773 ft-lb.

Wind:

V = 90 mph, Exposure B
Z = 10 ft
Structure Category = I
$K_Z = 2.01(15/z_g)^{2/\alpha} = 0.575$
Where, $\alpha = 9.5$ and $z_g = 900$ ft.
$K_{Zt} = 1$, h<60'
$K_d = 0.85$
I = 0.87
$C_f = 1.44$, G = 0.85
$q_Z = 0.00256 K_Z K_{Zt} K_d V^2 I = 12.4$ psf
$F = q_Z G C_f A_f$
F = 12.4 x 0.85 x 1.44 x 13 x 6 = 1,184 lb.
Overturning Moment = 1184 x 7 = 8,287 ft-lb.

Seismic:

$Fp = MAX(0.4IS_{DS}W_p, 0.1W_p)$ Use $Fp = 0.4IS_{DS}W_p$
w_p = weight of portion
I = 1.0
Short period spectral acceleration, $S_s = 1.311$;

Site Class D assumed. $F_a = 1.0$
$S_{ds} = 2/3 F_a S_s = 0.874$
$W_p = 3600/3 + 2500 + 1667 + 3300/3 = 6467$ lb.
$F_p = 0.35 \times 6467 = 2263$ lb. (bottom 4' = 905, top 6' = 1358)
Overturning Moment = 2263 x 5 = 11315 ft-lb.

Combined Factored Loads

Resisting Moment = (3600) 2/12 + (3300)2.75/12+ (4167) 10/12 = 4829 ft-lb.
Required hold down force, F_h
Wind and Soil: (2773+8287)-4829 = F_h (10/12)

F_h = 7,477 lb
Apply safety factors:
V_u = (2080+1184) x 1.6 = 5,222 lb.
N_u = 9142 x 1.6 = 11,963 lb.

Earthquake and Soil: (2773 x 1.6+11315)-4829 = F_h (10/12)

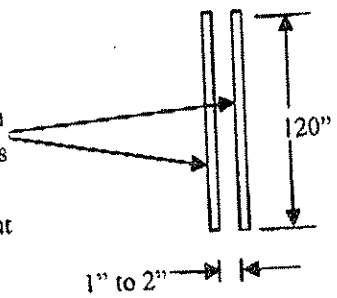
F_h = 13,107 lb
Apply safety factors:
V_u = 2263 x 1.6 + 1328 = 4,949 lb.
N_u = 13,107 lb.

Post Hold Down

Description:

(2) #5 bars embedded into footing and post.

#5 Deformed Bar, ASTM A615 Grade 60, embedded 36" min. or 24" with a hook into footing and 36" min. into post and centered in footing and post core. The core is 8" diameter at the top and 6" diameter at the bottom. The grout shall have an f'_c of 4,000 psi.



Anchors shall have edge reinforcement of a No. 4 bar or greater between anchor and edge and with the edge reinforcement enclosed within hoops spaced at not more than 13.2 inches.

Anchor Strength in Post

1. Steel Strength of Anchor in Tension
   $N_s = nA_{se}f_y = 2 \times 0.301 \times 60$ksi =36k per two bars

2. Steel Strength of Anchor in Shear
   $V_s = nA_{se}f_y = 2 \times 0.301 \times 60$ksi =36k per two bars

3. Concrete Breakout Strength of Anchor in Tension
   $N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{4000} \times 6.67^{1.5} = 26.147$ k
   $N_{cbg} = A_n/An_o \psi_2 \psi_3 N_b = 400/400 \times 0.9 \times 1.25 \times 26.128 =$ 29.4 k

4. Concrete Breakout Strength of Anchor in Shear
   $V_b = 7(l/d_o)^{0.2} \sqrt{d_o} \sqrt{f'_c}\, c_1^{1.5} = 7(6/0.5)^{0.2} \times \sqrt{0.5} \times \sqrt{4000} \times 6.67^{1.5} = 13.5$ k
   $V_{cbg} = A_v/Av_o \psi_6 \psi_7 V_b = 200/200 \times 0.9 \times 1.4 \times 10.003 =$ 17 k

5. Pullout Strength of Anchor in Tension
   Rebar embedded 60 inches to develop full strength.

$N_{pn} = 2 \times 0.301 \times 60ksi = 36k$ per two bars

6. Concrete Pry out Strength of Anchor in Shear
   $V_{cp} = k_{cp} N_{cb} = 1 \times 29.4 = 29.4$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: $0.75 \times 29.4 = 22 > 11.963$ OK

$\varphi V_n \geq V_u$: $0.75 \times 17 = 12.75 > 5.222$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$11963/22000 + 5222/12750 = 0.54 + 0.41 = 0.95$ OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: $0.75 \times 0.85 \times 29.4 = 18.7 > 13.107$ OK

$0.75\varphi V_n \geq V_u$: $0.75 \times 0.85 \times 17 = 10.8 > 4.949$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$13107/18743 + 4949/10838 = 0.699 + 0.457 = 1.16$ OK

Anchor Strength in Footing

7. Steel Strength of Anchor in Tension
   $N_s = nA_{se}f_y = 2 \times 0.301 \times 60ksi = 36k$ per two bars

8. Steel Strength of Anchor in Shear
   $V_s = nA_{se}f_y = 2 \times 0.301 \times 60ksi = 36k$ per two bars

1. Concrete Breakout Strength of Anchor in Tension
   $N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{3000} \times 7.85^{1.5} = 28.9$ k
   $N_{cbg} = A_c/Av_o\psi_1\psi_2\psi_3 N_b = 555/555 \times 1 \times 0.90 \times 1.25 \times 36 = 32.5$ k

2. Concrete Breakout Strength of Anchor in Shear
   $V_b = 7(l/d_o)^{0.2}\sqrt{d_o}\sqrt{f'_c}\, c_1^{1.5} = 7(4/0.625)^{0.2} \times \sqrt{0.625} \times \sqrt{3000} \times 7.85^{1.5} = 15$ k
   $V_{cbg} = A_c/Av_o\psi_5\psi_6\psi_7 V_b = 278/278 \times 1 \times 0.9 \times 1.4 \times 19.622 = 18.9$ k

3. Pullout Strength of Anchor in Tension
   Rebar embedded minimum of 11 inches hooked to develop full strength.
   $N_{pn} = 2 \times 0.301 \times 60ksi = 36k$ per two bars

4. Concrete Pryout Strength of Anchor in Shear
   $V_{cp} = k_{cp} N_{cb} = 1 \times 32.5 = 32.5$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: 0.75 x 32.5 = 24.4 > 11.963 OK

$\varphi V_n \geq V_u$: 0.75 x 18.9 = 14.2 > 5.222 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
11963/24400 + 5222/14175 = 0.49 + 0.37 = 0.86 OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: 0.75 x 0.85 x 32.5 = 20.7 > 13.107 OK

$0.75\varphi V_n \geq V_u$: 0.75 x 0.85 x 18.9 = 12 > 4.949 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
13107/20700 + 4949/12000 = 0.633 + 0.412 = 1.05 OK

Post Footings

Soil and wind loads:
Soil moment = 2080 x 1/3x4 = 2773 ft-lb.
Wind moment = 1184 x 7 = 8,287 ft-lb
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&w}$
2773+8287-2897 = $F_{s\&w}$ (7)
$F_{s\&w}$ = 1166 lb.

Soil and earthquake loads:
Soil moment = 2080 x 1/3x4 = 2773 ft-lb.
Earthquake moment = 1358 x 7 + 905 x 2 = 11316 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&e}$
2773+.7(11316)-2897 = $F_{s\&e}$ (7)
$F_{s\&e}$ = 1114 lb.

For footing design use $F_{s\&w}$ = 1166 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 32" in diameter for a minimum soil bearing allowable of 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM, GC and CL (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel, clayey gravel and inorganic clays of low to medium plasticity) is 64.

Vertical load:
$[4167 + 6000 + (150 \times 63/12 \times \pi r^2)]/\pi r^2$ = (4167+6000+4398)/5.585 = 2,608 psf < 2,660* OK
*Value has been increased one-third per IBC Table 1804.2, Note d.

Intermediate Post Footings

Intermediate post footings resist only soil loads.

Soil loads: 2080 lb. at 4'/3 = 16" above footing.
For footing design use F_s = 2080 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 24" in diameter for soil bearing allowable greater than or equal to 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM, GC and CL (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel, clayey gravel and inorganic clays of low to medium plasticity) is 70 inches.

Fence Panel Loads

Wind load = $q_z G C_f$ = 15 x 0.85 x 1.58 = 20.15 psf x 1.6 = 32.2 psf

Seismic load = 0.3(150 x 4/12) = 15.0 psf or .3(150 x 5.5/12) = 20.6 psf
Soil load = Cwh = 0.55x110x3 = 180 psf (average for bottom 2 feet) and 60x1 = 60psf (top 2 feet)
Load combinations:
1.0E + 1.6H = 200.6 psf, 1.6W = 32.2 psf

CONCRETE FENCE PANEL DESIGN & ANALYSIS

DESCRIPTION >> Fence Panels
>> Soil Wind

---------- GENERAL --------		--Span 1-	--Span 2-	--Span 3-	--Span 4-
ALL SPANS SIMPLE SUPPORT ?	y/n	y			
SPAN LENGTH	ft	4.33	12	0	0
END FIXITY.....	Lft	1	1	1	1
Fix,Pin,Free = 2,1,0	Rt	1	1	1	1
BEAM WIDTH	in	24	12	0	0
BEAM DEPTH	in	5.5	4	0	0
---- CALCULATED VALUES ----					
Left: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Center: Max Mu	ft-k	1.4	0.6	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
..Dist. to Mu	ft	2.16	6.00	0.00	0.00
Right: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Max Vu: Left	k	1.34	0.19	0.00	0.00
Rt	k	1.34	0.19	0.00	0.00
Reactions: Left: Dead	k	1.25	0.00	0.00	0.00
..(service) Live	k	0.09	0.19	0.00	0.00
Total	k	1.34	0.19	0.00	0.00
Right:Dead	k	1.25	0.00	0.00	0.00
Live	k	0.09	0.19	0.00	0.00
Total	k	1.34	0.19	0.00	0.00
Max. Defl @ Mid Span	in	-0.004	-0.065	0.000	0.000
X-Dist	ft	2.16	6.00	0.00	0.00
----- BEAM DESIGN DATA ----					
f'c	psi	4,000	4,000	3,000	3,000
Fy	psi	60,000	60,000	60,000	60,000
LEFT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
CENTER: As-BOTTOM	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
RIGHT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
------ APPLIED LOADS ------					
USE LL THIS SPAN?	Y/N	Y	Y	Y	Y
UNIFORM..... Soil	klf	0.576	0	0	0
ST	klf	0.0412	0.0322	0	0

DESIGN OF FOOTINGS FOR CANTILEVERED POST

DESCRIPTION >> Posts @ 13'O.C.w/2 intermediate,retaining 4'
>> CL,ML,MH CL,ML,MH

ALLOW PASSIVE	psf	200	200	0	0	0
MAX PASSIVE	psf	3,000	3,000	0	0	0
LOAD DURATION FACTOR		1.33	1.33	0	0	0
POINT LOAD	lbs	1,166	2,078	0	0	0
LOAD Ht.	ft	7.00	1.33	0.00	0.00	0.00
DIST. LOAD	#/ft	0	0	0	0	0
START HT.	ft	0.00	0.00	0.00	0.00	0.00
END HT.	ft	0.00	0.00	0.00	0.00	0.00
WIDTH/DIAMETER	in	32	24	0	0	0
CIRCULAR ?	y/n	Y	Y	Y	Y	Y
RESTRAINED ?	y/n	N	N	N	N	N
------ SUMMARY -------						
Moments @ Surface:						
Point Load	ft-#	8,162	2,764	0	0	0
Uniform Load	ft-#	0	0	0	0	0
... Total Moment	ft-#	8,162	2,764	0	0	0
Total Lateral Load	#	1,166	2,078	0	0	0
--- NON-RESTRAINED ----				RESULTS		
Min. Req'd Embedment						
A(1+(1+4.36h /A)^.5)/2						
A=2.34P/(S 1 b)	ft	5.31	5.85	0.00	0.00	0.00
Press @ 1/3 Embed.:						
Actual	psf	470	518	0	0	0
Allowable	psf	471	519	0	0	0

RECTANGULAR CONCRETE COLUMN DESIGN

DESCRIPTION >> 6' high fence post
>> posts at 13' 90 mph wind

DESIGN DATA

f'c	=	4,000 psi
Fy	=	60,000 psi
SEISMIC ZONE (0=wind):		0 0-4
COMBINE LL & ST	?	Y y/n
EFF. LENGTH FACTOR	=	1
IS COLUMN UNBRACED	?	y y/n
IF UNBRACED, Delta:S	=	0
Total Reinf. Area	=	1.24 in^2
% Steel	=	0.31 %

Note: 1% Min < Actual < 8% Max

COLUMN DATA

DEPTH	=	20 in
WIDTH	=	20 in
COLUMN HEIGHT	=	6 ft
CALC P:M DIAGRAM	?	N y/n

REBARS:	COUNT	BAR #	"d"
SET #1 :	2	5	4 in
SET #2 :	2	5	16 in
SET #3 :	0	0	0 in
SET #4 :	0	0	0 in
SET #5 :	0	0	0 in

APPLIED LOADS

AXIAL: DL	=	0.111 k
LL	=	0.111 k
ST	=	0 k
Ecc.	=	0 in

MOMENTS:		Top		Bottom
DL	=	0	ft-k	0
LL	=	0	ft-k	0
SHORT	=	0	ft-k	0

		DEAD	LIVE	SHORT		SLoc	ELoc
DISTRIBUTED :	#1 =	0	0	0.42375	klf @ x=	0	6 ft
	#2 =	0	0	0	klf @ x=	0	0 ft
POINT :	#1 =	0	0	0	k @ x=	0 ft	
	#2 =	0	0	0	k @ x=	0 ft	

SUMMARY

		ACI Equation 9-1	9-2	9-3	
Pu : Max. Factored	=	0.3441	0.2580	0.0999	k
Pn * Phi : Capacity @ Design Ecc.	=	800.903	5.0126	1.7371	k
		OK	OK	OK	
Mc = Delta:B*M2b + Delta:S*M2S	=	0.03	2.43	2.48	kft
Final Ecc.: Axial*Ecc + Moments	=	1.20	113.05	297.77	in
Magnification Factor	=	1.000	1.000	1.000	in
Design Eccentricity	=	1.20	113.05	297.77	in
Po * .80 : (short column)	=	1144.14	1144.1	1144.1	k
P : Balanced	=	539.177	539.17	539.17	k
Ecc: Balanced	=	6.80	6.80	6.80	in

SLENDERNESS EFFECTS

Actual kLu/r	=	12.00	Elastic Modulus	= 4E+06 psi
Beta	=	0.85		

		9-1	9-2	9-3	
Neutral Axis Distance from Edge	=	20.90	1.41	1.33	in
Phi	=	0.700	0.706	0.702	

Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.452	0.452	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max[(.2*Ec*Ig+Es*Is)/(1+Beta)					
-or- .4 Ec Ig/(1+Beta)]/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	2.43	2.48	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	113.05	297.77	in
Design Ecc. = Ecc * Delta	=	1.20	113.05	297.77	in

RECTANGULAR CONCRETE COLUMN DESIGN

DESCRIPTION >> 4'high fence post retaining 4' of soil w/ 6' post on top
>> posts at 13' 90 mph wind

DESIGN DATA

f'c	=	4,000 psi
Fy	=	60,000 psi
SEISMIC ZONE (0=wind):		0 0-4
COMBINE LL & ST	?	Y y/n
EFF. LENGTH FACTOR	=	1
IS COLUMN UNBRACED	?	y y/n
IF UNBRACED, Delta:S	=	0
Total Reinf. Area	=	1.24 in^2
% Steel	=	0.31 %

Note: 1% Min < Actual < 8% Max

COLUMN DATA

DEPTH	=	20 in
WIDTH	=	20 in
COLUMN HEIGHT	=	4 ft
CALC P:M DIAGRAM	?	N y/n

REBARS:	COUNT	BAR #	"d"
SET #1 :	2	5	4 in
SET #2 :	2	5	16 in
SET #3 :	0	0	0 in
SET #4 :	0	0	0 in
SET #5 :	0	0	0 in

APPLIED LOADS

AXIAL: DL	=	2.5	k
LL	=	0.111	k
ST	=	0	k
Ecc.	=	0	in

MOMENTS:		Top		Bottom
DL	=	0	ft-k	0
LL	=	0	ft-k	0
SHORT	=	-4.7731	ft-k	0

		DEAD	LIVE	SHORT		SLoc	ELoc
DISTRIBUTED :	#1 =	0	0	0.3948 klf	@ x=	2	4 ft
	#2 =	0	0	1.1844 klf	@ x=	0	2 ft
POINT :	#1 =	0	0	1.59104 k	@ x=	4 ft	
	#2 =	0	0	0 k	@ x=	0 ft	

SUMMARY

		ACI Equation 9-1	9-2	9-3	
Pu : Max. Factored	=	3.6887	2.7665	2.25	k
Pn * Phi : Capacity @ Design Ecc.	=	800.903	29.473	21.312	k
		OK	OK	OK	
Mc = Delta:B*M2b + Delta:S*M2S	=	0.37	6.09	6.21	kft
Final Ecc.: Axial*Ecc + Moments	=	1.20	26.40	33.09	in
Magnification Factor	=	1.000	1.000	1.000	in

Design Eccentricity	=	1.20	26.40	33.09	in
Po * .80 : (short column)	=	1144.14	1144.1	1144.1	k
P : Balanced	=	539.177	539.17	539.17	k
Ecc: Balanced	=	6.80	6.80	6.80	in

SLENDERNESS EFFECTS

Actual kLu/r = 8.00 Elastic Modulus = 4E+06 psi

Beta = 0.85

		9-1	9-2	9-3	
Neutral Axis Distance from Edge	=	20.90	1.98	1.80	in
Phi	=	0.700	0.735	0.726	
Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.949	0.949	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max{(.2*Ec*Ig+Es*Is)/(1+Beta) -or- .4 Ec Ig/(1+Beta)}/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	6.09	6.21	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	26.40	33.09	in
Design Ecc. = Ecc * Delta	=	1.20	26.40	33.09	in

```
-----------------------------------------------------------------------
                        STEEL  COLUMN  DESIGN
-----------------------------------------------------------------------
DESCRIPTION >> Fence
            >> Post at mid span for 12' panels, supporting bottom 4'
--------- COLUMN DATA ----------      ----------- DESIGN DATA -----------
AISC SECTION  ------>>W4x13            Fy                    =     36 ksi
TOTAL COLUMN HT.     =   1.33 ft       LOAD DURATION FACTOR =      1
                                       COMBINE LL & ST     ?      N  y/n

SUPPORT FIXITY   --->>      5 <<
1=Pin/Pin, 2=Fix/Fix, 3=Pin/Fix        SIDESWAY      1:Restrained, 0:Free
 4=Fix/Pin, 5=Fix/Free                    X-X AXIS          =      1
     (Bottom/Top)                         Y-Y AXIS          =      1
UNBRACED LENGTHS:                      EFFECTIVE LENGTH FACTORS:
    X-X AXIS          =      0 ft        X-X AXIS          =      1
    Y-Y AXIS          =   1.33 ft        Y-Y AXIS          =      1
------------------------- APPLIED LOADS ------------------------------
AXIAL DEAD LOAD      =    0.1 kips    ECC. for X-X MOMENTS =      0 in
  "   LIVE LOAD      =    0.1 kips      "   "  Y-Y    "    =      0 in
  "   SHORT TERM     =      0 kips
                                  Dead    Live   Short   SLoc   ELoc
                                -------  ------  ------  -----  -------

X-X AXIS MOMENTS:     TOP     =      0       0       0 k-ft
                      BOTTOM  =      0       0       0 k-ft
                    BTWN ENDS =      0       0       0      0 ft
Y-Y AXIS MOMENTS:     TOP     =      0       0       0 k-ft
                      BOTTOM  =      0       0       0 k-ft
                    BTWN ENDS =      0       0       0      0 ft
POINT LOADS: (k)      X-X     =      0       0    1.56   1.33 ft
                      Y-Y     =      0       0       0      0 ft
UNIFORM:  (k/ft)      X-X     =      0       0       0      0      0 ft
                      Y-Y     =      0       0       0      0      0 ft
|------------------------- SUMMARY ------------------------------|
| USE : W4X13,  Max Stress Ratio = 0.19                           |
|              Load Comb...>>  Dead    Live     D+L    DL+ST      |
|  Formula  1.6 - 1a       =   0.000   0.000   0.000   0.000   OK |
|  Formula  1.6 - 1b       =   0.000   0.000   0.000   0.000   OK |
|  Formula  1.6 - 2        =   0.001   0.001   0.003   0.194   OK |
|                                                                 |
| Actual & Allowable Stresses...                                  |
|  Fa : Allowable          =   20.84   20.84   20.84   20.84 ksi  |
|    fa : Actual           =    0.03    0.03    0.05    0.03 ksi  |
|  Fb:xx : Allow [1.6-1a]  =   23.76   23.76   23.76   23.76 ksi  |
|  "     " [1.6-1b & 1.6-2] =  23.76   23.76   23.76   23.76 ksi  |
|    fb:xx  Actual         =    0.00    0.00    0.00    4.58 ksi  |
|  Fb:yy : Allow [1.6-1a]  =   27.00   27.00   27.00   27.00 ksi  |
|  "     " [1.6-1b & 1.6-2] =  27.00   27.00   27.00   27.00 ksi  |
|    fb:yy  Actual         =    0.00    0.00    0.00    0.00 ksi  |
|                                                                 |
|  Max X-X Axis Deflection =   -0.006 in    @    1.33 ft from base |
```

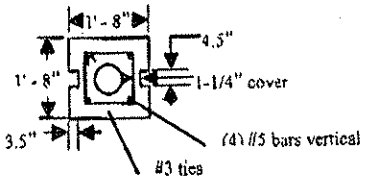
Max Y-Y Axis Deflection = 0.000 in @ 0.00 ft from base

STEEL SECTION DATA

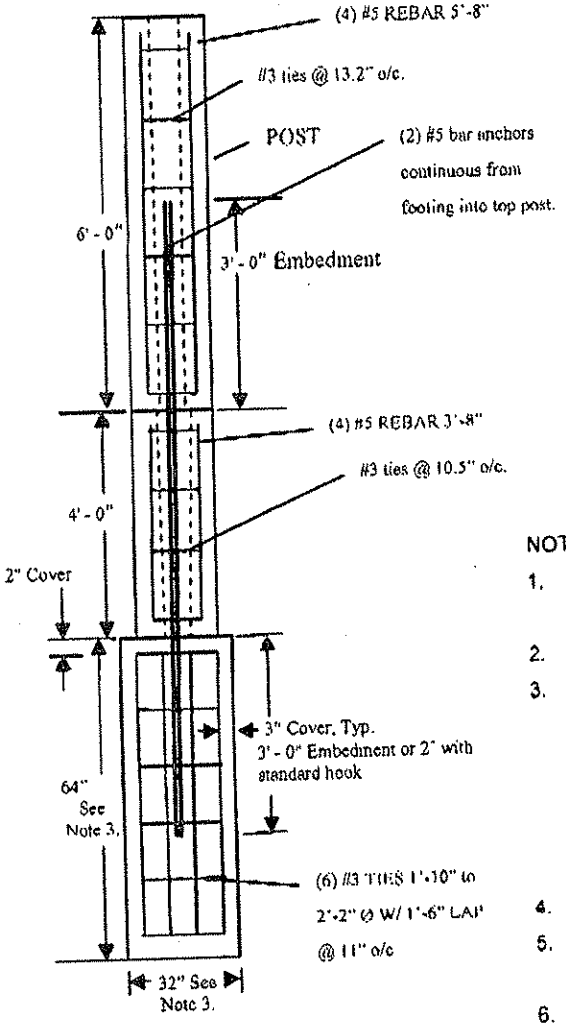
DEPTH	=	4.16 in	I-xx	=	11.300 in^4
WIDTH	=	4.060 in	S-xx	=	5.4326 in^3
FLANGE THICKNESS	=	0.345 in	R-xx	=	1.718 in
WEB THICKNESS	=	0.280 in	I-yy	=	3.8599 in^4
AREA	=	3.83 in^2	S-yy	=	1.90 in^3
WEIGHT	=	13.00 #/ft	R-yy	=	1.004 in
r-T	=	1.100			

INTERMEDIATE STRESS CALCULATION VALUES

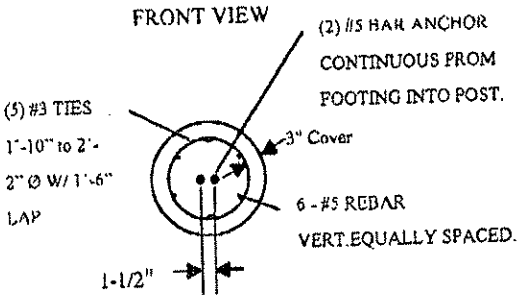
F'ex (DL+LL)	=	1E+08 psi	F'ex (DL+LL+ST)	=	1E+08 psi
F'ey (DL+LL)	=	590845 psi	F'ey (DL+LL+ST)	=	590845 psi
Cm:x (DL+LL)	=	0.60	Cm:x (DL+LL+ST)	=	1.00
Cm:y (DL+LL)	=	0.60	Cm:y (DL+LL+ST)	=	0.60
Cb:x (DL+LL)	=	1.75	Cb:x (DL+LL+ST)	=	1.00
Cb:y (DL+LL)	=	1.75	Cb:y (DL+LL+ST)	=	1.75



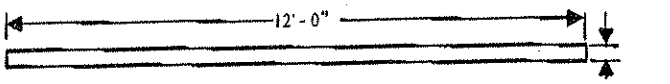
POST TOP VIEW



FRONT VIEW

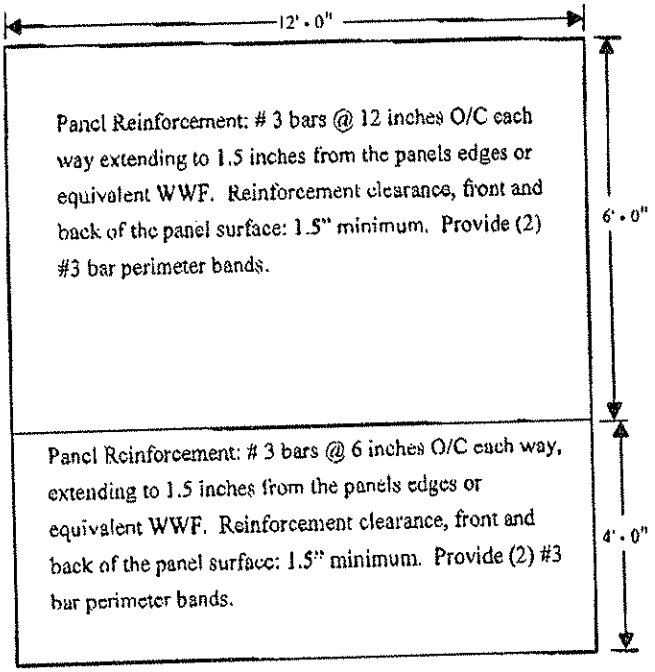


FOOTING TOP VIEW



FENCE PANEL TOP VEIW

4.0 top panel-5.5" bottom panel



FENCE PANEL FRONT VEIW

NOTES:

1. F'_c = 4,000 PSI MINIMUM FOR POST AND PANEL CONCRETE, 4,000 PSI FOR CELL GROUT.
2. F'_c = 3,000 PSI MINIMUM FOR FOOTINGS.
3. PROVIDE AVERAGE FOOTING DIAMETER OF 32" FOR SOIL BEARING ALLOWABLE GREATER THAN OR EQUAL TO 2,500 PSF WITH F'_c = 2,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM, GC AND CL (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL, CLAYEY GRAVEL AND INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY) IS 64 INCHES.
4. WIND: V = 90 MPH, EXPOSURE B.
5. SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_S = 1.31 OR LESS; SITE CLASSES A, B, C, OR D; IMPORTANCE FACTOR, I_P = 1.0.
6. PROVIDE LATERAL SUPPORT AT ONE-THIRD SPAN AND AT TWO-THIRDS SPAN OF BOTTOM 4' PANELS BY INSTALLING W4X13 STEEL POST IN 24" DIAMETER BY 70" DEEP CONCRETE FOOTINGS. STEEL POSTS MUST CONTACT THE PANEL SURFACE OPPOSITE THE SOIL SIDE AND EXTEND 18 INCHES MIN. UP FROM THE BOTTOM OF THE PANEL. THE TOP OF THE FOOTING MUST BE IN CONTACT WITH THE BOTTOM OF THE PANELS. BOTTOM PANEL CAN RETAIN UP TO 4' OF CLAYEY SOIL TYPES SC, ML-CL OR CL PER TABLE 1610.1.

* Contacted David Keith 10/22/07
8' steel posts are acceptable 3' on panel
5' in footing within the 12" from bottom
of footing. The steel beam must be in
contact w/ panel all 36".

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To: Shane Greenwood From: Mike Maddox

Fax: 253 5235 Pages: 18

Phone: Date: 6-13-07

Re: CC:

☐ Urgent ☐ For Review ☐ Please Comment ☐ Please Reply ☐ Please Recycle

• Comments:

ANY PROBLEMS RECEIVING THIS FAX CONTACT:

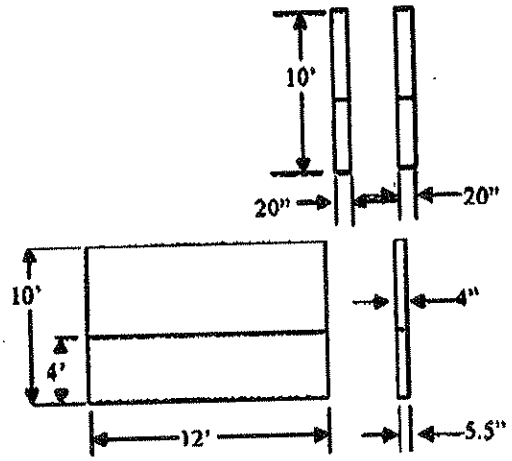
STRUCTURAL ANALYSIS OF SEGMENTED TEN FOOT HIGH PRECAST CONCRETE FENCE WITH BOTTOM 4 FOOT HIGH SEGMENT LATERALLY SUPPORTED BY INTERMEDIATE STEEL POSTS IN FOOTINGS AND RETAINING FOUR FEET OF COURSE GRANULAR SOIL AT RIVERWALK, SOUTH JORDAN

PREPARED FOR
ALL FIVE
CLYDE ALLEN

JUNE 11, 2007

PREPARED BY
DAVID KEITH ENGINEERING PLLC
AMERICAN FORK, UTAH

Ten Foot High Precast Concrete Fence



Posts

Height: 4 ft. & 6 ft.
Breadth: 20 in.
Width: 20 in.
Weight = 10 x 20/12 x 20/12 x 150 =4,167 lb.
Spacing: 13' – 0"

Intermediate Posts: W4x13 steel columns embedded in 24" diameter by 62" deep concrete footing. Steel posts must contact the panel surface opposite the soil side and extend 36 inches minimum up from the bottom of the panel. The top of the footing must be in contact with the bottom of the panels. Bottom panel can retain up to 4' of course granular soil, types GW, GP, SW, or SP per table 1610.1.

Panels

Height:	6 ft.	4ft
Breadth:	12 ft.	12 ft
Thickness:	4 in.	5.5 in.

Weight = 6 x 12 x 4/12 x 150 = 3,600 lb.
4 x 12 x 5.5/12 x 150 = 3,300 lb.

Lateral Forces (2006 IBC) and Anchor Loads

Soil:

F = 30 psf x 4' x 4'/2 x 6.5' = 1560 lb.
Overturning Moment = 1560 x 1/3x4 = 2080 ft-lb.

Wind:

V = 90 mph, Exposure B
Z = 10 ft
Structure Category = I
$K_z = 2.01(15/z_g)^{2/\alpha} = 0.575$
Where, $\alpha = 9.5$ and $z_g = 900$ ft.
$K_{zt} = 1$, h<60'
$K_d = 0.85$
I = 0.87
$C_f = 1.44$, G = 0.85
$q_z = 0.00256 K_z K_{zt} K_d V^2 I = 12.4$ psf
$F = q_z G C_f A_f$
F = 12.4 x 0.85 x 1.44 x 13 x 6 = 1,184 lb.
Overturning Moment = 1184 x 7 = 8,287 ft-lb.

Seismic:

$F_p = MAX(0.4IS_{DS}W_p, 0.1W_p)$ Use $F_p = 0.4IS_{DS}W_p$
w_p = weight of portion
I = 1.0
Short period spectral acceleration, $S_s = 1.311$;
Site Class D assumed. $F_s = 1.0$

$S_{ds} = 2/3 F_a S_s = 0.874$
$W_p = 3600/2 + 2500 + 1667 + 3300/2 = 7617$ lb.
$F_p = 0.35 \times 7617 = 2666$ lb. (bottom 4' = 1066, top 6' = 1560)
Overturning Moment = 2666 x 5 = 13330 ft-lb.

Combined Factored Loads

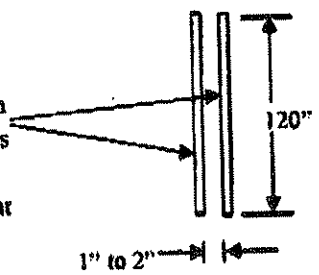
Resisting Moment = (3600) 2/12 + (3300)2.75/12+ (4167) 10/12 = 4829 ft-lb.
Required hold down force, F_h
Wind and Soil: (2080+8287)-4829 = F_h (10/12)
F_h = 6646 lb
Apply safety factors:
V_u = (2080+1184) x 1.6 = 5222 lb.
N_u = 6646 x 1.6 = 9969 lb.
Earthquake and Soil: (2080 x 1.6+13330)-4829 = F_h (10/12)
F_h = 14195 lb
Apply safety factors:
V_u = 2080 x 1.6 + 2666 = 5994 lb.
N_u = 14195 lb.

Post Hold Down

Description:

(2) #5 bars embedded into footing and post.

#5 Deformed Bar, ASTM A615 Grade 60, embedded 36" min. or 24" with a hook into footing and 36" min. into post and centered in footing and post core. The core is 8" diameter at the top and 6" diameter at the bottom. The grout shall have an f'_c of 4,000 psi,



Anchors shall have edge reinforcement of a No. 4 bar or greater between anchor and edge and with the edge reinforcement enclosed within hoops spaced at not more than 13.2 inches.

Anchor Strength in Post

1. <u>Steel Strength of Anchor in Tension</u>
   $N_s = nA_{se}f_y$ = 2 x 0.301 x 60ksi =36k per two bars

2. <u>Steel Strength of Anchor in Shear</u>
   $V_s = nA_{se}f_y$ = 2 x 0.301 x 60ksi =36k per two bars

3. <u>Concrete Breakout Strength of Anchor in Tension</u>
   $N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{4000} \times 6.67^{1.5} = 26.147$ k
   $N_{cbg} = A_N/A_{No}\psi_2\psi_3 N_b$ = 400/400 x 0.9 x 1.25 x 26.128 = <u>29.4 k</u>

4. <u>Concrete Breakout Strength of Anchor in Shear</u>
   $V_b = 7(l/d_o)^{0.2}\sqrt{d_o}\sqrt{f'_c}\, c_1^{1.5} = 7(6/0.5)^{0.2} \times \sqrt{0.5} \times \sqrt{4000} \times 6.67^{1.5} = 13.5$ k
   $V_{cbg} = A_V/A_{Vo}\psi_6\psi_7 V_b$ = 200/200 x 0.9 x 1.4 x 10.003 = <u>17 k</u>

5. <u>Pullout Strength of Anchor in Tension</u>
   Rebar embedded 60 inches to develop full strength.
   N_{pn} = 2 x 0.301 x 60ksi =36k per two bars

6. Concrete Pry out Strength of Anchor in Shear
$V_{cp} = k_{cp} N_{cb} = 1 \times 29.4 = 29.4$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: $0.75 \times 29.4 = 22 > 9.969$ OK

$\varphi V_n \geq V_u$: $0.75 \times 17 = 12.75 > 5.222$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$9969/22000 + 5222/12750 = 0.45 + 0.41 =$ 0.9 OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: $0.75 \times 0.85 \times 29.4 = 18.7 > 14.195$ OK

$0.75\varphi V_n \geq V_u$: $0.75 \times 0.85 \times 17 = 10.8 > 5.994$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$14195/24991 + 5994/14451 = 0.57 + 0.42 =$ 1.0 OK

Anchor Strength in Footing

7. Steel Strength of Anchor in Tension
$N_s = nA_{se}f_y = 2 \times 0.301 \times 60$ksi $=36$k per two bars

8. Steel Strength of Anchor in Shear
$V_s = nA_{se}f_y = 2 \times 0.301 \times 60$ksi $=36$k per two bars

1. Concrete Breakout Strength of Anchor in Tension
$N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{3000} \times 7.85^{1.5} = 28.9$ k
$N_{cbg} = A_c/A_{co}\psi_1\psi_2\psi_3 N_b = 555/555 \times 1 \times 0.90 \times 1.25 \times 36 =$ 32.5 k

2. Concrete Breakout Strength of Anchor in Shear
$V_b = 7(l/d_o)^{0.2}\sqrt{d_o}\sqrt{f'_c}\, c_1^{1.5} = 7(4/0.625)^{0.2} \times \sqrt{0.625} \times \sqrt{3000} \times 7.85^{1.5} = 15$ k
$V_{cbg} = A_c/A_{co}\psi_5\psi_6\psi_7 V_b = 278/278 \times 1 \times 0.9 \times 1.4 \times 19.622 =$ 18.9 k

3. Pullout Strength of Anchor in Tension
Rebar embedded minimum of 11 inches hooked to develop full strength.
$N_{pn} = 2 \times 0.301 \times 60$ksi $=36$k per two bars

4. Concrete Pryout Strength of Anchor in Shear
$V_{cp} = k_{cp} N_{cb} = 1 \times 32.5 = 32.5$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: $0.75 \times 32.5 = 24.4 > 9.969$ OK

$\varphi V_n \geq V_u$: 0.75 x 18.9 = 14.2 > 5.222 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
9969/24400 + 5222/14175 = 0.41 + 0.37 = 0.8 OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: 0.75 x 0.85 x 32.5 = 20.7 > 14.195 OK

$0.75\varphi V_n \geq V_u$: 0.75 x 0.85 x 18.9 = 12 > 5.994 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
14195/20700 + 5994/12000 = 0.686 + 0.500 = 1.2 OK

Post Footings

Soil and wind loads:
Soil moment = 1560 x 1/3x4 = 2080 ft-lb.
Wind moment = 1184 x 7 = 8,287 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&w}$
2080+8287-2897 = $F_{s\&w}$ (7)
$F_{s\&w}$ = 1067 lb.

Soil and earthquake loads:
Soil moment = 1560 x 1/3x4 = 2080 ft-lb.
Earthquake moment = 1560 x 7 + 1066 x 2 = 13052 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&e}$
2080+.7(13052)-2897 = $F_{s\&e}$ (7)
$F_{s\&e}$ = 1189 lb.

For footing design use $F_{s\&e}$ = 1189 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 32" in diameter for a minimum soil bearing allowable of 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM, GC and CL (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel, clayey gravel and inorganic clays of low to medium plasticity) is 64.

Vertical load:
$[4167 + 6000 + (150 \times 63/12 \times \pi r^2)]/\pi r^3$ = (4167+6000+4398)/5.585 = 2,608 psf < 2,660* OK
*Value has been increased one-third per IBC Table 1804.2, Note d.

Intermediate Post Footings

Intermediate post footings resist only soil loads.
Soil loads: 1560 lb. at 4'/3 = 16" above footing.
For footing design use F_s = 1560 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 24" in diameter for soil bearing allowable greater than or equal to 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM, GC and CL (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel, clayey gravel and inorganic clays of low to medium plasticity) is 62 inches.

Fence Panel Loads

Wind load = q_zGC_f = 15 x 0.85 x 1.58 = 20.15 psf x 1.6 = 32.2 psf

Seismic load = 0.3(150 x 4/12) = 15.0 psf or .3(150 x 5.5/12) = 20.6 psf
Soil load = Cwh = 0.3x100x3 = 90 psf (average for bottom 2 feet) and .3x100x1 = 30psf (top 2 feet)
Load combinations:
1.0E + 1.6H = 165 psf, 1.6W = 32.2 psf

CONCRETE FENCE PANEL DESIGN & ANALYSIS

DESCRIPTION >> Fence Panels
>> Soil Wind

---------- GENERAL --------		--Span 1-	--Span 2-	--Span 3-	--Span 4-
ALL SPANS SIMPLE SUPPORT ?	y/n	y			
SPAN LENGTH	ft	6.5	12	0	0
END FIXITY.....	Lft	1	1	1	1
Fix,Pin,Free = 2,1,0	Rt	1	1	1	1
BEAM WIDTH	in	24	12	0	0
BEAM DEPTH	in	5.5	4	0	0
---- CALCULATED VALUES ----					
Left: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Center: Max Mu	ft-k	1.7	0.6	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
..Dist. to Mu	ft	3.25	6.00	0.00	0.00
Right: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Max Vu: Left	k	1.07	0.19	0.00	0.00
Rt	k	1.07	0.19	0.00	0.00
Reactions: Left: Dead	k	0.94	0.00	0.00	0.00
..(service) Live	k	0.13	0.19	0.00	0.00
Total	k	1.07	0.19	0.00	0.00
Right:Dead	k	0.94	0.00	0.00	0.00
Live	k	0.13	0.19	0.00	0.00
Total	k	1.07	0.19	0.00	0.00
Max. Defl @ Mid Span	in	-0.011	-0.065	0.000	0.000
X-Dist	ft	3.25	6.00	0.00	0.00
----- BEAM DESIGN DATA ----					
f'c	psi	4,000	4,000	3,000	3,000
Fy	psi	60,000	60,000	60,000	60,000
LEFT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
CENTER: As-BOTTOM	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
RIGHT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
------ APPLIED LOADS ------					
USE LL THIS SPAN?	Y/N	Y	Y	Y	Y
UNIFORM..... Soil	klf	0.288	0	0	0
ST	klf	0.0412	0.0322	0	0

DESIGN OF FOOTINGS FOR CANTILEVERED POST

DESCRIPTION >> Posts @ 13'O.C.w/1 intermediate,retaining 4'
>> CL,ML,MH CL,ML,MH

ALLOW PASSIVE	psf	200	200	200	0	0
MAX PASSIVE	psf	3,000	3,000	3,000	0	0
LOAD DURATION FACTOR		1.33	1.33	1.33	0	0
POINT LOAD	lbs	1,189	1,560	0	0	0
LOAD Ht.	ft	7.00	1.33	0.00	0.00	0.00
DIST. LOAD	#/ft	0	0	347	0	0
START HT.	ft	0.00	0.00	0.00	0.00	0.00
END HT.	ft	0.00	0.00	4.00	0.00	0.00
WIDTH/DIAMETER	in	32	24	24	0	0
CIRCULAR ?	y/n	Y	y	y	Y	Y
RESTRAINED ?	y/n	N	N	N	N	N
------ SUMMARY -------						
Moments @ Surface:						
Point Load	ft-#	8,323	2,075	0	0	0
Uniform Load	ft-#	0	0	2,776	0	0
... Total Moment	ft-#	8,323	2,075	2,776	0	0
Total Lateral Load	#	1,189	1,560	1,388	0	0
--- NON-RESTRAINED ----				RESULTS		
Min. Req'd Embedment						
A(1+(1+4.36h /A)^.5)/2						
A=2.34P/(S 1 b)	ft	5.35	5.13	5.11	0.00	0.00
Press @ 1/3 Embed.:						
Actual	psf	473	456	454	0	0
Allowable	psf	474	455	453	0	0

```
-----------------------------------------------------------------------
                  RECTANGULAR CONCRETE COLUMN DESIGN
-----------------------------------------------------------------------
 DESCRIPTION >> 6' high fence post
             >> posts at 13' 90 mph wind
---------- DESIGN  DATA ----------  ----------- COLUMN DATA -----------
 f'c                  =  4,000 psi   DEPTH                =     20 in
 Fy                   = 60,000 psi   WIDTH                =     20 in
 SEISMIC ZONE (0=wind):       0 0-4  COLUMN HEIGHT        =      6 ft
 COMBINE LL & ST     ?    Y    y/n   CALC P:M DIAGRAM    ?     N   y/n
 EFF. LENGTH FACTOR   =       1
                                    REBARS:    COUNT  BAR #    "d"
 IS COLUMN UNBRACED  ? y        y/n  SET #1 :      2      5      4 in
 IF UNBRACED, Delta:S =       0      SET #2 :      2      5     16 in
                                     SET #3 :      0      0      0 in
 Total Reinf. Area    =   1.24 in^2  SET #4 :      0      0      0 in
 % Steel              =   0.31  %    SET #5 :      0      0      0 in
 Note: 1% Min < Actual < 8% Max
---------------------------- APPLIED LOADS ----------------------------
                                 MOMENTS:        Top          Bottom
 AXIAL: DL    =  0.111 k              DL    =      0   ft-k      0
        LL    =  0.111 k              LL    =      0   ft-k      0
        ST    =      0 k              SHORT =      0   ft-k      0
       Ecc.   =      0 in
                          DEAD   LIVE   SHORT          SLoc    ELoc
 DISTRIBUTED  :   #1  =      0      0 0.42375 klf @ x=     0      6 ft
                  #2  =      0      0       0 klf @ x=     0      0 ft
 POINT        :   #1  =      0      0       0 k   @ x=     0 ft
                  #2  =      0      0       0 k   @ x=     0 ft

|----------- SUMMARY ---------------------------- ACI Equation -------|
|                                                 9-1    9-2    9-3    |
|  Pu : Max. Factored                 =        0.3441 0.2580 0.0999 k  |
|  Pn * Phi : Capacity @ Design Ecc.  =       800.903 5.0126 1.7371 k  |
|                                                 OK     OK     OK     |
|  Mc = Delta:B*M2b + Delta:S*M2S     =          0.03   2.43   2.48 kft|
|  Final Ecc.: Axial*Ecc + Moments    =          1.20 113.05 297.77 in |
|  Magnification Factor               =         1.000  1.000  1.000 in |
|  Design Eccentricity                =          1.20 113.05 297.77 in |
|                                                                      |
|  Po * .80 : (short column)          =       1144.14 1144.1 1144.1 k  |
|  P : Balanced                       =       539.177 539.17 539.17 k  |
|  Ecc: Balanced                      =          6.80   6.80   6.80 in |
-----------------------------------------------------------------------|
------------------------- SLENDERNESS EFFECTS -------------------------
  Actual  kLu/r      =   12.00        Elastic  Modulus   =  4E+06 psi
  Beta               =    0.85
                                                 9-1     9-2    9-3
  Neutral Axis Distance from Edge     =         20.90   1.41   1.33 in
  Phi                                 =         0.700  0.706  0.702
```

Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.452	0.452	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max{(.2*Ec*Ig+Es*Is)/(1+Beta) -or- .4 Ec Ig/(1+Beta)}/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	2.43	2.48	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	113.05	297.77	in
Design Ecc. = Ecc * Delta	=	1.20	113.05	297.77	in

RECTANGULAR CONCRETE COLUMN DESIGN

DESCRIPTION >> 4'high fence post retaining 4' of soil w/ 6' post on top
>> posts at 13' 90 mph wind

DESIGN DATA			COLUMN DATA		
f'c	= 4,000 psi		DEPTH	=	20 in
Fy	= 60,000 psi		WIDTH	=	20 in
SEISMIC ZONE (0=wind):	0 0-4		COLUMN HEIGHT	=	4 ft
COMBINE LL & ST ?	Y	y/n	CALC P:M DIAGRAM ?	N	y/n
EFF. LENGTH FACTOR =	1				

REBARS:	COUNT	BAR #	"d"
SET #1 :	2	5	4 in
SET #2 :	2	5	16 in
SET #3 :	0	0	0 in
SET #4 :	0	0	0 in
SET #5 :	0	0	0 in

IS COLUMN UNBRACED ? y y/n
IF UNBRACED, Delta:S = 0

Total Reinf. Area = 1.24 in^2
% Steel = 0.31 %
Note: 1% Min < Actual < 8% Max

APPLIED LOADS

AXIAL: DL	=	2.5 k	MOMENTS:		Top		Bottom
LL	=	0.111 k	DL	=	0	ft-k	0
ST	=	0 k	LL	=	0	ft-k	0
Ecc.	=	0 in	SHORT	=	-4.7731	ft-k	0

			DEAD	LIVE	SHORT		SLoc	ELoc	
DISTRIBUTED	:	#1 =	0	0	0.3948	klf @ x=	2	4	ft
		#2 =	0	0	1.1844	klf @ x=	0	2	ft
POINT	:	#1 =	0	0	1.59104	k @ x=	4	ft	
		#2 =	0	0	0	k @ x=	0	ft	

SUMMARY

		ACI Equation 9-1	9-2	9-3	
Pu : Max. Factored	=	3.6887	2.7665	2.25	k
Pn * Phi : Capacity @ Design Ecc.	=	800.903	29.473	21.312	k
		OK	OK	OK	
Mc = Delta:B*M2b + Delta:S*M2S	=	0.37	6.09	6.21	kft
Final Ecc.: Axial*Ecc + Moments	=	1.20	26.40	33.09	in
Magnification Factor	=	1.000	1.000	1.000	in

```
-----------------------------------------------------------------------
                        STEEL  COLUMN  DESIGN
-----------------------------------------------------------------------
 DESCRIPTION >> Fence
            >> Post at mid span for 12' panels, supporting bottom 4'
--------- COLUMN DATA ----------     ---------- DESIGN DATA ----------
 AISC SECTION  ------>>W4x13          Fy                    =     36 ksi
 TOTAL COLUMN HT.     =   1.33 ft     LOAD DURATION FACTOR =      1
                                      COMBINE LL & ST     ?      N  y/n
 SUPPORT FIXITY   --->>     5 <<
 1=Pin/Pin, 2=Fix/Fix, 3=Pin/Fix      SIDESWAY      1:Restrained, 0:Free
  4=Fix/Pin, 5=Fix/Free                 X-X AXIS          =      1
     (Bottom/Top)                       Y-Y AXIS          =      1
 UNBRACED LENGTHS:                    EFFECTIVE LENGTH FACTORS:
    X-X AXIS         =      0 ft        X-X AXIS          =      1
    Y-Y AXIS         =   1.33 ft        Y-Y AXIS          =      1
--------------------------- APPLIED LOADS ----------------------------
 AXIAL DEAD LOAD     =    0.1 kips    ECC. for X-X MOMENTS =      0 in
   "   LIVE LOAD     =    0.1 kips      "   "  Y-Y    "    =      0 in
   "   SHORT TERM    =      0 kips
                                Dead    Live   Short   SLoc   ELoc
                               ------- ------- ------- ------ -------
 X-X AXIS MOMENTS:    TOP     =      0       0       0 k-ft
                    BOTTOM    =      0       0       0 k-ft
                  BTWN ENDS   =      0       0       0      0 ft
 Y-Y AXIS MOMENTS:    TOP     =      0       0       0 k-ft
                    BOTTOM    =      0       0       0 k-ft
                  BTWN ENDS   =      0       0       0      0 ft
 POINT LOADS: (k)     X-X     =      0       0    1.56   1.33 ft
                      Y-Y     =      0       0       0      0 ft
 UNIFORM:  (k/ft)     X-X     =      0       0       0      0      0 ft
                      Y-Y     =      0       0       0      0      0 ft
|---------------------------- SUMMARY -------------------------------|
| USE : W4X13,  Max Stress Ratio = 0.19                               |
|               Load Comb...>>  Dead    Live     D+L   DL+ST          |
|  Formula  1.6 - 1a        =   0.000   0.000   0.000  0.000   OK    |
|  Formula  1.6 - 1b        =   0.000   0.000   0.000  0.000   OK    |
|  Formula  1.6 - 2         =   0.001   0.001   0.003  0.194   OK    |
|                                                                     |
| Actual & Allowable Stresses...                                      |
|  Fa : Allowable           =   20.84   20.84   20.84  20.84 ksi    |
|    fa : Actual            =    0.03    0.03    0.05   0.03 ksi    |
|  Fb:xx : Allow [1.6-1a]   =   23.76   23.76   23.76  23.76 ksi    |
|  "     " [1.6-1b & 1.6-2] =   23.76   23.76   23.76  23.76 ksi    |
|    fb:xx  Actual          =    0.00    0.00    0.00   4.58 ksi    |
|  Fb:yy : Allow [1.6-1a]   =   27.00   27.00   27.00  27.00 ksi    |
|  "     " [1.6-1b & 1.6-2] =   27.00   27.00   27.00  27.00 ksi    |
|    fb:yy  Actual          =    0.00    0.00    0.00   0.00 ksi    |
|                                                                     |
|  Max X-X Axis Deflection =  -0.006 in    @    1.33 ft from base    |
```

Design Eccentricity	=	1.20	26.40	33.09	in
Po * .80 : (short column)	=	1144.14	1144.1	1144.1	k
P : Balanced	=	539.177	539.17	539.17	k
Ecc: Balanced	=	6.80	6.80	6.80	in

---------- SLENDERNESS EFFECTS ----------

Actual kLu/r = 8.00 Elastic Modulus = 4E+06 psi

Beta = 0.85

		9-1	9-2	9-3	
Neutral Axis Distance from Edge	=	20.90	1.98	1.80	in
Phi	=	0.700	0.735	0.726	
Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.949	0.949	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max[(.2*Ec*Ig+Es*Is)/(1+Beta) -or- .4 Ec Ig/(1+Beta)]/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	6.09	6.21	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	26.40	33.09	in
Design Ecc. = Ecc * Delta	=	1.20	26.40	33.09	in

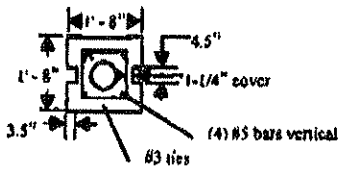
| Max Y-Y Axis Deflection = 0.000 in @ 0.00 ft from base |

STEEL SECTION DATA

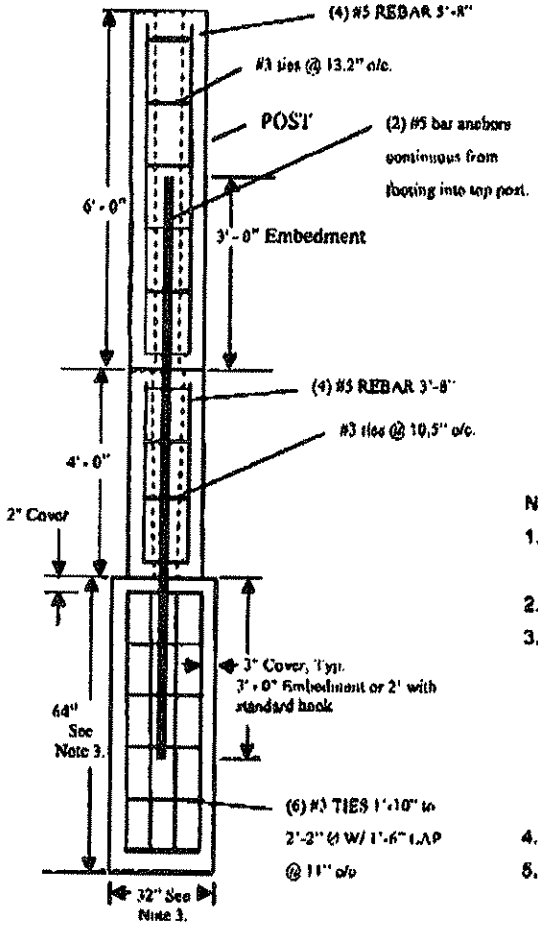
DEPTH	=	4.16 in	I-xx	=	11.300 in^4
WIDTH	=	4.060 in	S-xx	=	5.4326 in^3
FLANGE THICKNESS	=	0.345 in	R-xx	=	1.718 in
WEB THICKNESS	=	0.280 in	I-yy	=	3.8599 in^4
AREA	=	3.83 in^2	S-yy	=	1.90 in^3
WEIGHT	=	13.00 #/ft	R-yy	=	1.004 in
r-T	=	1.100			

INTERMEDIATE STRESS CALCULATION VALUES

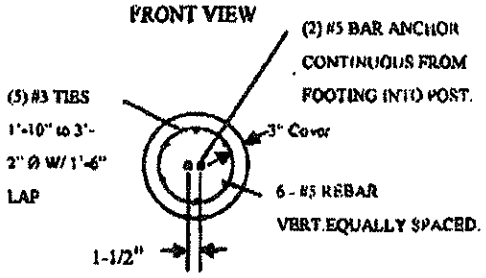
F'ex (DL+LL)	=	1E+08 psi	F'ex (DL+LL+ST)	=	1E+08 psi
F'ey (DL+LL)	=	590845 psi	F'ey (DL+LL+ST)	=	590845 psi
Cm:x (DL+LL)	=	0.60	Cm:x (DL+LL+ST)	=	1.00
Cm:y (DL+LL)	=	0.60	Cm:y (DL+LL+ST)	=	0.60
Cb:x (DL+LL)	=	1.75	Cb:x (DL+LL+ST)	=	1.00
Cb:y (DL+LL)	=	1.75	Cb:y (DL+LL+ST)	=	1.75



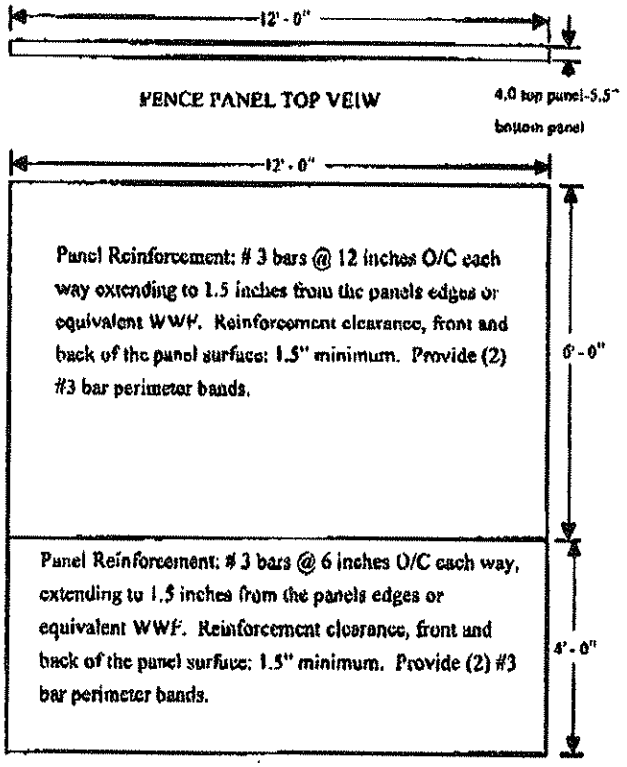
POST TOP VIEW



FRONT VIEW



FOOTING TOP VIEW



FENCE PANEL TOP VEIW

FENCE PANEL FRONT VEIW

NOTES:

1. F'_c = 4,000 PSI MINIMUM FOR POST AND PANEL CONCRETE, 4,000 PSI FOR CELL GROUT.
2. F'_c = 3,000 PSI MINIMUM FOR FOOTINGS.
3. PROVIDE AVERAGE FOOTING DIAMETER OF 32" FOR SOIL BEARING ALLOWABLE GREATER THAN OR EQUAL TO 2,500 PSF WITH F'_c = 2,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM, GC AND CL (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL, CLAYEY GRAVEL AND INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY) IS 64 INCHES.
4. WIND: V = 90 MPH. EXPOSURE B.
5. SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_s = 1.31 OR LESS: SITE CLASSES A, B, C, OR D; IMPORTANCE FACTOR, I_p = 1.0.
6. PROVIDE LATERAL SUPPORT AT MIDSPAN OF BOTTOM 4' PANELS BY INSTALLING W4X13 STEEL POST IN 24" DIAMETER BY 62" DEEP CONCRETE FOOTINGS. STEEL POSTS MUST CONTACT THE PANEL SURFACE OPPOSITE THE SOIL SIDE AND EXTEND 18 INCHES MIN. UP FROM THE BOTTOM OF THE PANEL. THE TOP OF THE FOOTING MUST BE IN CONTACT WITH THE BOTTOM OF THE PANELS. BOTTOM PANEL CAN RETAIN UP TO 4' OF COURSE GRANULAR SOIL, TYPES GW, GP, SW, OR SP PER TABLE 1610.1.

Mayor-William Kent Money
Council Member-Brian C. Butters
Council Member-David W. Colton
Council Member-Bradley G. Marlor
Council Member-Larry Short
Council Member-Leona Winger

City Manager-Ricky A. Horst

SOUTH JORDAN
UTAH

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e-mail: info@sjc.utah.gov http://sjc.utah.gov

MAY 9, 2007

Arbor Development
Attn: Cory Gust
45 West 10000 South, Suite 301
Sandy, Utah 84070

RE: PRECAST CONCRETE WALLS INSTALLED AT THE GROVES AND THE VILLAGE AT RIVERWALK

Dear Cory,

The purpose of this letter is to advise Arbor Development of the serious **safety,** structural and aesthetic concerns the City of South Jordan has with the precast concrete walls installed in the above referenced subdivisions by Arbor Development. Based on our observations, the City feels that the walls were not adequately designed and built per existing site conditions. The following is a list of some of those concerns:

-The footings for the concrete columns were not installed at sufficient bury depths to support the retaining material.
-The majority of the material retained by the wall appears to be a non-draining soil, thus water accumulates adding additional load to the retaining wall.
-Each concrete column is comprised of two columns stacked and not one continuous column.
-Several footings have not been properly backfilled particularly along the west wall of The Village at Riverwalk.
-We have noted several stress cracks down the center of retaining precast concrete panels in The Village at Riverwalk.

It's only a matter of time when one or more of these walls structures will fail causing serious damage to property and possible injury, so time is of the essence. The City is requiring that Arbor Development submit a plan for review to correct these concerns. Also, the City will not release bond money for the fencing until this item is corrected. If the fencing is not adequately addressed, then the bond money will be used to correct the defective work. If you have any questions regarding this matter, please feel free to contact me at your earliest convenience.

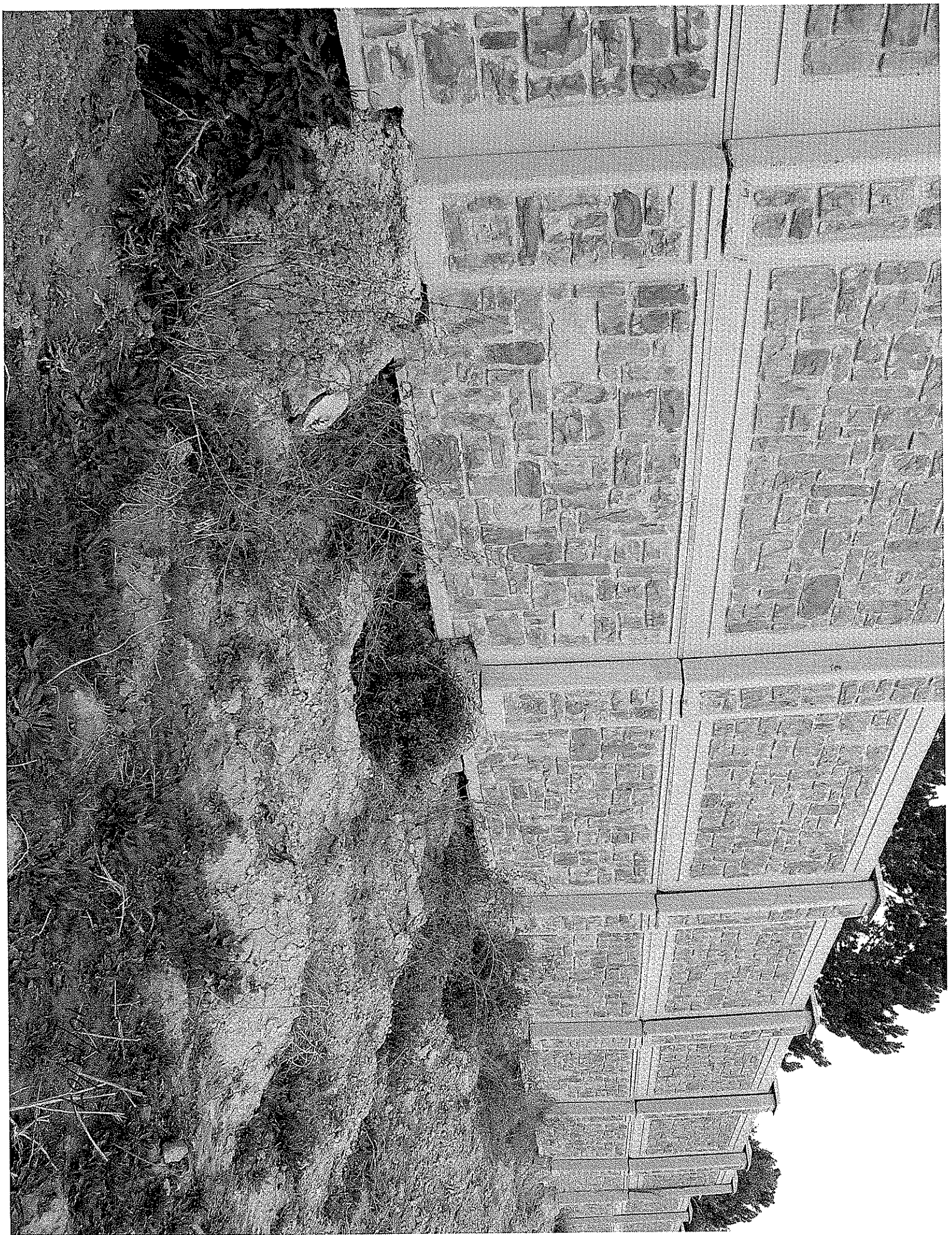
Sincerely,

Shane Greenwood, P.E.
Senior Engineer

Attachments

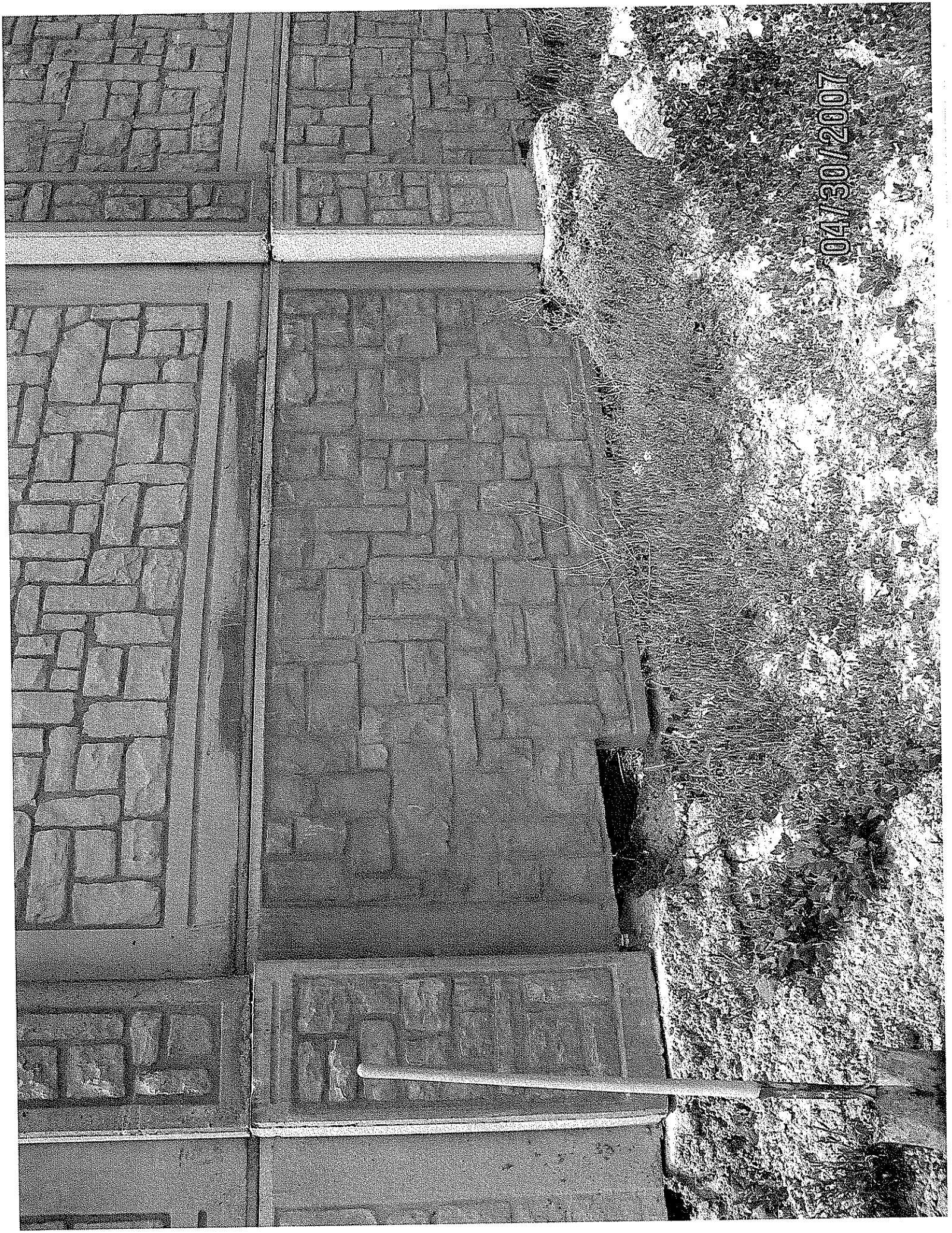
04/30/2007

04/30/2007



04/30/2007

04/30/2007


04/30/2007

STRUCTURAL ANALYSIS OF SEGMENTED TEN FOOT HIGH PRECAST CONCRETE FENCE WITH BOTTOM 4 FEET HIGH SEGMENT LATERALLY SUPPORTED WITH INTERMEDIATE STEEL POSTS IN FOOTINGS RETAINING FOUR FEET OF SOIL

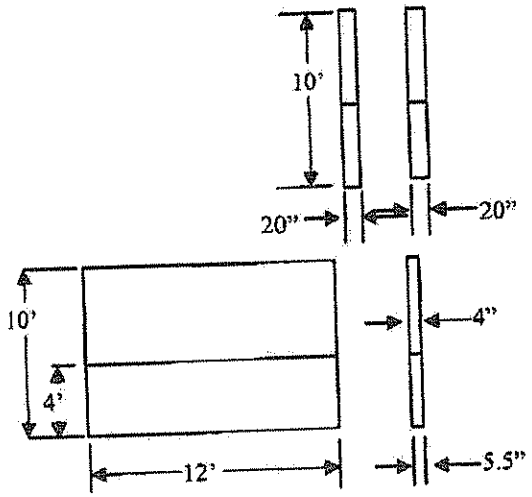
PREPARED FOR
ALL FIVE
CLYDE ALLEN

MARCH 19, 2007

REGISTERED PROFESSIONAL ENGINEER
164702-2202
DAVID O.
KEITH
3/19/07
STATE OF UTAH

PREPARED BY
David O. Keith, PE
AMERICAN FORK, UTAH

Ten Foot High Precast Concrete Fence



Posts

Height: 4 ft. & 6 ft.
Breadth: 20 in.
Width: 20 in.
Weight = 10 x 20/12 x 20/12 x 150 =4,167 lb.
Spacing: 13' – 0"

Intermediate Posts: W4x13 steel columns embedded in 24" diameter by 4.5' deep concrete footing. Steel posts must contact the panel surface opposite the soil side and extend 18 inches minimum up from the bottom of the panel. The top of the footing must be in contact with the bottom of the panels. Bottom panel can retain up to 4' of course granular soil, types GW, GP, SW, or SP per table 1610.1.

Panels

Height:	6 ft.	4ft
Breadth:	12 ft.	12 ft
Thickness:	4 in.	5.5 in.

Weight = 6 x 12 x 4/12 x 150 = 3,600 lb.
4 x 12 x 5.5/12 x 150 = 3,300 lb.

Lateral Forces (2006 IBC) and Anchor Loads

Soil:

F = 30 psf x 4' x 4'/2 x 6.5' = 1560 lb.
Overturning Moment = 1560 x 1/3x4 = 2080 ft-lb.

Wind:

V = 90 mph, Exposure C
Z = 10 ft
Structure Category = 1
$K_Z = 2.01(15/z_g)^{2/\alpha} = 0.85$
Where, $\alpha = 9.5$ and $z_g = 900$ ft.
$K_{Zt} = 1$, flat terrain
$K_d = 0.85$
I = 0.87
$C_f = 1.58$, G = 0.85
$q_Z = 0.00256 K_Z K_{Zt} K_d V^2 I = 15$ psf
$F = q_Z G C_f A_f$
F = 15 x 0.85 x 1.58 x 13 x 6 = 1,571 lb.
Overturning Moment = 1571 x 7 = 10,999 ft-lb.

Seismic:

ARCHITECTURAL COMPONENTS SEISMIC COEFFICIENTS

Architectural component: Limited deformability elements and attachments
$Fp = 0.4 a_p I_p S_{ds} W_p (1+2z/h)/R_p = 0.3W_p$ (not greater than $1.6W_p$ or less than $0.3W_p$)
Use $F_p = 0.3W_p$
Short period spectral acceleration, $S_s = 1.5$;

Site Class D assumed. $F_a = 1.0$

$S_{ds} = 2/3 F_a S_s = 1.0$

$a_p = 1$

$I_p = 1.0$

$R_p = 2.5$

$z = 0, h = 10$

$W_p = 3600 + 4167 = 7767$ lb.

$F_p = 0.3 \times 7767 = 2330$ lb.

Overturning Moment = 1080 x 7 + 1250 x 5 = 13810 ft-lb.

Combined Factored Loads

Resisting Moment = (3600) 2/12 + (3300)2.75/12+ (4167) 10/12 = 4829 ft-lb.

Required hold down force, F_h

Wind and Soil: (2080+10999)-4829 = F_h (10/12)

$F_h = 9900$ lb

Apply safety factors:

$V_u = (1560+1571) \times 1.6 = 5010$ lb.

$N_u = 9900 \times 1.6 = 15840$ lb.

Earthquake and Soil: (1560 x 1.6+13810)-4829 = F_h (10/12)

$F_h = 13{,}772$ lb

Apply safety factors:

$V_u = 1560 \times 1.6 + 2330 = 4{,}826$ lb.

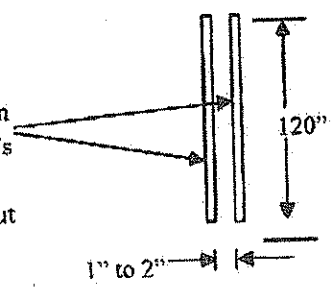
$N_u = 13{,}772$ lb.

Post Hold Down

Description:

(2) #5 bars embedded into footing and post.

#5 Deformed Bar, ASTM A615 Grade 60, embedded 36" min. or 24" with a hook into footing and 36" min. into post and centered in footing and post core. The core is 8" diameter at the top and 6" diameter at the bottom. The grout shall have an f'_c of 4,000 psi.



Anchors shall have edge reinforcement of a No. 4 bar or greater between anchor and edge and with the edge reinforcement enclosed within hoops spaced at not more than 13.2 inches.

Anchor Strength in Post

1. Steel Strength of Anchor in Tension

   $N_s = nA_{se}f_y = 2 \times 0.301 \times 60\text{ksi} = 36\text{k}$ per two bars

2. Steel Strength of Anchor in Shear

   $V_s = nA_{se}f_y = 2 \times 0.301 \times 60\text{ksi} = 36\text{k}$ per two bars

3. Concrete Breakout Strength of Anchor in Tension

   $N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{4000} \times 6.67^{1.5} = 26.147$ k

   $N_{cbg} = A_n/An_o \psi_2 \psi_3 N_b = 400/400 \times 0.9 \times 1.25 \times 26.128 = \underline{29.4\text{ k}}$

4. Concrete Breakout Strength of Anchor in Shear

   $V_b = 7(l/d_o)^{0.2} \sqrt{d_o} \sqrt{f'_c}\, c_1^{1.5} = 7(6/0.5)^{0.2} \times \sqrt{0.5} \times \sqrt{4000} \times 6.67^{1.5} = 13.5$ k

   $V_{cbg} = A_v/Av_o \psi_6 \psi_7 V_b = 200/200 \times 0.9 \times 1.4 \times 10.003 = \underline{17\text{ k}}$

5. Pullout Strength of Anchor in Tension
   Rebar embedded 60 inches to develop full strength.
   $N_{pn} = 2 \times 0.301 \times 60ksi = 36k$ per two bars

6. Concrete Pry out Strength of Anchor in Shear
   $V_{cp} = k_{cp} N_{cb} = 1 \times 29.4 = 29.4$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: $0.75 \times 29.4 = 22 > 15.840$ OK

$\varphi V_n \geq V_u$: $0.75 \times 17 = 12.75 > 5.010$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$15840/22000 + 5010/12750 = 0.72 + 0.39 = 1.12$ OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: $0.75 \times 0.85 \times 29.4 = 18.7 > 13.77$ OK

$0.75\varphi V_n \geq V_u$: $0.75 \times 0.85 \times 17 = 10.8 > 4.826$ OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
$13772/18743 + 4826/10838 = 0.735 + 0.445 = 1.2$ OK

Anchor Strength in Footing

7. Steel Strength of Anchor in Tension
   $N_s = nA_{se}f_y = 2 \times 0.301 \times 60ksi = 36k$ per two bars

8. Steel Strength of Anchor in Shear
   $V_s = nA_{se}f_y = 2 \times 0.301 \times 60ksi = 36k$ per two bars

1. Concrete Breakout Strength of Anchor in Tension
   $N_b = k\sqrt{f'_c}\, h_{ef}^{1.5} = 24 \times \sqrt{3000} \times 7.85^{1.5} = 28.9$ k
   $N_{cbg} = A_v/A_{vo}\psi_1\psi_2\psi_3 N_b = 555/555 \times 1 \times 0.90 \times 1.25 \times 36 = 32.5$ k

2. Concrete Breakout Strength of Anchor in Shear
   $V_b = 7(l/d_o)^{0.2}\sqrt{d_o}\sqrt{f'_c}\, c_1^{1.5} = 7(4/0.625)^{0.2} \times \sqrt{0.625} \times \sqrt{3000} \times 7.85^{1.5} = 15$ k
   $V_{cbg} = A_v/A_{vo}\psi_5\psi_6\psi_7 V_b = 278/278 \times 1 \times 0.9 \times 1.4 \times 19.622 = 18.9$ k

3. Pullout Strength of Anchor in Tension
   Rebar embedded minimum of 11 inches hooked to develop full strength.
   $N_{pn} = 2 \times 0.301 \times 60ksi = 36k$ per two bars

4. Concrete Pryout Strength of Anchor in Shear
   $V_{cp} = k_{cp} N_{cb} = 1 \times 32.5 = 32.5$ k

Allowable Loads

Wind and Soil

$\varphi N_n \geq N_u$: 0.75 x 32.5 = 24.4 > 13.77 OK

$\varphi V_n \geq V_u$: 0.75 x 18.9 = 14.2 > 5.010 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
13770/24400 + 5010/14175 = 0.564 + 0.353 = 0.92 OK

Seismic and Soil

$0.75\varphi N_n \geq N_u$: 0.75 x 0.85 x 32.5 = 20.7 > 13.77 OK

$0.75\varphi V_n \geq V_u$: 0.75 x 0.85 x 18.9 = 12 > 4.826 OK

If, $V_u > 0.2\varphi V_n$ and $N_u > 0.2\varphi N_n$, then: $N_u/\varphi N_n + V_u/\varphi V_n \leq 1.2$
13772/20700 + 4826/12000 = 0.665 + 0.402 = 1.1 OK

Post Footings

Soil and wind loads:
Soil moment = 1560 x 1/3x4 = 2080 ft-lb.
Wind moment = 1571 x 7 = 10,999 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&w}$
2080+10999-2897 = $F_{s\&w}$ (5)
$F_{s\&w}$ = 2036 lb.

Soil and earthquake loads:
Soil moment = 1560 x 1/3x4 = 2080 ft-lb.
Earthquake moment = 1080 x 7 + 1250 x 5 = 13810 ft-lb.
Gravity moment = 0.6[(3600) 2/12 + (3300)2.75/12+ (4167) 10/12] = 2897 ft-lb.
Resultant wind and soil load on fence footing, $F_{s\&e}$
2080+.7(13810)-2897 = $F_{s\&e}$ (5)
$F_{s\&e}$ = 1770 lb.

For footing design use $F_{s\&e}$ = 2036 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 28" in diameter for soil bearing allowable greater than or equal to 2,500 psf or 32" in diameter for a minimum soil bearing allowable of 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM and GC (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel and clayey gravel) is 66 inches for the 28" diameter footing and 63 inches for the 32" diameter footing.

Vertical load:
$[4167 + 6000 + (150 \times 66/12 \times \pi r^2)]/\pi r^2$ = (4167+6000+3527)/4.276 = 3,203 psf < 3,325* OK
$[4167 + 6000 + (150 \times 63/12 \times \pi r^2)]/\pi r^2$ = (4167+6000+4398)/5.585 = 2,608 psf < 2,660* OK
*Value has been increased one-third per IBC Table 1804.2, Note d.

Intermediate Post Footings

Intermediate post footings resist only soil loads.
Soil loads: 1560 lb. at 4'/3 = 16" above footing.
For footing design use F_s = 1560 lb.

For lateral bearing allowable use two times the tabular values per Section 1804.3.1

Footings are 24" in diameter for soil bearing allowable greater than or equal to 2,000 psf with f'_c = 3,000 psi minimum. The depth for soil types GW, GP, SW, SP, SM, SC, GM and GC (sandy gravel and/or gravel, sand, silty sand, clayey sand, silty gravel and clayey gravel) is 54 inches.

Fence Panel Loads

Wind load = $q_z GC_f$ = 15 x 0.85 x 1.58 = 20.15 psf x 1.6 = 32.2 psf

Seismic load = 0.3(150 x 4/12) = 15.0 psf or .3(150 x 5.5/12) = 20.6 psf
Soil load = Cwh = 0.3x100x3 = 90 psf (average for bottom 2 feet) and .3x100x1 = 30psf (top 2 feet)
Load combinations:
1.0E + 1.6H = 165 psf, 1.6W = 32.2 psf

CONCRETE FENCE PANEL DESIGN & ANALYSIS

DESCRIPTION >> Fence Panels
>> Soil Wind

GENERAL		Span 1	Span 2	Span 3	Span 4
ALL SPANS SIMPLE SUPPORT ?	y/n	y			
SPAN LENGTH	ft	6	12	0	0
END FIXITY.....	Lft	1	1	1	1
Fix,Pin,Free = 2,1,0	Rt	1	1	1	1
BEAM WIDTH	in	12	12	0	0
BEAM DEPTH	in	5.5	4	0	0
CALCULATED VALUES					
Left: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Center: Max Mu	ft-k	1.2	0.9	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
..Dist. to Mu	ft	3.00	6.00	0.00	0.00
Right: Max Mu	ft-k	0.0	0.0	0.0	0.0
Mn * Phi	ft-k	2.6	0.9	0.0	0.0
Max Vu: Left	k	0.79	0.31	0.00	0.00
Rt	k	0.79	0.31	0.00	0.00
Reactions: Left: Dead	k	0.00	0.00	0.00	0.00
..(service) Live	k	0.50	0.19	0.00	0.00
Total	k	0.50	0.19	0.00	0.00
Right: Dead	k	0.00	0.00	0.00	0.00
Live	k	0.49	0.19	0.00	0.00
Total	k	0.49	0.19	0.00	0.00
Max. Defl @ Mid Span	in	-0.008	-0.065	0.000	0.000
X-Dist	ft	3.00	6.00	0.00	0.00
BEAM DESIGN DATA					
f'c	psi	4,000	4,000	3,000	3,000
Fy	psi	60,000	60,000	60,000	60,000
LEFT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
CENTER: As-BOTTOM	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
RIGHT: As-TOP	in^2	0.22	0.11	0	0
'd' TO BARS	in	2.75	2	0	0
APPLIED LOADS					
USE LL THIS SPAN?	Y/N	Y	Y	Y	Y
UNIFORM..... DL	klf	0	0	0	0
LL	klf	0.165	0.0322	0	0

DESIGN OF FOOTINGS FOR CANTILEVERED POST

DESCRIPTION		>> 4' High Fence Retaing 4' @ 6.5' O.C.				
		>> CL,ML,MH	SW,SP,SM	GW & GP		
ALLOW PASSIVE	psf	200	300	400	300	400
MAX PASSIVE	psf	3,000	4,500	6,000	4,500	6,000
LOAD DURATION FACTOR		1.33	1.33	1.33	1.33	1.33
POINT LOAD	lbs	1,560	1,560	1,560	1,560	1,560
LOAD Ht.	ft	1.33	1.33	1.33	1.33	1.33
DIST. LOAD	#/ft	0	0	0	0	0
START HT.	ft	0.00	0.00	0.00	0.00	0.00
END HT.	ft	0.00	0.00	0.00	0.00	0.00
WIDTH/DIAMETER	in	24	24	24	24	24
CIRCULAR ?	y/n	Y	Y	Y	Y	Y
RESTRAINED ?	y/n	N	N	N	N	N
------ SUMMARY -------						
Moments @ Surface:						
Point Load	ft-#	2,075	2,075	2,075	2,075	2,075
Uniform Load	ft-#	0	0	0	0	0
... Total Moment	ft-#	2,075	2,075	2,075	2,075	2,075
Total Lateral Load	#	1,560	1,560	1,560	1,560	1,560
--- NON-RESTRAINED ----				RESULTS		
Min. Req'd Embedment						
A(1+(1+4.36h /A)^.5)/2						
A=2.34P/(S 1 b)	ft	5.13	4.29	3.78	4.29	3.78
Press @ 1/3 Embed.:						
Actual	psf	456	569	668	569	668
Allowable	psf	455	570	670	570	670

DESIGN OF FOOTINGS FOR CANTILEVERED POST

DESCRIPTION		>> 10' High Fence Posts at 13' O.C.				
		>> CL,ML,MH	SW,SP,SM	GW & GP	SW,SP,SM	GW & GP
ALLOW PASSIVE	psf	200	300	400	300	400
MAX PASSIVE	psf	3,000	4,500	6,000	4,500	6,000
LOAD DURATION FACTOR		1.33	1.33	1.33	1.33	1.33
POINT LOAD	lbs	2,036	2,036	2,036	2,036	2,036
LOAD Ht.	ft	5.00	5.00	5.00	5.00	5.00
DIST. LOAD	#/ft	0	0	0	0	0
START HT.	ft	0.00	0.00	0.00	0.00	0.00
END HT.	ft	0.00	0.00	0.00	0.00	0.00
WIDTH/DIAMETER	in	28	28	28	32	32
CIRCULAR ?	y/n	Y	Y	Y	Y	Y
RESTRAINED ?	y/n	N	N	N	N	N
------ SUMMARY ------						
Moments @ Surface:						
Point Load	ft-#	10,180	10,180	10,180	10,180	10,180
Uniform Load	ft-#	0	0	0	0	0
... Total Moment	ft-#	10,180	10,180	10,180	10,180	10,180
Total Lateral Load	#	2,036	2,036	2,036	2,036	2,036
--- NON-RESTRAINED ----				RESULTS		
Min. Req'd Embedment						
A(1+(1+4.36h /A)^.5)/2						
A=2.34P/(S 1 b)	ft	6.50	5.52	4.93	5.24	4.67
Press @ 1/3 Embed.:						
Actual	psf	577	735	873	696	829
Allowable	psf	577	734	874	697	828

```
-----------------------------------------------------------------------
                  RECTANGULAR CONCRETE COLUMN DESIGN
-----------------------------------------------------------------------
DESCRIPTION >> 6' high fence post
            >> posts at 13' 90 mph wind
---------- DESIGN  DATA ----------  ----------- COLUMN DATA -----------
f'c                  =  4,000 psi   DEPTH                =     20 in
Fy                   = 60,000 psi   WIDTH                =     20 in
SEISMIC ZONE (0=wind):       0 0-4  COLUMN HEIGHT        =      6 ft
COMBINE LL & ST     ?    Y    y/n   CALC P:M DIAGRAM    ?     N   y/n
EFF. LENGTH FACTOR   =       1
                                    REBARS:    COUNT  BAR #    "d"
IS COLUMN UNBRACED  ? y        y/n   SET #1 :      2      5      4 in
IF UNBRACED, Delta:S =       0       SET #2 :      2      5     16 in
                                     SET #3 :      0      0      0 in
Total Reinf. Area    =   1.24 in^2   SET #4 :      0      0      0 in
% Steel              =   0.31  %     SET #5 :      0      0      0 in
Note: 1% Min < Actual < 8% Max
---------------------------- APPLIED LOADS ----------------------------
                                  MOMENTS:        Top          Bottom
AXIAL: DL    =  0.111 k              DL    =      0   ft-k      0
       LL    =  0.111 k              LL    =      0   ft-k      0
       ST    =      0 k              SHORT =      0   ft-k      0
      Ecc.   =      0 in
                          DEAD   LIVE   SHORT          SLoc    ELoc
DISTRIBUTED  :   #1  =      0      0 0.42375 klf @ x=     0      6 ft
                 #2  =      0      0       0 klf @ x=     0      0 ft
POINT        :   #1  =      0      0       0 k   @ x=     0 ft
                 #2  =      0      0       0 k   @ x=     0 ft

|---------- SUMMARY ---------------------------- ACI Equation -------|
|                                                 9-1    9-2    9-3    |
|  Pu : Max. Factored                  =        0.3441 0.2580 0.0999 k  |
|  Pn * Phi : Capacity @ Design Ecc.   =       800.903 5.0126 1.7371 k  |
|                                                 OK     OK     OK     |
|  Mc = Delta:B*M2b + Delta:S*M2S      =          0.03   2.43   2.48 kft|
|  Final Ecc.: Axial*Ecc + Moments     =          1.20 113.05 297.77 in |
|  Magnification Factor                =         1.000  1.000  1.000 in |
|  Design Eccentricity                 =          1.20 113.05 297.77 in |
|                                                                      |
|  Po * .80 : (short column)           =       1144.14 1144.1 1144.1 k  |
|  P : Balanced                        =       539.177 539.17 539.17 k  |
|  Ecc: Balanced                       =          6.80   6.80   6.80 in |
-----------------------------------------------------------------------|
------------------------ SLENDERNESS EFFECTS -------------------------
  Actual  kLu/r      =   12.00          Elastic  Modulus   =  4E+06 psi
  Beta               =    0.85
                                                 9-1     9-2     9-3
  Neutral Axis Distance from Edge      =        20.90   1.41    1.33 in
  Phi                                  =        0.700  0.706   0.702
```

```
Max. kLu/r to neglect slenderness    =        22.0   22.0   22.0
Beta = Sustained / Maximum Moments   =       0.452  0.452  1.000
Cm                                   =       1.000  1.000  1.000
EI = Max[(.2*Ec*Ig+Es*Is)/(1+Beta)
   -or-  .4 Ec Ig/(1+Beta)]/1000000 =           0      0      0
Pc : Pi^2 * EI / (kLu)^2             =         0.0    0.0    0.0
Alpha : Max Pu / ( Phi * Pc )        =       0.000  0.000  0.000
Delta:b=Cm/(1-Alpha)                 =       1.000  1.000  1.000
Delta:b * M2b                        =        0.00   0.00   0.00 ft-k
Delta:s * M2s                        =        0.00   2.43   2.48 ft-k
Eccentricity: Ecc. Loads + Moments   =        1.20 113.05 297.77 in
Design Ecc. = Ecc * Delta            =        1.20 113.05 297.77 in
-----------------------------------------------------------------------
                  RECTANGULAR CONCRETE COLUMN DESIGN
-----------------------------------------------------------------------
DESCRIPTION >> 4'high fence post retaining 4' of soil w/ 6' post on top
            >> posts at 13' 90 mph wind
---------- DESIGN  DATA ----------  ----------- COLUMN DATA -----------
f'c                  =  4,000 psi   DEPTH                =     20 in
Fy                   = 60,000 psi   WIDTH                =     20 in
SEISMIC ZONE (0=wind):       0 0-4  COLUMN HEIGHT        =      4 ft
COMBINE LL & ST     ?    Y    y/n   CALC P:M DIAGRAM    ?     N   y/n
EFF. LENGTH FACTOR   =       1
                                   REBARS:    COUNT  BAR #    "d"
IS COLUMN UNBRACED  ? y        y/n  SET #1 :      2      5      4 in
IF UNBRACED, Delta:S =       0      SET #2 :      2      5     16 in
                                    SET #3 :      0      0      0 in
Total Reinf. Area    =   1.24 in^2  SET #4 :      0      0      0 in
% Steel              =   0.31  %    SET #5 :      0      0      0 in
Note: 1% Min < Actual < 8% Max
---------------------------- APPLIED LOADS ----------------------------
                                MOMENTS:        Top          Bottom
AXIAL: DL    =    2.5 k              DL    =      0   ft-k      0
       LL    =  0.111 k              LL    =      0   ft-k      0
       ST    =      0 k              SHORT =-4.7731   ft-k      0
      Ecc.   =      0 in
                         DEAD   LIVE   SHORT          SLoc    ELoc
DISTRIBUTED  :   #1  =      0      0  0.3948 klf @ x=     2      4 ft
                 #2  =      0      0  1.1844 klf @ x=     0      2 ft
POINT        :   #1  =      0      0 1.59104 k   @ x=     4 ft
                 #2  =      0      0       0 k   @ x=     0 ft

|----------- SUMMARY ----------------------------- ACI Equation -------|
|                                                 9-1    9-2    9-3    |
|  Pu : Max. Factored                 =        3.6887 2.7665   2.25 k  |
|  Pn * Phi : Capacity @ Design Ecc.  =       800.903 29.473 21.312 k  |
|                                                 OK     OK     OK     |
|  Mc = Delta:B*M2b + Delta:S*M2S     =          0.37   6.09   6.21 kft|
|  Final Ecc.: Axial*Ecc + Moments    =          1.20  26.40  33.09 in |
|  Magnification Factor               =         1.000  1.000  1.000 in |
```

Design Eccentricity	=	1.20	26.40	33.09	in
Po * .80 : (short column)	=	1144.14	1144.1	1144.1	k
P : Balanced	=	539.177	539.17	539.17	k
Ecc: Balanced	=	6.80	6.80	6.80	in

SLENDERNESS EFFECTS

Actual kLu/r = 8.00 Elastic Modulus = 4E+06 psi

Beta = 0.85

		9-1	9-2	9-3	
Neutral Axis Distance from Edge	=	20.90	1.98	1.80	in
Phi	=	0.700	0.735	0.726	
Max. kLu/r to neglect slenderness	=	22.0	22.0	22.0	
Beta = Sustained / Maximum Moments	=	0.949	0.949	1.000	
Cm	=	1.000	1.000	1.000	
EI = Max[(.2*Ec*Ig+Es*Is)/(1+Beta) -or- .4 Ec Ig/(1+Beta)]/1000000	=	0	0	0	
Pc : Pi^2 * EI / (kLu)^2	=	0.0	0.0	0.0	
Alpha : Max Pu / (Phi * Pc)	=	0.000	0.000	0.000	
Delta:b=Cm/(1-Alpha)	=	1.000	1.000	1.000	
Delta:b * M2b	=	0.00	0.00	0.00	ft-k
Delta:s * M2s	=	0.00	6.09	6.21	ft-k
Eccentricity: Ecc. Loads + Moments	=	1.20	26.40	33.09	in
Design Ecc. = Ecc * Delta	=	1.20	26.40	33.09	in

```
-----------------------------------------------------------------------
                        STEEL  COLUMN  DESIGN
-----------------------------------------------------------------------
 DESCRIPTION >> Fence
            >> Post at mid span for 12' panels, supporting bottom 4'
--------- COLUMN DATA ----------     ---------- DESIGN DATA ----------
 AISC SECTION  ------>>W4x13          Fy                    =     36 ksi
 TOTAL COLUMN HT.     =   1.33 ft     LOAD DURATION FACTOR =      1
                                      COMBINE LL & ST     ?      N  y/n
 SUPPORT FIXITY   --->>     5 <<
 1=Pin/Pin, 2=Fix/Fix, 3=Pin/Fix      SIDESWAY      1:Restrained, 0:Free
  4=Fix/Pin, 5=Fix/Free                 X-X AXIS          =      1
     (Bottom/Top)                       Y-Y AXIS          =      1
 UNBRACED LENGTHS:                    EFFECTIVE LENGTH FACTORS:
    X-X AXIS          =      0 ft       X-X AXIS          =      1
    Y-Y AXIS          =   1.33 ft       Y-Y AXIS          =      1
--------------------------- APPLIED LOADS ------------------------------
 AXIAL DEAD LOAD      =    0.1 kips    ECC. for X-X MOMENTS =      0 in
   "   LIVE LOAD      =    0.1 kips      "   "  Y-Y    "    =      0 in
   "   SHORT TERM     =      0 kips
                                 Dead    Live   Short   SLoc   ELoc
                               ------- ------- ------- ------ -------
 X-X AXIS MOMENTS:    TOP     =      0       0       0 k-ft
                    BOTTOM    =      0       0       0 k-ft
                  BTWN ENDS   =      0       0       0      0 ft
 Y-Y AXIS MOMENTS:    TOP     =      0       0       0 k-ft
                    BOTTOM    =      0       0       0 k-ft
                  BTWN ENDS   =      0       0       0      0 ft
 POINT LOADS: (k)     X-X     =      0       0    1.56   1.33 ft
                      Y-Y     =      0       0       0      0 ft
 UNIFORM:  (k/ft)     X-X     =      0       0       0      0      0 ft
                      Y-Y     =      0       0       0      0      0 ft
|---------------------------- SUMMARY ------------------------------|
| USE : W4X13,  Max Stress Ratio = 0.19                              |
|              Load Comb...>>  Dead    Live     D+L   DL+ST          |
|  Formula  1.6 - 1a       =   0.000   0.000   0.000  0.000   OK    |
|  Formula  1.6 - 1b       =   0.000   0.000   0.000  0.000   OK    |
|  Formula  1.6 - 2        =   0.001   0.001   0.003  0.194   OK    |
|                                                                    |
| Actual & Allowable Stresses...                                     |
|  Fa : Allowable          =   20.84   20.84   20.84  20.84 ksi      |
|    fa : Actual           =    0.03    0.03    0.05   0.03 ksi      |
|  Fb:xx : Allow [1.6-1a]  =   23.76   23.76   23.76  23.76 ksi      |
|  "     " [1.6-1b & 1.6-2] =  23.76   23.76   23.76  23.76 ksi      |
|    fb:xx  Actual         =    0.00    0.00    0.00   4.58 ksi      |
|  Fb:yy : Allow [1.6-1a]  =   27.00   27.00   27.00  27.00 ksi      |
|  "     " [1.6-1b & 1.6-2] =  27.00   27.00   27.00  27.00 ksi      |
|    fb:yy  Actual         =    0.00    0.00    0.00   0.00 ksi      |
|                                                                    |
|  Max X-X Axis Deflection =  -0.006 in    @    1.33 ft from base    |
```

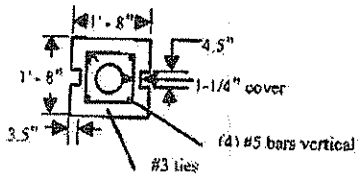
| Max Y-Y Axis Deflection = 0.000 in @ 0.00 ft from base |

STEEL SECTION DATA

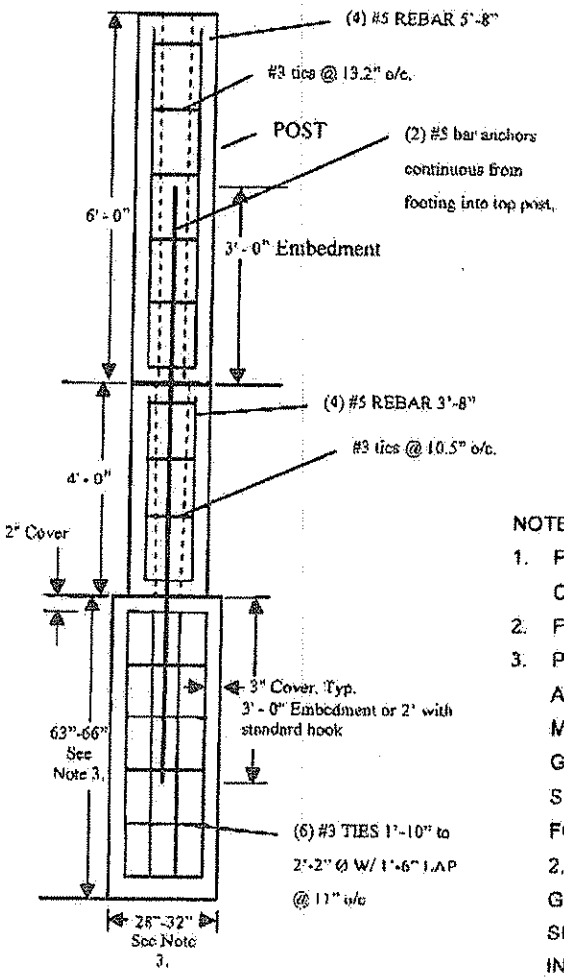
DEPTH	=	4.16 in	I-xx	=	11.300 in^4
WIDTH	=	4.060 in	S-xx	=	5.4326 in^3
FLANGE THICKNESS	=	0.345 in	R-xx	=	1.718 in
WEB THICKNESS	=	0.280 in	I-yy	=	3.8599 in^4
AREA	=	3.83 in^2	S-yy	=	1.90 in^3
WEIGHT	=	13.00 #/ft	R-yy	=	1.004 in
r-T	=	1.100			

INTERMEDIATE STRESS CALCULATION VALUES

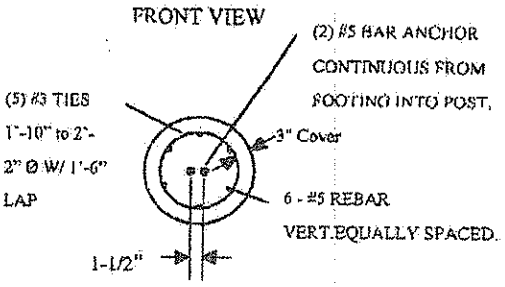
F'ex (DL+LL)	=	1E+08 psi	F'ex (DL+LL+ST)	=	1E+08 psi
F'ey (DL+LL)	=	590845 psi	F'ey (DL+LL+ST)	=	590845 psi
Cm:x (DL+LL)	=	0.60	Cm:x (DL+LL+ST)	=	1.00
Cm:y (DL+LL)	=	0.60	Cm:y (DL+LL+ST)	=	0.60
Cb:x (DL+LL)	=	1.75	Cb:x (DL+LL+ST)	=	1.00
Cb:y (DL+LL)	=	1.75	Cb:y (DL+LL+ST)	=	1.75



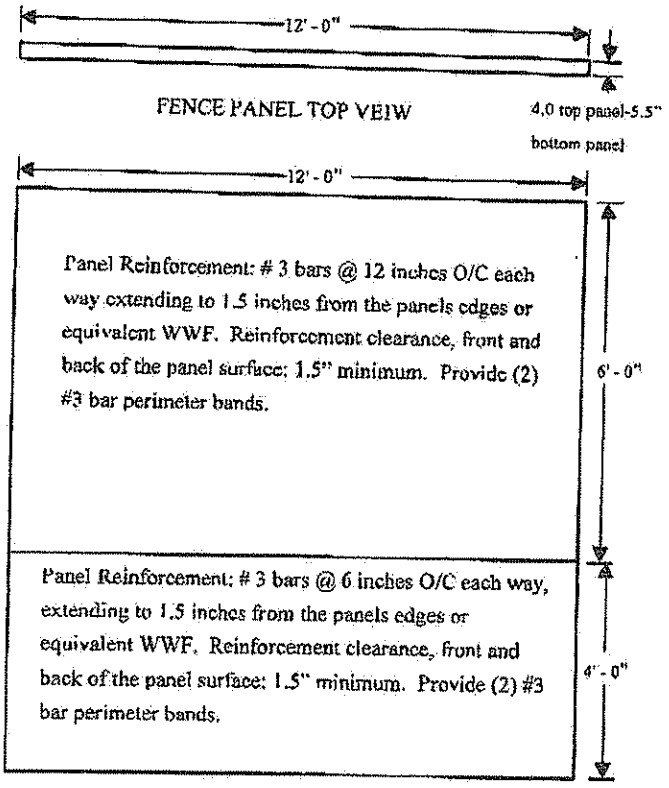
POST TOP VIEW



FRONT VIEW



FOOTING TOP VIEW



FENCE PANEL FRONT VEIW

NOTES:

1. F'_c = 4,000 PSI MINIMUM FOR POST AND PANEL CONCRETE, 4,000 PSI FOR CELL GROUT.
2. F'_c = 3,000 PSI MINIMUM FOR FOOTINGS.
3. PROVIDE AVERAGE FOOTING DIAMETER OF 28" FOR SOIL BEARING ALLOWABLE GREATER THAN OR EQUAL TO 2,500 PSF WITH F'_c = 3,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM AND GC (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL AND CLAYEY GRAVEL), IS 66 INCHES. PROVIDE AVERAGE FOOTING DIAMETER OF 32" FOR MINIMUM SOIL BEARING ALLOWABLE OF 2,000 PSF WITH F'_c = 3,000 PSI MIN. FOOTING DEPTH FOR SOIL TYPES GW, GP, SW, SP, SM, SC, GM AND GC (SANDY GRAVEL AND/OR GRAVEL, SAND, SILTY SAND, CLAYEY SAND, SILTY GRAVEL AND CLAYEY GRAVEL), IS 63 INCHES.
4. WIND: V = 90 MPH, EXPOSURE C.
   SEISMIC: SHORT PERIOD SPECTRAL ACCELERATION, S_S = 1.5 OR LESS; SITE CLASSES A, B, C, OR D ; IMPORTANCE FACTOR, I_P = 1.0.
   PROVIDE LATERAL SUPPORT AT MIDSPAN OF BOTTOM 4' PANELS BY INSTALLING W4X13 STEEL POST IN 24" DIAMETER BY 4.5' DEEP CONCRETE FOOTINGS. STEEL POSTS MUST CONTACT THE PANEL SURFACE OPPOSITE THE SOIL SIDE AND EXTEND 18 INCHES MIN. UP FROM THE BOTTOM OF THE PANEL. THE TOP OF THE FOOTING MUST BE IN CONTACT WITH THE BOTTOM OF THE PANELS. BOTTOM PANEL CAN RETAIN UP TO 4' OF COURSE GRANULAR SOIL TYPES GW, GP, SW, OR SP PER TABLE 1610.1.

COPY - Chris

South Jordan City
Capital Projects
Payment Authorization

All authorizing signatures (PM, CIP Analyst, CFO) are required prior to payment release.

Project: Retaining Wall Design at Riverwalk

PLEASE PAY: IGES, Inc.

Address: 4153 Commerce Drive
Salt Lake City, UT 84107

Invoice#	Account#	Amount
00605-001-01	6700-770-74495	$3,995.00
00605-001-02	6700-770-74495	$4,505.00
	TOTAL	$8,500.00

Comments:
Retaining Wall Design at Riverwalk
Budget – $8,500.00
Remaining Budget – $0.00

** Please use PO number and make sure remit to address is the same as above. ***

Project Manager — Date 2/1/05

Capital Projects Analyst — Date 2/1/05

Chief Financial Officer — Date 2/1/05

City Manager — Date

MAILED
9-9-04

Invoice No. 00605-001-01

IGES Intermountain GeoEnvironmental Services, Inc.

INVOICE

Customer

Name: South Jordan City
Address: 1600 West Towne Center Drive
City: South Jordan City State UT ZIP 84095
Attn: Mr. Jeremy Nielsen

Date: 8/31/2004
Job No. 00605-001
Rep: John Wallace
Fed Tax ID - 87-0581028

Qty	Description	Unit Price	TOTAL
	Geotechnical Investigation for Jordan River Dr. and Retaining Wall Design for The Village at Riverwalk development		
1.0	Lump Sum Contract @ 47% completion of work	$3,995.00	$3,995.00

SENT TO
JAN 24 2005
Tammy DEPT.

SubTotal	$3,995.00
Shipping & Handling	$0.00
Taxes State	
Sub Total This Page	$3,995.00

Payment Details

- ○ Cash
- ◉ Check
- ○ Other

Office Use Only

Please Send All Payments TO: IGES, Inc. 4153 Commerce Drive
Salt Lake City, UT 84107

MAILED
10-8-04

Intermountain GeoEnvironmental Services, Inc.

Invoice No. 00605-001-02

INVOICE

Customer

Name: South Jordan City
Address: 1600 West Towne Center Drive
City: South Jordan City State UT ZIP 84095
Attn: Mr. Jeremy Nielsen

Date: 9/30/2004
Job No.: 00605-001
Rep: John Wallace
Fed Tax ID - 87-0581028

Qty	Description	Unit Price	TOTAL
	Geotechnical Investigation for Jordan River Dr. and Retaining Wall Design for The Village at Riverwalk development		
	Lump Sum Contract 8,500.00 Less previous bill ($3,995.00)		
1.0	**Balance Due 4,505.00**	$4,505.00	$4,505.00

SENT TO
JAN 24 2005
Tammy DEPT.

SubTotal	$4,505.00
Shipping & Handling	$0.00
Taxes State	
Sub Total This Page	$4,505.00

Payment Details

- ○ Cash
- ◉ Check
- ○ Other

Office Use Only

Please Send All Payments TO: IGES, Inc. 4153 Commerce Drive
Salt Lake City, UT 84107

IGES

Intermountain GeoEnvironmental Services, Inc.

Statement of Account

Bill To:

Attn: Accounts Payable
South Jordan City
1600 Town Center Drive
South Jordan, UT 84095-8697
ID # 00605

Date	Terms	IGES Tax ID #
11/30/2004	**PAST DUE** - Please Remit Payment Upon Receipt	87-0581028

Invoice Date	Invoice Number	Invoice Amount	Days Overdue	Interest Applied 31-60	61-90	90+	Total Now Due
8/31/2004	00605-001-01	$3,995.00	142	$59.93	$60.82	$124.40	$4,240.15
9/30/2004	00605-001-02	$4,504.00	112	$67.56	$68.57	$69.60	$4,709.74

Please make payment immediately to avoid additional interest and collection costs.

Please indicate which invoices you are providing payment for and include a copy of this statement with check

Interest of 1.5% per month will begin to accrue on all balances over 30 days past due

31-60	61-90	Over 90 Days	**Amount Due**
127.49	129.40	194.00	$8,949.88

Please Make Checks Payable to: IGES, Inc.
4153 Commerce Dr. Phone: 801-270-9400
Salt Lake City, UT 84107 Fax: 801-270-9401
Website: http://www.igesinc.com

per John Wallace - cut check today 2/1/05
to avoid late fee & interest.

Van

Invoice No. 00605-001-02

Intermountain GeoEnvironmental Services, Inc.

INVOICE

Customer

Name: South Jordan City
Address: 1600 West Towne Center Drive
City: South Jordan City State UT ZIP 84095
Attn: Mr. Jeremy Nielsen

Date: 9/30/2004
Job No.: 00605-001
Rep: John Wallace
Fed Tax ID - 87-0581028

Qty	Description	Unit Price	TOTAL
1.0	**Geotechnical Investigation for Jordan River Dr. and Retaining Wall Design for The Village at Riverwalk development** Lump Sum Contract 8,500.00 Less previous bill (\$3,995.00) **Balance Due 4,505.00**	\$4,505.00	\$4,505.00

SubTotal	\$4,505.00
Shipping & Handling	\$0.00
Taxes State	
Sub Total This Page	\$4,505.00

Payment Details

- ○ Cash
- ◉ Check
- ○ Other

Office Use Only

Please Send All Payments TO: IGES, Inc. 4153 Commerce Drive
Salt Lake City, UT 84107

Intermountain GeoEnvironmental Services, Inc.

Invoice No. 00605-001-01

INVOICE

Customer

Name: South Jordan City
Address: 1600 West Towne Center Drive
City: South Jordan City State UT ZIP 84095
Attn: Mr. Jeremy Nielsen

Date: 8/31/2004
Job No.: 00605-001
Rep: John Wallace
Fed Tax ID - 87-0581028

Qty	Description	Unit Price	TOTAL
	Geotechnical Investigation for Jordan River Dr. and Retaining Wall Design for The Village at Riverwalk development		
1.0	Lump Sum Contract @ 47% completion of work	$3,995.00	$3,995.00

SubTotal	$3,995.00
Shipping & Handling	$0.00
Taxes State	
Sub Total This Page	$3,995.00

Payment Details

- ○ Cash
- ◉ Check
- ○ Other

Office Use Only

Please Send All Payments TO: IGES, Inc. 4153 Commerce Drive
Salt Lake City, UT 84107

IGES

Intermountain GeoEnvironmental Services, Inc.

Statement of Account

Bill To:

Mr. Jeremy Nielsen
South Jordan City
1600 Town Center Drive
South Jordan, UT 84095-8697
ID # 00605

Date	Terms	IGES Tax ID #
11/30/2004	**PAST DUE -** Please Remit Payment Upon Receipt	87-0581028

Invoice Date	Invoice Number	Invoice Amount	Days Overdue	Interest Applied 31-60	61-90	90+	Total Now Due
8/31/2004	00605-001-01	$3,995.00	91	$0.00	$0.00	$0.00	$3,995.00
9/30/2004	00605-001-02	$4,505.00	61	$0.00	$0.00		$4,505.00

The Village @ Riverwalk North of Mullisans

Riverwalk development 4101-710-74280?

Size of Retaining wall that needs to be installed G. Wharcott Signed Contract.

Pleas nt for and include a copy of this statement with check

Intere ances over 30 days past due

90	Over 90 Days	Amount Due
00	0.00	$8,500.00

ble to: IGES, Inc.
801-270-9400
801-270-9401
e: http://www.igesinc.com

Applied Geotechnical Engineering Consultants, P.C.

September 9, 2005

Arbor Commercial/Residential
45 West 10000 South, Suite 301
Sandy, UT 84070

Attention: Mike Maddox
FAX: 561-8647

Subject: Geotechnical Consultation
MSE Retaining Walls
The Village at Riverwalk
Approximately 10200 South 700 West
South Jordan, Utah
AGEC Project No. 1050873

Gentlemen:

Applied Geotechnical Engineering Consultants, P.C. (AGEC) was requested to provide geotechnical consultation for the mechanically stabilized earth (MSE) retaining walls to be constructed along the southwest portion of the proposed Village at Riverwalk development located at approximately 10200 South 700 West in South Jordan, Utah.

PREVIOUS STUDIES

AGEC previously conducted a geotechnical investigation for The Village at Riverewalk Development and presented our findings and recommendations in a report dated August 24, 2004 under AGEC Project No. 1040659.

AGEC previously conducted a preliminary geotechnical investigation for the site for Bowen Collins and Associates and presented our findings and recommendations in a report dated November 19, 2003 under AGEC Project No. 1030854.

The area of the proposed MSE walls is located outside the area investigated during our previous studies.

PROPOSED CONSTRUCTION

We understand that MSE walls are planned to be constructed along the main entry road to the proposed development located along the southwest portion of the site. The MSE walls

are planned to have a maximum exposed face height of 15 feet. We understand that the MSE wall design and stability analysis was performed by others.

Representatives of AGEC were requested to perform in-place moisture and density tests on the imported granular fill used to backfill the MSE walls. Reports of construction observations and the results of field and laboratory tests are reported under AGEC Project No. 1050873.

OBSERVATIONS

A representative of AGEC was requested to visit the site on September 1, 2005. The excavation for the MSE wall foundation in the area of Station 22+00 encountered a significant amount of fill. The fill consists of clay and silt soil with occasional organic and metal debris and areas of significant wood, metal, plastic and other debris. The fill and debris extend to depths on the order of 14 feet below the adjacent ground surface. Water was observed in the base of the excavation at the time of our site visit.

A representative of AGEC was requested to meet with representatives of Arbor Commercial/Residential and the MSE wall contractor on September 6, 2005. At the time of our site visit, the contractor was removing the unsuitable fill from the area south of Station 22+00. The material in the area of Station 22+00 consists primarily of debris with small amounts of soil. Additional excavation for the MSE wall extends south.

The excavated area extends at least 10 feet east/west (into the existing hillside). We anticipate that additional excavation will be needed to remove the unsuitable fill from the reinforced soil fill portion of the MSE walls. We understand that the MSE wall in the area of Station 22+00 is planned to be approximately 15 feet high.

CONCLUSIONS AND RECOMMENDATIONS

Based on conditions observed at the time of our site visits, information provided by representative of Arbor Commercial/Residential and the MSE wall contractor, information presented in the above-referenced geotechnical report and our experience in the area, the following conclusions and recommendations are given:

A. Unsuitable Fill

1. <u>Excavation</u>
   Unsuitable fill, topsoil, debris and other deleterious materials should be removed from below and behind the proposed MSE walls. The unsuitable fill should be removed from behind the proposed MSE walls a horizontal distance equal to or greater than the maximum reinforcment length for the wall section.

   Unsuitable fill, topsoil, debris and other deleterious materials should be removed from below and extending in front of the proposed MSE walls a distance of at

least ½ horizontal to 1 vertical for the thickness of structural fill provided below the MSE wall foundation.

Water, loose and/or disturbed soil and other deleterious materials should be removed from the base of the excavation prior to placement of structural fill. The subsurface water level should be maintained near or below the base of the excavation during fill placement.

An engineer from AGEC should observe the base of excavated areas and MSE wall foundation excavation areas prior to placement of structural fill.

2. Materials

Free-draining gravel with less than 5 percent passing the No. 200 sieve should be used as fill near and below the original water level. The free-draining crushed gravel should be placed in lifts and densified with vibratory compaction equipment.

Above the subsurface water level, structural fill may consist of non-expansive granular soil with less than 35 percent passing the No. 200 sieve and have a maximum particle size of 3 inches.

3. Compaction

To facilitate the compaction process, the fill should be moisture adjusted to within 2 percent of the optimum moisture content prior to placement and compaction as fill.

Fill placed below the proposed MSE wall foundation bearing elevation should be compacted to at least 95 percent of the the maximum dry density as determined by ASTM D-1557. Fill placed behind the MSE walls and below proposed roadways should be compacted to at least 90 percent of the the maximum dry density as determined by ASTM D-1557.

Fill placed for the project should be frequently tested for compaction.

B. MSE Wall Settlement

We understand that the proposed MSE walls may extend up to approximately 15 feet high with reinforced fill extending approximately 10 to 26 feet behind the walls. Placement of greater than 3 feet of site grading fill over relatively large areas may result in significant settlement of the underlying compressible soil due to the load of the fill. The load of the wall backfill and site grading fill may result in significant differential settlement along the wall alignment. Consideration should be given to conducting additional investigation and evaluation in areas where significant amounts of fill are planned to be placed.

C. Pavement Subgrade Support

We anticipate that the proposed main entry road into the proposed development will be constructed in areas excavated into the undisturbed natural soil or above areas of compacted MSE backfill material.

Areas of significant debris and unsuitable fill may extend beyond the area removed and replaced during construction of the MSE walls and may extend below proposed pavement areas. Ideally, the unsuitable fill, debris and other deleterious materials would be removed from below proposed pavement areas and be replaced with properly compacted granular fill. If the owner is willing to accept some risk of pavement distress due to differential densification of the existing fill, a portion of the unsuitable fill could be left below proposed pavement areas. We recommend that at least 4 feet of properly compacted structural fill be provided below proposed pavement areas if a portion of the unsuitable fill is left below these areas.

LIMITATIONS

This letter has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client. The conclusions and recommendations included in the letter are based on conditions encountered at the site during our site visits, information provided by representatives of Arbor Commercial/Residential and the MSE wall contractor, information presented in the above-referenced geotechnical report and our experience in the area. Variations in the subsurface conditions may not become evident until additional exploration or excavation is conducted. If the subsurface conditions or proposed construction is significantly different from what is described in this letter, we should be notified to reevaluate the conclusions and recommendations given.

If you have any questions or if we can be of further service, please call.

Sincerely,

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, P.C.

9-9-05

Christopher J. Beckman, P.E.

Reviewed by JEN, P.E.
CJB/dc

August 31, 2005

Salt Lake Valley Health Department
Attention: Garth Miner
788 East Woodoak Lane Suite 120
Murray, Utah 84107

Re: Water Availability Letter-The Village at Riverwalk

This letter is to inform you that the preliminary and final plats submitted to our office have been reviewed for water service availability. Based upon the preliminary, water service is available for The Village at Riverwalk, located at approximately 10100 South 770 West, 49.35 acres.

If you have any questions, please feel free to contact me at your convenience.

Sincerely,

Shane Greenwood
South Jordan City Senior Engineer

CC: File
Planning & Zoning

SOUTH JORDAN
UTAH
"Life Just off the Fast Lane"
1600 West Towne Center Drive / South Jordan, UT 84095-8265 / Telephone (801) 254-3742/ Fax (801) 253-5235
e-mail: info@ci.south-jordan.ut.us www.ci.south-jordan.ut.us

ARBOR Commercial / Residential

CHECK REQUEST FORM

DATE 8·25·2004

VENDOR NAME Division of Water Quality

AMOUNT $$ $100.00

ACCOUNT NAME
LOT # / PROJECT The Village at Riverwalk Development

ACCOUNT # 1-1905

DESCRIPTION [illegible]

ARBOR RESIDENTIAL PROPERTIES LLC

6163

Division of Water Quality	6163	8/25/2004	$100.00

Payment; Division of Water Quality
In Payment For: Invoice #8/25/04 Purchase #8/25/04 8/25/2004 $100.00

Utah Department of Environmental Quality - Division of Water Quality

Storm Water Permit Issuance System

SUCCESS!

Thank you for applying for a Storm Water Permit online! Your notice of intent has been accepted.

Storm Water Permit Number: UTR103668

Please print this page as a record of your permit coverage.

Amount Due: $100.00

This permit coverage is not valid until you issue a check for the full amount made payable to the DIVISION OF WATER QUALITY, and send it to:

Utah Dept. of
Environmental Quality
Division of Water Quality
P.O. Box 144870
Salt Lake City, UT 84114-
4870

PERMIT INFORMATION

Permit Registration Date: 08/25/04
Permit Expiration Date: 09/01/05

PAYMENT INFORMATION

Payment Method: CHECK
Permit Application Fee: $100.00
Total Amount Paid: UNPAID

SITE INFORMATION

Main Operator: arbor residential

Contact Person: Mike Maddox
Contact Phone Number: 801 652-6916

Site Name: The Village at River Walk Development
Project Number (if any):
Street Address: Approximately 700w. 10200s.
County: SALT LAKE
City, State, Zip: SOUTH JORDAN, UT 84094
Latitude:
Longitude:

To view a printable version of your NOI application

Click Here

Return to Start

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Copyright © 2004 State of Utah - All rights reserved.

Shane Greenwood

From: Ken Short
Sent: Friday, September 02, 2005 10:57 AM
To: Shane Greenwood
Cc: Jennifer Smith
Subject: Villages at Riverwalk Water model

Shane,

The water model for Villages at Riverwalk meets the city's requirements.

Under PDF conditions with fire flow pressure is 80.32 psi with high velocities of 6.45 fps.
Under PDF without fire flow low pressure is 96.80 psi with high velocities of 1.43 fps.

Under PIF conditions 81.66 psi with high velocities of 4.94 fps.

Let me know if you have any questions, Thanks

Kenneth Short
Associate Engineer
South Jordan City
Public Services

kshort@sjc.utah.gov
Office: (801) 253-5230
Fax: (801) 253-0617

Public Services Plan Review
First Review

Project Name: The Village at Riverwalk

Development Team in Charge: _____

Received in Public Services by: Tammy Date: August 30, 2005

Due Date: September 8, 2005

Water Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Streets Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: See Sheet # DT-05

Parks Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Returned to Development Services: ___/___/___

Public Services Plan Review
First Review

Project Name: The Village at Riverwalk

Development Team in Charge: _____

Received in Public Services by: Tammy Date: August 30, 2005

Due Date: September 8, 2005

Water Superintendent: Initial [9/12 HMS] Reviewed on: 9/12/05 Satisfied / Not Satisfied

If not satisfied please comment: See plans

Streets Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Parks Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Returned to Development Services: ___/___/___

Public Services Plan Review
First Review

Project Name: Village at Riverwalk

Development Team in Charge: Judy and Shane

Received in Public Services by: Anne H. Date: 8/8/05

Due Date: August 29, 2005

Water Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Streets Superintendent: Initial [✓] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: See pg. PP-01

Parks Superintendent: Initial [ ] Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Returned to Development Services: ___/___/___

Public Services Plan Review
First Review

Project Name: Village at Riverwalk

Development Team in Charge: Judy and Shane

Received in Public Services by: Anne H. Date: 8/8/05

Due Date: August 29, 2005

Water Superintendent: Initial AWS Reviewed on: 8/29/05 Satisfied / Not Satisfied

If not satisfied please comment: See plans

Streets Superintendent: Initial ____ Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Parks Superintendent: Initial ____ Reviewed on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Returned to Development Services: ___/___/___

Public Services Plan Review
Final Review

Project Name: The Village at Riverwalk

Development Team in Charge: _____

Received in Public Services by: Anne H. Date: 6/17/05

Due Date: June 24, 2005

Water Superintendent: Initial [ ] Reviewed on: ___/___/___ Approved / Not Approved

If not approved please comment: _____

Streets Superintendent: Initial [✓] Reviewed on: 6/22/05 Approved / Not Approved

If not approved please comment: ~~Need to see detailed gate [illegible]~~ Where is Key Pad located?

Parks Superintendent: Initial [ ] Reviewed on: ___/___/___ Approved / Not Approved

If not approved please comment: _____

Returned to Development Services: ___/___/___

Public Services Plan Review
First Review

Project Name: Village at Riverwalk

Development Team in Charge: Shane / Judy

Received in Public Services by: . Date: May 11, 2005

Due Date: May 31, 2005

Water Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Streets Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Parks Superintendent: Initial [JAW] Received on: 5 / 31 / 05 Satisfied / Not Satisfied

If not satisfied please comment:

ROUNDABOUTS, ISLANDS, TRAILS, AND OPEN SPACE TO BE LANDSCAPED ACCORDING TO S.S.C. WATER WISE LANDSCAPE ORDINANCE AND SPECS, WILL CITY MAINTAIN THESE AREAS OR IS THIS UNDER AN H.O.A. PARK DEPT. NEEDS TO REVIEW LANDSCAPE PLANS WHEN AVAILABLE.

Returned to Development Services: 6 / 1 / 05

Public Services Plan Review
First Review

Project Name: **The Village at Riverwalk**

Development Team in Charge: Shane and Judy

Received in Public Services by: Anne H. Date: 5/11/05

Due Date: **May 31, 2005**

Water Superintendent: Initial [AMS] Received on: 6/1/05 Satisfied / Not Satisfied

If not satisfied please comment: See plans

Streets Superintendent: Initial [ ] Received on: __/__/__ Satisfied / Not Satisfied

If not satisfied please comment:

Parks Superintendent: Initial [ ] Received on: __/__/__ Satisfied / Not Satisfied

If not satisfied please comment:

Returned to Development Services: __/__/__

Public Services Plan Review
First Review

Project Name: The Village at Riverwalk

Development Team in Charge: Shane and Judy

Received in Public Services by: Anne H. Date: 5/11/05

Due Date: **May 31, 2005**

Water Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Streets Superintendent: Initial [✓] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: ~~See pages 6 of 13~~ See page 13 of 13

No snow shall be pushed into Baxter Dr. Deadend sign needs to be put at begining of Baxter Dr. Keep pad weeds to be out of South Jordan City Right of way. To have any obstruction in Roadway is against MUTCD.

Parks Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Returned to Development Services: ___/___/___

Public Services Plan Review
First Review

Project Name: The Village at Riverwalk

Development Team in Charge: Team A

Received in Public Services by: Tammy Date: March 29, 2004

Due Date: April 12,2004

Water Superintendent: Initial [Ams] Received on: 3/31/04 Satisfied / Not Satisfied

If not satisfied please comment: Show water line opposite side of water feature Max 500' spacing on Hydrants, Show Valves, 16 W is it Water line looks like but Riverwalk Circle SS ties onto it tie Cul-de-sac to 16 W. if water, Show Overview of all utilities

Streets Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Parks Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment:

Returned to Development Services: ___/___/___

Public Services Plan Review
First Review

Project Name: The Village at Riverwalk

Development Team in Charge: Team A

Received in Public Services by: Tammy Date: March 29, 2004

Due Date: April 12,2004

Water Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Streets Superintendent: Initial [✓] Received on: 3/30/03 Satisfied / Not Satisfied

If not satisfied please comment: See MAP.

Parks Superintendent: Initial [ ] Received on: ___/___/___ Satisfied / Not Satisfied

If not satisfied please comment: _____

Returned to Development Services: ___/___/___

SETTLEMENT AGREEMENT AND MUTUAL RELEASE

This SETTLEMENT AGREEMENT AND MUTUAL RELEASE ("Agreement") is made and entered into this 2 day of February, 2010, by and between ARBOR GARDNER, L.C. ("Arbor'), a Utah limited liability company, LIBERTY VENTURES, L.C. ("Liberty"), a Utah limited liability company, GARY MCDOUGAL ("McDougal"), an individual, and SOUTH JORDAN CITY ("South Jordan"), a Utah municipal corporation. Arbor, Liberty, McDougal, and South Jordan shall sometimes be hereinafter referred to collectively as the "Parties," or individually as a "Party."

A. On or about January 29, 2009, Arbor commenced an action in the Third Judicial District Court in and for Salt Lake County, State of Utah, Case No. 090901538 (hereinafter the "Litigation") alleging several claims against Liberty and McDougal related to certain improvements to residential real property at or about 10600 South Baxter Road (935 West) area in South Jordan City, Utah (the "Property") and is commonly known as Mulligan Ridge at Riverwalk Development. These claims were related to a July 21, 2004 Development Agreement (the "Development Agreement") entered between McDougal and South Jordan.

B. On or about June 1, 2009, Liberty and McDougal filed an Answer and Counterclaim against Arbor (the "McDougal Counterclaim") alleging claims against Arbor related to the Property.

C. On or about June 1, 2009, Liberty and McDougal filed a Third Party Complaint (the "McDougal Third Party Complaint") against South Jordan for a Declaratory Judgment related to the Property.

D. On or about June 23, 2009, Arbor filed a Reply to the McDougal Counterclaim.

E. On or about July 6, 2009, South Jordan filed an Answer to the McDougal Third Party Complaint.

F. As a result of negotiations between the Parties, the Parties desire to fully and completely settle the disputes amongst them with respect to the Litigation, the McDougal Counterclaim, the McDougal Third Party Complaint, and the Property (collectively, the "Dispute").

G. As a result of a settlement entered between the Parties, the Parties agree to fully and completely settle the disputes among them based upon the terms and conditions set forth below, for which purpose this Agreement has been executed.

NOW THEREFORE, based on the foregoing and other good and valuable consideration, the receipt and sufficiency of which are hereby acknowledged, it is hereby acknowledged and agreed by and between the Parties as follows:

1. Acknowledgment and Settlement. The Parties acknowledge that all issues between

attorneys, representatives, insurers, and agents, resulting from any fact, circumstance, event, happening, omission, or occurrence connected with, related directly or indirectly to, or arising from the Litigation, the Property, the McDougal Counterclaim, the McDougal Third Party Complaint, or the Dispute, and any other matter arising prior to the date of this Agreement, irrespective of how, why or by reason of what facts, whether now existing or which could, might or may be claimed to exist, whether known or unknown, suspected or unsuspected, liquidated or unliquidated, including, without limitation, any and all claims, demands, defenses and causes of action which were or could have been set forth in the Litigation, the McDougal Counterclaim, and the McDougal Third Party Complaint. In addition, Arbor hereby waives, releases, forgives and discharges any and all claims related to the Development Agreement.

B. South Jordan hereby waives, releases, forgives and discharges any and all claims, demands, damages, expenses, costs, losses, liabilities, and causes of action of every kind and nature, that they have or may have against Arbor, Liberty, and McDougal, including all of their respective employees, members, managers, officers, shareholders, directors, trustees, beneficiaries, successors, subsidiaries, affiliates, and assigns, heirs, attorneys, representatives, insurers, and agents, resulting from any fact, circumstance, event, happening, omission, or occurrence connected with, related directly or indirectly to, or arising from the Litigation, the Property, the McDougal Counterclaim, the McDougal Third Party Complaint, or the Dispute, and any other matter arising prior to the date of this Agreement, irrespective of how, why or by reason of what facts, whether now existing or which could, might or may be claimed to exist, whether known or unknown, suspected or unsuspected, liquidated or unliquidated, including, without limitation, any and all claims, demands, defenses and causes of action which were or could have been set forth in the Litigation, the McDougal Counterclaim, and the McDougal Third Party Complaint. In addition, South Jordan hereby waives, releases, forgives and discharges any and all claims related to the Development Agreement.

C. Liberty and McDougal hereby waive, release, forgive and discharge any and all claims, demands, damages, expenses, costs, losses, liabilities, and causes of action of every kind and nature, that they have or may have against South Jordan and Arbor, including all of their respective employees, members, managers, officers, shareholders, directors, trustees, beneficiaries, successors, subsidiaries, affiliates, and assigns, heirs, attorneys, representatives, insurers, and agents, resulting from any fact, circumstance, event, happening, omission, or occurrence connected with, related directly or indirectly to, or arising from the Litigation, the Property, the McDougal Counterclaim, the McDougal Third Party Complaint, or the Dispute, and any other matter arising prior to the date of this Agreement, irrespective of how, why or by reason of what facts, whether now existing or which could, might or may be claimed to exist, whether known or unknown, suspected or unsuspected, liquidated or unliquidated, including, without limitation, any and all claims, demands, defenses and causes of action which were or could have been set forth in the Litigation, the McDougal Counterclaim, and the McDougal Third Party Complaint. In addition, Liberty and McDougal hereby waive, release, forgive and discharge any and all claims related to the Development Agreement.

13. Counterparts and Facsimile. This Agreement may be executed in counterparts and by facsimile, all of which, when taken together, shall constitute the entire Agreement.

[Signatures to Follow]

Michael W. Spence (4674)
James A. Sorenson (12239)
RAY QUINNEY & NEBEKER P.C.
36 South State Street, Suite 1400
P.O. Box 45385
Salt Lake City, Utah 84145-0385
Telephone: (801) 532-1500
Facsimile: (801) 532-7543

Attorneys for Arbor Gardner, L.C.

IN THE THIRD JUDICIAL DISTRICT COURT

FOR SALT LAKE COUNTY, STATE OF UTAH

ARBOR GARDNER, L.C., a Utah limited liability company, **Plaintiff,** **v.** **LIBERTY VENTURES L.C., a Utah limited liability company, and GARY MCDOUGAL, an individual.** **Defendant.**	**ORDER OF DISMISSAL WITH PREJUDICE** **Case No. 090901538** **Judge Kennedy**
LIBERTY VENTURES, L.C., a Utah limited liability company, and GARY McDOUGAL, an individual, **Defendants and Third-Party Plaintiffs,** **v.** **CITY OF SOUTH JORDAN,** **Third-Party Defendant.**	

933250

BRYAN L. MCDOUGAL

Bryan L. McDougal
Attorney for Liberty Ventures, L.C. and Gary McDougal

CITY OF SOUTH JORDAN

I. Robert Wall
Ryan W. Loose
Attorneys for City of South Jordan

Michael W. Spence (4674)
James A. Sorenson (12239)
RAY QUINNEY & NEBEKER P.C.
36 South State Street, Suite 1400
P.O. Box 45385
Salt Lake City, Utah 84145-0385
Telephone: (801) 532-1500
Facsimile: (801) 532-7543

Attorneys for Arbor Gardner, L.C.

IN THE THIRD JUDICIAL DISTRICT COURT

FOR SALT LAKE COUNTY, STATE OF UTAH

ARBOR GARDNER, L.C., a Utah limited liability company, **Plaintiff,** **v.** **LIBERTY VENTURES L.C., a Utah limited liability company, and GARY MCDOUGAL, an individual.** **Defendant.**	**STIPULATION AND JOINT MOTION FOR DISMISSAL WITH PREJUDICE** **Case No. 090901538** **Judge Kennedy**
LIBERTY VENTURES, L.C., a Utah limited liability company, and GARY McDOUGAL, an individual, **Defendants and Third-Party Plaintiffs,** **v.** **CITY OF SOUTH JORDAN,** **Third-Party Defendant.**	

CITY OF SOUTH JORDAN

I. Robert Wall
Ryan W. Loose
Attorneys for City of South Jordan

11028688
9/10/2010 9:52:00 AM $13.00
Book - 9857 Pg - 6349-6350
Gary W. Ott
Recorder, Salt Lake County, UT
SURETY TITLE
BY: eCASH, DEPUTY - EF 2 P.

WHEN RECORDED, MAIL TO:
South Jordan City
1600 West Towne Center Drive
South Jordan, Utah 84095

Access Easement

COURTESY RECORDING
This document is being recorded solely as a courtesy and an accommodation to the parties named therein. SURETY TITLE AGENCY hereby expressly disclaims any responsibility or liability for the accuracy of the content thereof.

Parcel Nos. Affected
27-14-278-005
27-14-278-004

Salt Lake County

Brady Boman, **Grantor(s)**, of Salt Lake City, County of Salt Lake, State of Utah, hereby Grant and Convey to Ryan and Jennifer Bacher, **Grantee,** at 10327 South Jordan Creek Dr, South Jordan, County of Salt Lake, State of Utah, 84095, herein referred to as Grantee, for the sum of Ten and no / 100 Dollars ($10.00), and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, **an Access Easement** which is more particularly described as follows:

Legal Description (See Exhibit "A")

Access Easement

Grantee reserves said thirty feet by thirty feet section of the Southwest corner of Lot 49 as Access Easement to construct, and maintain, access to Lot 48 with the right of ingress and egress to said Grantee, its officers, employees, representatives, agents, and assigns to enter upon the above described easement.

IN WITNESS WHEREOF, Brady Boman has caused this instrument to be executed, this 2nd day of September, A.D. 2010.

Brady Boman, Grantor

STATE OF UTAH)
) ss.
COUNTY OF SALT LAKE)

On the date first above written personally appeared before me, Brady Boman, who, being by me duly sworn, say that they are the owners of record of said property and that they executed the same.

WITNESS my hand and official stamp the date in this certificate first above written:

NOTARY PUBLIC
MELANI THATCHER
Commission No. 576590
Commission Expires
NOVEMBER 1, 2012
STATE OF UTAH

Melani Thatcher
Notary Public

Shane Greenwood

From: Mike Foerster [mikef@southvalley.dst.ut.us]
Sent: Wednesday, December 16, 2009 1:33 PM
To: Shane Greenwood
Subject: RE: The Village at Riverwalk

Yes. He indicated he really needs access to the manhole.

From: Shane Greenwood [mailto:SGreenwood@sjc.utah.gov]
Sent: Wednesday, December 16, 2009 1:32 PM
To: Mike Foerster
Subject: RE: The Village at Riverwalk

Mike,

Have you been able to talk to your director on this item?

Thanks,
Shane

From: Mike Foerster [mailto:mikef@southvalley.dst.ut.us]
Sent: Friday, December 04, 2009 9:36 AM
To: Shane Greenwood
Subject: RE: The Village at Riverwalk

Okay. I understand. Let me talk to my director of field services and see if/when he needs access and I'll let you know.

From: Shane Greenwood [mailto:SGreenwood@sjc.utah.gov]
Sent: Thursday, December 03, 2009 11:59 AM
To: Mike Foerster
Subject: The Village at Riverwalk

Hey Mike,

I've got a little situation in The Village at Riverwalk PUD Subdivision (see attached vicinity map) that I'm hoping you could help me with. As can been seen on the attached construction drawing, SSMH #48 was installed on the property line. It appears to be for future sewer connections when the property to the north develops, not part of the current system in Riverwalk. The developer of Riverwalk installed precast concrete walls along their north property line but left a gap across the road (Meadow Creek Lane). We're not sure exactly why they did not install the fence across the road other than utility conflicts but City requires that they complete the fence across. The only utility it really impacts is a sewer manhole as can been seen in the attached construction drawing and aerial drawing.

I've attached two proposed solutions to the fence alignment on the aerial drawings. One solution would be to install the fence straight across but covering access to the manhole (keep in mind for future use only). It is assumed that when that property develops the fence across the road would be removed. The other solution to angle a couple of the fence panels toward the development to go around the manhole but it would be on the inaccessible side of the fence.

Will you take a look at the attached drawings and let me know your thoughts and direction as to how we direct the developer to finish the fence?

ARBOR

FROM THE DESK OF RICKY A. HORST

Copy to:
- ☐ Mayor/Council
- ☐ D.C.M.
- ☑ A.C.M. Municipal Services
- ☐ A.C.M. Finance & Admin
- ☑ Other: BRAD
- ☐ Cabinet
- ☐ A.C.M. Legal
- ☐ Finance Council

And:
- ☑ FYI
- ☐ Return W/Comments
- ☐ File
- ☐ Please Handle

Note: _____

March 21, 2008

Rick Horst
City Manager
South Jordan City

Re: Riverwalk Open Space

Dear Rick;

This letter is a follow up to the conversation that you had with John Gust earlier this week. Arbor Gardner agrees to complete the following to satisfy the developer's requirements regarding the open space at Riverwalk that has been deeded to the City.

1. Complete the walkway from the subdivision to the Jordan River. (Asphalt)
2. Remove the excess soils from the North end of the property and grade to fit in with the surrounding area.
3. Scarify the soil so it will be ready to seed.
4. The City agrees to allow 2, 12' x 16' signs located on the East and West side of the golf course. (in exchange for $5000.00 contribution to Sesquicentennial Venue)

Please sign below if you are in agreement.

Thank you,

Chris Drent
Arbor Residential Properties

Rick Horst
South Jordan City Manager

December 1, 2008

South Jordan City
1600 West Towne Center Drive
South Jordan, UT 84095

Re: Cold Weather Paving; Riverwalk Trail

To Whom It May Concern,

It has been requested that we write a letter discussing how Geneva Rock Products intends to approach paving after November 1. We have researched the City's Specifications and the APWA Specifications and have found that the Ambient Temperature must be 45 degrees and rising to begin paving operation. With this information we have postponed paving to take place when the weather forecast shows the temperatures to be above 50 for the day. We would like to pave on Tuesday, December 2, 2008. We have attached with this letter the local forecast and it shows that on Tuesday the temperature will reach 45 degrees around 11:00am. We plan on starting the paving operation at 11:00am on Tuesday. We will also work to have a roller right behind the paver compacting the asphalt once it is laid down to minimize any exposure to extreme cold temperatures.

Please call if you have any concerns, contact me at (801) 664-0952. We hope to complete this project in a timely manner and keep you, the city, and the developer happy with the process we have explained above.

Sincerely,

Brian Fawson
Project Manager
Geneva Rock Products, Inc.

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- Meteo Madness: Monday Map Discussion Videos
- Mt. Washington: Just How Cold Has It Been?
- Brett Anderson: Updated Long Range Model Outlook

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1. New York	48° F
2. Los Angeles	53° F
3. Mexico City	51° F
4. Paris	41° F
5. Tokyo	48° F

Celsius/Fahrenheit

Monthly Features

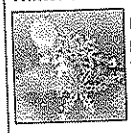
Easy Holiday Shopping!

Trying to avoid those long lines at the stores and pricey online shipping costs during the holidays? Want to find that perfect gift for your favorite weather enthusiast? Check out the AccuMall! Great gifts, free shipping and no lines; your holiday shopping just got easier!

Travel Center

Vacation season has arrived, so check out AccuWeather.com's Travel section for Travel Talk, Featured Destinations, and Destination Weather.

Winter Weather Center



Is your home prepared for winter? Check out these timely tips in our Winter Weather Center.

AccuWeather.com Forums

South Jordan, UT Hour by Hour™ Forecast

Monday, December 01, 2008

Metric | English

Hourly Weather Summary

Tuesday Afternoon, December 2 — More Hourly Information:

9am	10am	11am	Noon	1pm	2pm	3pm	4pm
42° F Mostly Cloudy	43° F Mostly Cloudy	46° F Mostly Cloudy	48° F Mostly Cloudy	49° F Mostly Cloudy	49° F Mostly Cloudy	48° F Mostly Cloudy	47° F Mostly Cloudy

PREVIOUS 6 HOURS — NEXT 6 HOURS

Hourly Weather Details

Tuesday Afternoon, December 2

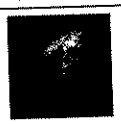
	9am	10am	11am	Noon	1pm	2pm	3pm	4pm
RealFeel®	33	33	36	39	40	38	39	39
Dewpoint	28	27	26	27	26	25	26	26
Humidity	58	52	47	43	40	40	41	43
Wind Dir	S	SSW	SW	WSW	WNW	NW	NW	NW
Wind Speed	13	15	17	18	19	20	17	13
Precip Type	--	--	--	--	--	--	--	--

PREVIOUS 6 HOURS — NEXT 6 HOURS

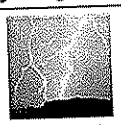
Severe Weather Potentials for the Next 6 Hours

Heavy Rain	Minimal	Heavy Snow	Minimal
High Winds	**Possible**	Ice Build Up	Minimal
ThunderStorms	Minimal	Rapid Freeze Up	Minimal
Dense Fog	Minimal		

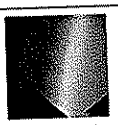
Weather Photo Gallery - Highest Rated Photos



navy



weathermatrix



weathermatrix

The clouds seem to speak Sometimes You Get Lucky Central PA Rainbow 10/1

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Federal Emergency Management Agency

Washington, D.C. 20472

AUG 09 2004

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

The Honorable W. Kent Money
Mayor, City of South Jordan
1600 West Towne Center Drive
South Jordan, UT 84095

IN REPLY REFER TO:

Case No.:	04-08-0379P
Community Name:	City of South Jordan, UT
Community No.:	490107
Effective Date of This Revision:	DEC 09 2004

Dear Mayor Money:

The Flood Insurance Study report and Flood Insurance Rate Map for your community have been revised by this Letter of Map Revision (LOMR). Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals issued in your community.

Additional documents are enclosed which provide information regarding this LOMR. Please see the List of Enclosures below to determine which documents are included. Other attachments specific to this request may be included as referenced in the Determination Document. If you have any questions regarding floodplain management regulations for your community or the National Flood Insurance Program (NFIP) in general, please contact the Consultation Coordination Officer for your community. If you have any technical questions regarding this LOMR, please contact the Director, Federal Insurance and Mitigation Division of the Department of Homeland Security's Federal Emergency Management Agency (FEMA) in Denver, Colorado, at (303) 235-4830, or the FEMA Map Assistance Center toll free at 1-877-336-2627 (1-877-FEMA MAP). Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Sincerely,

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

For: Doug Bellomo, P.E., CFM, Acting Chief
Hazard Identification Section
Mitigation Division
Emergency Preparedness
and Response Directorate

List of Enclosures:
- Letter of Map Revision Determination Document
- Annotated Flood Insurance Rate Map
- Annotated Flood Insurance Study Report

cc: Mr. Gary Whatcott
Director of Administrative Services
City of South Jordan

[redacted], P.E.
Civil Science, Inc.

 | Issue Date: AUG 09 2004 | Effective Date: DEC 09 2004 | Case No.: 04-08-0379P | LOMR-APP

Federal Emergency Management Agency

Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT

COMMUNITY AND REVISION INFORMATION		PROJECT DESCRIPTION	BASIS OF REQUEST
COMMUNITY	City of South Jordan Salt Lake County Utah	FILL	HYDRAULIC ANALYSIS NEW TOPOGRAPHIC DATA
	COMMUNITY NO.: 490107		
IDENTIFIER	South Jordan City Floodplain Study – 9900 South to 10300 South	APPROXIMATE LATITUDE & LONGITUDE: 40.561, -111.909 SOURCE: USGS QUADRANGLE DATUM: NAD 83	
FLOODING SOURCE(S) & REVISED REACH(ES)	Jordan River – from approximately 3,700 feet upstream of the North Jordan Canal Diversion to approximately 1,100 feet downstream of 10600 South Street		

SUMMARY OF REVISIONS

Effective Flooding:	Zone AE	Zone X (shaded)	BFEs*	Floodway
Revised Flooding:	Zone AE	Zone X (shaded)	BFEs	Floodway
Increases:	YES	YES	NONE	NONE
Decreases:	YES	YES	YES	YES

* BFEs – Base Flood Elevations

ANNOTATED MAPPING ENCLOSURES	ANNOTATED STUDY ENCLOSURES
TYPE: FIRM* NO.: 49035C0433 E Date: September 21, 2001 TYPE: FIRM NO.: 49035C0434 E Date: September 21, 2001	DATE OF EFFECTIVE FLOOD INSURANCE STUDY REPORT: May 15, 2002 PROFILE: 130P FLOODWAY DATA TABLE

* FIRM – Flood Insurance Rate Map; ** FBFM – Flood Boundary and Floodway Map; *** FHBM – Flood Hazard Boundary Map

DETERMINATION

This document provides the determination from the Department of Homeland Security's Federal Emergency Management Agency (FEMA) regarding a request for a Letter of Map Revision (LOMR) for the area described above. Using the information submitted, we have determined that a revision to the flood hazards depicted in the Flood Insurance Study (FIS) report and/or National Flood Insurance Program (NFIP) map is warranted. This document revises the effective NFIP map, as indicated in the attached documentation. Please use the enclosed annotated map panels revised by this LOMR for floodplain management purposes and for all flood insurance policies and renewals in your community.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Kevin C Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate 102426 D.A04080379 102IAC

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION

APPLICABLE NFIP REGULATIONS/COMMUNITY OBLIGATION

We have made this determination pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (P.L. 93-234) and in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, P.L. 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65. Pursuant to Section 1361 of the National Flood Insurance Act of 1968, as amended, communities participating in the NFIP are required to adopt and enforce floodplain management regulations that meet or exceed NFIP criteria. These criteria, including adoption of the FIS report and FIRM, and the modifications made by this LOMR, are the minimum requirements for continued NFIP participation and do not supersede more stringent State/Commonwealth or local requirements to which the regulations apply.

COMMUNITY REMINDERS

We based this determination on the 1-percent-annual-chance flood discharges computed in the FIS for your community without considering subsequent changes in watershed characteristics that could increase flood discharges. Future development of projects upstream could cause increased flood discharges, which could cause increased flood hazards. A comprehensive restudy of your community's flood hazards would consider the cumulative effects of development on flood discharges subsequent to the publication of the FIS report for your community and could, therefore, establish greater flood hazards in this area.

Your community must regulate all proposed floodplain development and ensure that permits required by Federal and/or State/Commonwealth law have been obtained. State/Commonwealth or community officials, based on knowledge of local conditions and in the interest of safety, may set higher standards for construction or may limit development in floodplain areas. If your State/Commonwealth or community has adopted more restrictive or comprehensive floodplain management criteria, those criteria take precedence over the minimum NFIP requirements.

We will not print and distribute this LOMR to primary users, such as local insurance agents or mortgage lenders; instead, the community will serve as a repository for the new data. We encourage you to disseminate the information in this LOMR by preparing a news release for publication in your community's newspaper that describes the revision and explains how your community will provide the data and help interpret the NFIP maps. In that way, interested persons, such as property owners, insurance agents, and mortgage lenders, can benefit from the information.

This revision has met our criteria for removing an area from the 1-percent-annual-chance floodplain to reflect the placement of fill. However, we encourage you to require that the lowest adjacent grade and lowest floor (including basement) of any structure placed within the subject area be elevated to or above the Base (1-percent-annual-chance) Flood Elevation.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Kevin C. Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate

102426 D.A04080379 102IAC

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

COMMUNITY INFORMATION (CONTINUED)

We have designated a Consultation Coordination Officer (CCO) to assist your community. The CCO will be the primary liaison between your community and FEMA. For information regarding your CCO, please contact:

Mr. Steve L. Olsen
Director, Federal Insurance and Mitigation Division
Federal Emergency Management Agency, Region VIII
Denver Federal Center, Building 710
P.O. Box 25267
Denver, CO 80225-0267
(303) 235-4830

STATUS OF THE COMMUNITY NFIP MAPS

We are preparing a revised FIRM and FIS report for Salt Lake County; therefore, we will not physically revise and republish the FIRM and FIS report for your community to incorporate the modifications made by this LOMR at this time. Preliminary copies of the revised countywide FIRM and FIS report will be distributed for review within 6 months. We will incorporate the modifications made by this LOMR into the Preliminary FIRM before it is distributed, and the modifications will be included when the revised FIRM becomes effective.

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

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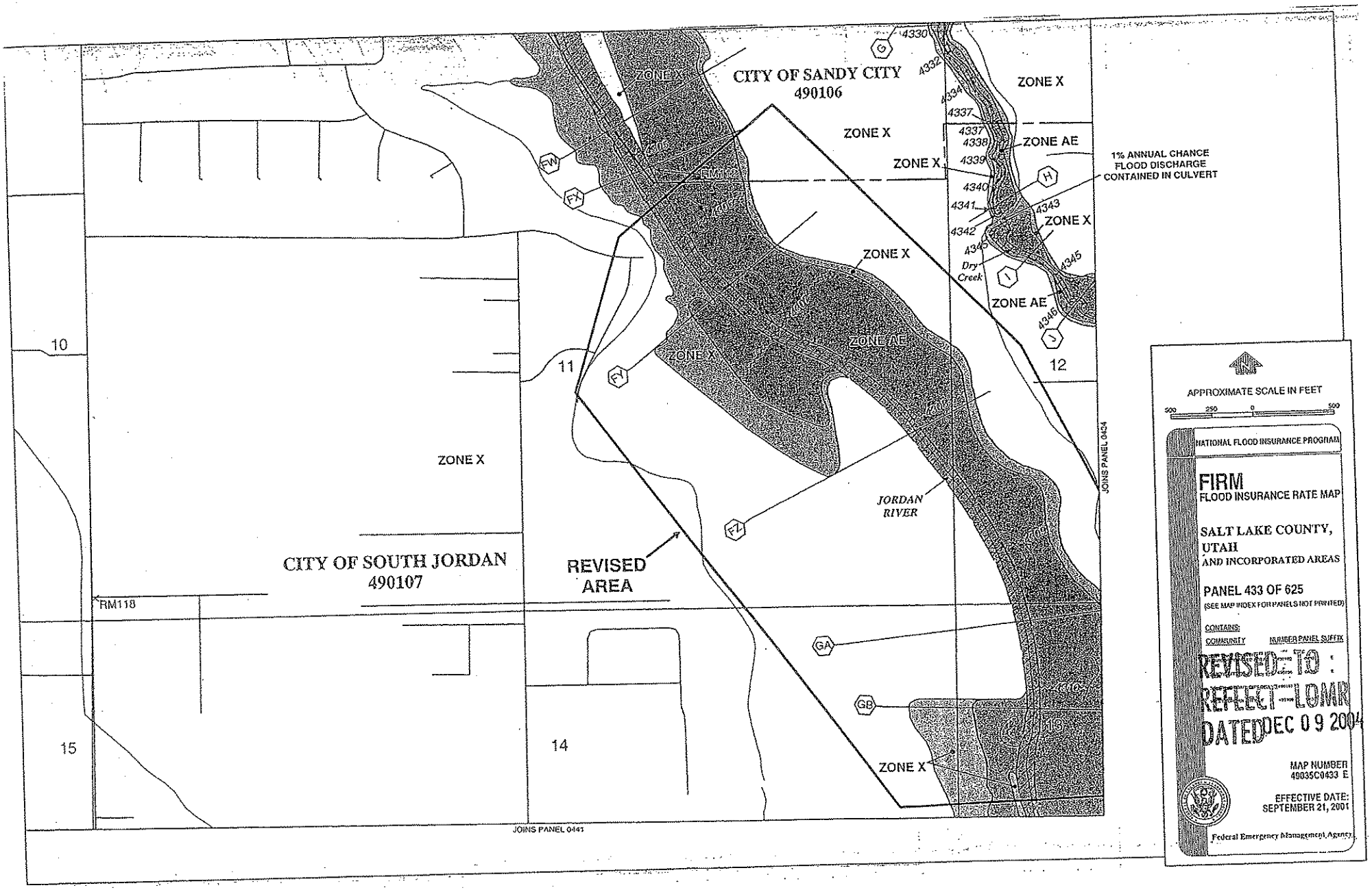

CITY OF SANDY CITY
490106
CITY OF SOUTH JORDAN
490107
REVISED AREA
ZONE X
ZONE AE
1% ANNUAL CHANCE FLOOD DISCHARGE CONTAINED IN CULVERT
JORDAN RIVER
Dry Creek
4330
4332
4334
4337
4338
4339
4340
4341
4342
4343
4345
4346
FM112
RM118
10
11
12
14
15
16
JOINS PANEL 0441
JOINS PANEL 0434
APPROXIMATE SCALE IN FEET
500 250 0 500
NATIONAL FLOOD INSURANCE PROGRAM
FIRM
FLOOD INSURANCE RATE MAP
SALT LAKE COUNTY, UTAH
AND INCORPORATED AREAS
PANEL 433 OF 625
(SEE MAP INDEX FOR PANELS NOT PRINTED)
CONTAINS:
COMMUNITY NUMBER PANEL SUFFIX
REVISED TO REFLECT LOMR DATED DEC 09 2004
MAP NUMBER
49035C0433 E
EFFECTIVE DATE:
SEPTEMBER 21, 2001
Federal Emergency Management Agency

Federal Emergency Management Agency
Washington, D.C. 20472

LETTER OF MAP REVISION DETERMINATION DOCUMENT (CONTINUED)

PUBLIC NOTIFICATION OF REVISION

Within 90 days of the second publication in the local newspaper, a citizen may request that we reconsider this determination. Any request for reconsideration must be based on scientific or technical data. Therefore, this letter will be effective only after the 90-day appeal period has elapsed and we have resolved any appeals that we receive during this appeal period. Until this LOMR is effective, the revised BFEs presented in this LOMR may be changed.

A notice of changes will be published in the *Federal Register*. This information also will be published in your local newspaper on or about the dates listed below.

LOCAL NEWSPAPER Name: *Salt Lake Tribune*
Dates: 09/02/2004 09/09/2004

PUBLIC NOTIFICATION

FLOODING SOURCE	LOCATION OF REFERENCED ELEVATION	BFE (FEET NGVD)		MAP PANEL NUMBER(S)
		EFFECTIVE	REVISED	
Jordan River	Approximately 3,000 feet downstream of 10600 South Street	4,310	4,309	49035C0433 E

This determination is based on the flood data presently available. The enclosed documents provide additional information regarding this determination. If you have any questions about this document, please contact the FEMA Map Assistance Center toll free at 1-877-336-2677 (1-877-FEMA MAP) or by letter addressed to the LOMR Depot, 3601 Eisenhower Avenue, Alexandria, VA 22304. Additional information about the NFIP is available on our website at http://www.fema.gov/nfip.

Kevin C Long

Kevin C. Long, CFM, Project Engineer
Hazard Identification Section
Mitigation Division
Emergency Preparedness and Response Directorate 102426 D.A04080379 102IAC

CHANGES ARE MADE IN DETERMINATIONS OF BASE FLOOD ELEVATIONS FOR THE CITY OF SOUTH JORDAN, SALT LAKE COUNTY, UTAH, UNDER THE NATIONAL FLOOD INSURANCE PROGRAM

On September 21, 2001, the Department of Homeland Security's Federal Emergency Management Agency identified Special Flood Hazard Areas (SFHAs) in the City of South Jordan, Salt Lake County, Utah, through issuance of a Flood Insurance Rate Map (FIRM). The Mitigation Division has determined that modification of the elevations of the flood having a 1-percent chance of being equaled or exceeded in any given year (base flood) for certain locations in this community is appropriate. The modified Base Flood Elevations (BFEs) revise the FIRM for the community.

The changes are being made pursuant to Section 206 of the Flood Disaster Protection Act of 1973 (Public Law 93-234) and are in accordance with the National Flood Insurance Act of 1968, as amended (Title XIII of the Housing and Urban Development Act of 1968, Public Law 90-448), 42 U.S.C. 4001-4128, and 44 CFR Part 65.

A hydraulic analysis was performed to incorporate new topographic data and the effects of placement of fill and has resulted in a revised delineation of the regulatory floodway, increases and decreases in SFHA width, and decreased BFEs for the Jordan River from approximately 3,700 feet upstream of the North Jordan Canal Diversion to approximately 1,100 feet downstream of 10600 South Street. The table below indicates existing and modified BFEs for selected locations along the affected lengths of the flooding source(s) cited above.

Location	Existing BFE (feet)*	Modified BFE (feet)*
Approximately 3,000 feet downstream of 10600 South Street	4,310	4,309

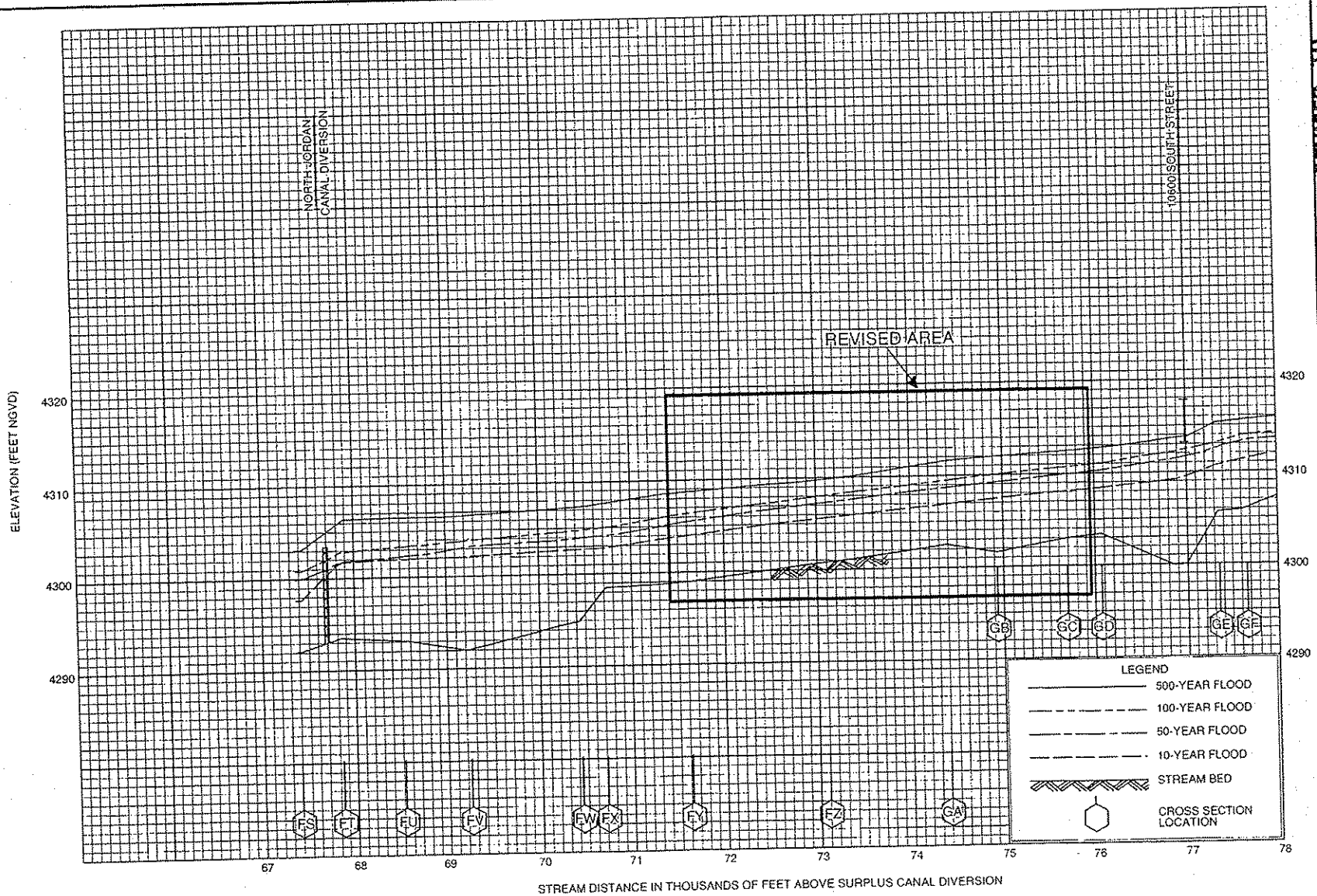
*National Geodetic Vertical Datum, rounded to nearest whole foot

Under the above-mentioned Acts of 1968 and 1973, the Mitigation Division must develop criteria for floodplain management. To participate in the National Flood Insurance Program (NFIP), the community must use the modified BFEs to administer the floodplain management measures of the NFIP. These modified BFEs will also be used to calculate the appropriate flood insurance premium rates for new buildings and their contents and for the second layer of insurance on existing buildings and contents.

Upon the second publication of notice of these changes in this newspaper, any person has 90 days in which he or she can request, through the Chief Executive Officer of the community, that the Mitigation Division reconsider the determination. Any request for reconsideration must be based on knowledge of changed conditions or new scientific or technical data. All interested parties are on notice that until the 90-day period elapses, the Mitigation Division's determination to modify the BFEs may itself be changed.

Any person having knowledge or wishing to comment on these changes should immediately notify:

The Honorable W. Kent Money
Mayor, City of South Jordan
1600 West Towne Center Drive
South Jordan, UT 84095



FLOOD PROFILES

JORDAN RIVER

REVISED TO REFLECT LOMR DATED DEC 09 2004

FEDERAL EMERGENCY MANAGEMENT AGENCY

SALT LAKE COUNTY, UT
AND INCORPORATED AREAS

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Jordan River (Cont'd)				REVISED DATA				
GA	74,396	88	605	5.0	4,309.5	4,309.5	4,310.3	0.8
GB	74,926	80	569	5.3	4,310.1	4,310.1	4,310.8	0.7
GC	75,706	92	736	4.1	4,311.2	4,311.2	4,312.1	0.9
GD	76,066	74	625	4.8	4,311.5	4,311.5	4,312.3	0.8
GE	77,342	96	537	5.6	4,313.3	4,313.3	4,313.9	0.6
GF	77,632	144	1,017	3.0	4,313.9	4,313.9	4,314.5	0.6
GG	78,542	108	517	5.8	4,314.8	4,314.8	4,315.3	0.5
GH	79,652	104	718	4.2	4,316.4	4,316.4	4,317.1	0.7
GI	80,902	105	763	3.9	4,317.5	4,317.5	4,318.4	0.9
GJ	82,032	128	913	3.3	4,318.5	4,318.5	4,319.5	1.0
GK	82,502	86	654	4.6	4,319.1	4,319.1	4,320.0	0.9
GL	82,892	87	559	5.4	4,320.0	4,320.0	4,320.7	0.7
GM	83,957	88	527	5.7	4,321.7	4,321.7	4,322.3	0.6
GN1	84,777	67	536	5.6	4,322.5	4,322.5	4,323.2	0.7
GN2	86,627	185	945	3.2	4,324.3	4,324.3	4,325.1	0.8
GO	87,787	205	843	3.6	4,325.6	4,325.6	4,326.0	0.4
GP	88,087	78	411	7.3	4,326.0	4,326.0	4,326.2	0.2
GQ	88,847	77	441	6.8	4,327.5	4,327.5	4,328.2	0.7
GR	89,907	109	658	4.6	4,329.4	4,329.4	4,329.9	0.5
GS	90,677	115	617	4.9	4,330.2	4,330.2	4,330.6	0.4
GT	91,752	69	503	6.0	4,331.9	4,331.9	4,332.1	0.2
GU	92,242	170	1,025	2.9	4,333.3	4,333.3	4,333.5	0.2
GV	92,862	60	432	6.9	4,334.6	4,334.6	4,334.6	0.0
GW	93,427	50	354	8.5	4,336.2	4,336.2	4,336.2	0.0
GX	94,027	194	989	3.0	4,337.3	4,337.3	4,338.0	0.7
GY	94,937	85	483	6.2	4,337.7	4,337.7	4,338.4	0.7
GZ	96,257	155	697	4.3	4,339.2	4,339.2	4,340.1	0.9

[1]Feet above Surplus Canal Diversion

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

SALT LAKE COUNTY, UT
AND INCORPORATED AREAS

FLOODWAY DATA

JORDAN RIVER

REVISED TO REFLECT LOMR DATED DEC 09 2004

FLOODING SOURCE		FLOODWAY			BASE FLOOD WATER-SURFACE ELEVATION			
CROSS SECTION	DISTANCE[1]	WIDTH (FEET)	SECTION AREA (SQUARE FEET)	MEAN VELOCITY (FEET PER SECOND)	REGULATORY	WITHOUT FLOODWAY	WITH FLOODWAY	INCREASE
					(FEET NGVD)			
Jordan River (Cont'd)								
FA	54,981	89	781	3.6	4,287.5	4,287.5	4,287.9	0.4
FB	55,481	58	575	4.8	4,287.9	4,287.9	4,288.3	0.4
FC	56,641	48	516	5.4	4,289.1	4,289.1	4,289.6	0.5
FD	57,641	46	607	4.6	4,290.5	4,290.5	4,291.4	0.9
FE	58,841	76	681	4.1	4,291.9	4,291.9	4,292.9	1.0
FF	59,901	61	559	5.0	4,292.9	4,292.9	4,293.8	0.9
FG	60,931	121	899	3.1	4,293.9	4,293.9	4,294.6	0.7
FH	61,361	86	659	4.2	4,294.2	4,294.2	4,294.9	0.7
FI	61,561	247	706	3.9	4,294.7	4,294.7	4,295.1	0.4
FJ	61,931	63	564	4.9	4,295.0	4,295.0	4,295.6	0.6
FK	62,821	74	563	5.0	4,295.7	4,295.7	4,296.7	1.0
FL	63,441	86	672	4.2	4,296.3	4,296.3	4,297.3	1.0
FM	63,991	89	585	4.8	4,296.8	4,296.8	4,297.5	0.7
FN	64,406	70	528	5.3	4,297.8	4,297.8	4,298.4	0.6
FO	64,796	67	645	4.3	4,298.7	4,298.7	4,299.3	0.6
FP	65,406	44	467	6.0	4,299.0	4,299.0	4,299.8	0.8
FQ	66,156	76	707	3.9	4,299.9	4,299.9	4,300.8	0.9
FR	66,496	93	664	4.2	4,300.0	4,300.0	4,300.9	0.9
FS	67,416	99	762	3.7	4,300.9	4,300.9	4,301.6	0.7
FT	67,856	79	569	5.3	4,303.0	4,303.0	4,303.0	0.0
FU	68,516	68	447	6.7	4,303.4	4,303.4	4,303.6	0.2
FV	69,226	83	785	3.8	4,304.1	4,304.1	4,304.5	0.4
FW	70,426	76	564	5.3	4,304.8	4,304.8	4,305.1	0.3
FX	70,726	89	533	5.6	4,305.1	4,305.1	4,305.4	0.3
FY	71,616	78	484	6.2	4,306.5	4,306.5	4,306.6	0.1
FZ	73,086	77	581	5.2	4,308.0	4,308.0	4,308.9	0.9

[1]Feet above Surplus Canal Diversion

TABLE 11

FEDERAL EMERGENCY MANAGEMENT AGENCY

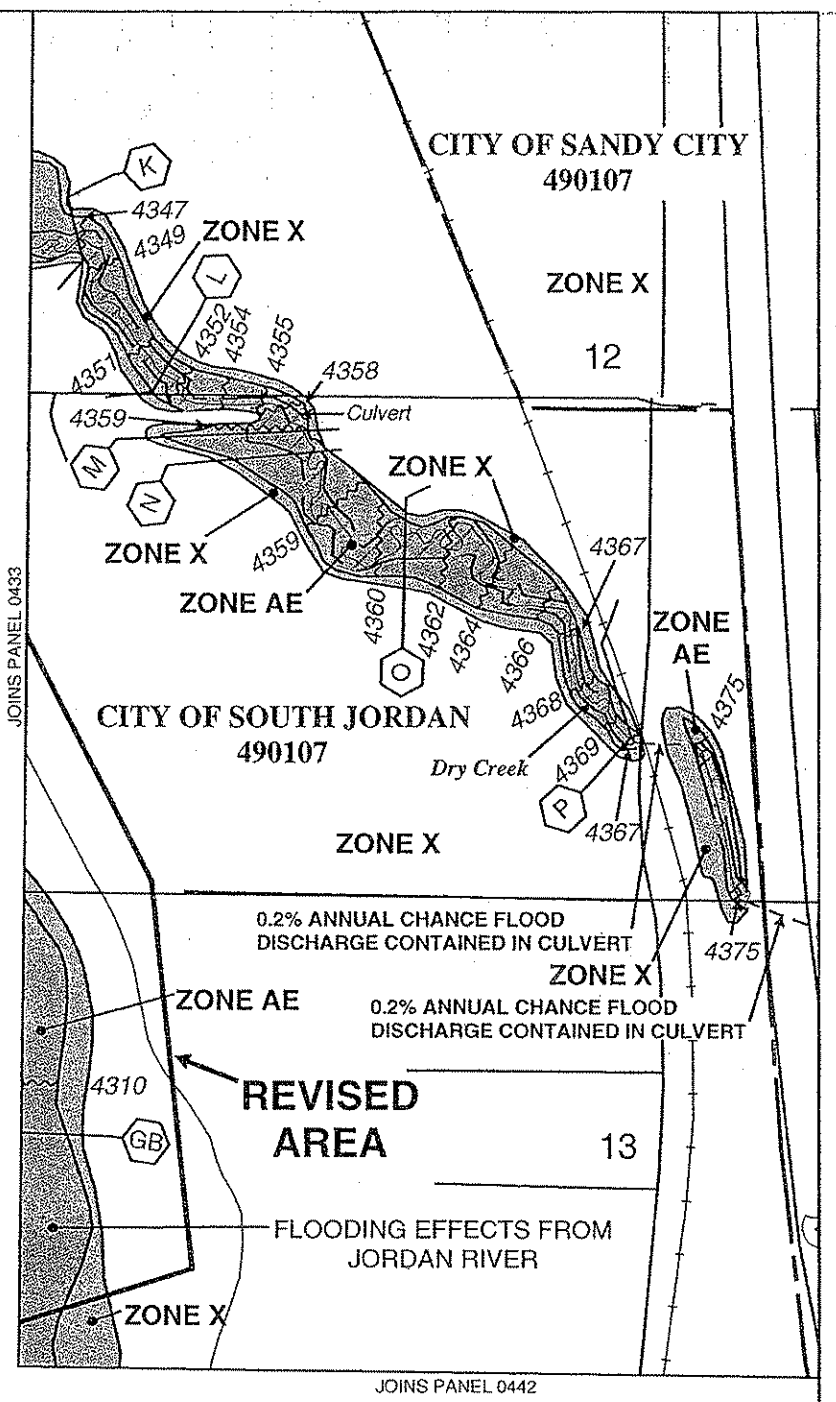
SALT LAKE COUNTY, UT
AND INCORPORATED AREAS

FLOODWAY DATA

REVISED DATA

JORDAN RIVER

REVISED TO REFLECT LOMR DATED DEC 09 2004



APPROXIMATE SCALE IN FEET

500 250 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

SALT LAKE COUNTY, UTAH
AND INCORPORATED AREAS

PANEL 434 OF 625

(SEE MAP INDEX FOR PANELS NOT PRINTED)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
SALT LAKE COUNTY UNINCORPORATED AREAS	490102	0434	E
SANDY, CITY OF	490104	0434	E
SOUTH JORDAN, CITY OF	490107	0434	E

REVISED TO REFLECT LOMR DATED DEC 09 2004

MAP NUMBER
49035C0434 E

EFFECTIVE DATE:
SEPTEMBER 21, 2001

Federal Emergency Management Agency

Applied Geotechnical Engineering Consultants, P.C.

GEOTECHNICAL INVESTIGATION

THE VILLAGE AT RIVER WALK DEVELOPMENT

APPROXIMATELY 700 WEST 10200 SOUTH

SOUTH JORDAN, UTAH

PREPARED FOR:

ARBOR COMMERCIAL/RESIDENTIAL
45 WEST 10000 SOUTH, SUITE 301
SANDY, UTAH 84070

ATTENTION: MIKE MADDOX

PROJECT NO. 1040659

AUGUST 24, 2004

600 West Sandy Parkway • Sandy, Utah 84070 • (801) 566-6399 • FAX (801) 566-6493

TABLE OF CONTENTS

EXECUTIVE SUMMARY . . . . . Page 1

SCOPE . . . . . Page 3

SITE CONDITIONS . . . . . Page 3

FIELD STUDY . . . . . Page 4

SUBSURFACE CONDITIONS . . . . . Page 5

SUBSURFACE WATER . . . . . Page 7

PROPOSED CONSTRUCTION . . . . . Page 7

RECOMMENDATIONS . . . . . Page 8

A. Site Grading . . . . . Page 8
B. Foundations . . . . . Page 11
C. Concrete Slab-on-Grade . . . . . Page 13
D. Lateral Earth Pressures . . . . . Page 14
E. Subsurface Drains . . . . . Page 15
F. Seismicity, Faulting and Liquefaction . . . . . Page 16
G. Water Soluble Sulfates . . . . . Page 17
H. Pavement . . . . . Page 18

LIMITATIONS . . . . . Page 20

REFERENCES

FIGURES

LOCATIONS OF EXPLORATORY TEST PITS AND BORINGS FIGURE 1
LOGS OF EXPLORATORY BORINGS FIGURE 2
LOGS OF TEST PITS FIGURE 3
LEGEND AND NOTES OF EXPLORATORY TEST PITS AND BORINGS FIGURE 4
CONSOLIDATION TEST RESULTS FIGURES 5 & 6
GRADATION TEST RESULTS FIGURES 7 - 10
SUMMARY OF LABORATORY TEST RESULTS TABLE 1

APPENDIX - Liquefaction Analysis

EXECUTIVE SUMMARY

1. Up to approximately 2 feet of topsoil was encountered at the site. Lean clay was encountered below the topsoil in all areas investigated, except Test Pit TP-4. The clay extends to a depth of up to approximately 10 feet below the ground surface. Sand and gravel was encountered below the topsoil in Test Pit TP-4 and below the clay and extends the maximum depth investigated, approximately 59 feet.

   A moderate to large amount of organic material was encountered in the clay in Test Pit TP-2.

2. Subsurface water was encountered in the test pits and borings at depths ranging from approximately 4 to 7½ feet below the existing ground surface when checked up to 11 days after the excavation/drilling.

3. The proposed residences may be supported on spread footings bearing on compacted structural fill extending down to the undisturbed natural soil or on the undisturbed natural sand and gravel. Topsoil and soil with significant organics should be removed from below proposed footings. Footings bearing on at least 2 feet of compacted structural fill extending down to the undisturbed natural soil or on at least 2 feet of the undisturbed natural sand and gravel may be designed using an allowable net bearing pressure of 2,500 pounds per square foot. Foundation recommendations are presented in the report.

4. Lean clay with moderate to large amounts of organic material was encountered in Test Pit TP-2. Soil with significant organics may exist in other areas of the site and possibly along the Jordan River. Topsoil, soil with significant organics and other deleterious materials should be removed from below proposed building areas. A geotechnical engineer should observe foundation excavations prior to placement of structural fill or concrete. Additional study may be considered to better define the extent of organic soils.

5, The upper natural soil encountered at the site consists primarily of clay with a relatively high moisture content and subsurface water is relatively shallow. The clay and shallow subsurface water level may result in construction access difficulties for rubber-tired construction equipment when the upper soil is very moist to wet such as during the winter or spring or periods of precipitation. Care will be required to minimize disturbance of the natural soil during construction. Placement of granular fill will generally improve site conditions for construction and will likely be needed in areas where the subgrade soil consists of very moist to wet clay and silt.

Executive Summary Continued

6. If the lowest floor level of a proposed structure extends below grade, the subgrade floor portion of the proposed structure should be protected with a perimeter drain system. Recommendations related to subsurface drains are presented within the report.

7. A site specific liquefaction analysis was conducted in conjunction with our previous investigation at the site. Based on the subsurface encountered to the depth investigated, our understanding of geologic conditions in the area and our engineering analysis, it is our professional opinion that the site has a "very low" potential for liquefaction and liquefaction is not considered a hazard for the project. Additional information related to liquefaction potential at the site is presented within the report.

8. Geotechnical information related to foundations, subgrade preparation, pavement design, materials and construction is included in the report.

SCOPE

This report presents the results of a geotechnical investigation for The Village at River Walk development to be located at approximately 700 West 10200 South in South Jordan, Utah. The report presents the subsurface conditions encountered, laboratory test results and recommendations for foundations and pavement. The study was conducted in general accordance with our proposal dated July 15, 2004.

AGEC previously conducted a preliminary geotechnical investigation for the site for Bowen, Collins and Associates and presented our findings and recommendations in a report dated November 19, 2003 under AGEC Project No. 1030854.

Field exploration was conducted to obtain information on the subsurface conditions. Samples obtained from the field investigation were tested in the laboratory to determine physical and engineering characteristics of the on-site soil. Information obtained from the field and laboratory was augmented with our experience in the area and information presented in the above-referenced geotechnical report and was used to define conditions at the site for our engineering analysis and to develop recommendations for the proposed foundations and pavement.

This report has been prepared to summarize the data obtained during the study and to present our conclusions and recommendations based on the proposed construction and the subsurface conditions encountered. Design parameters and a discussion of geotechnical engineering considerations related to construction are included in the report.

SITE CONDITIONS

The site consists of undeveloped pasture lands and wetland areas. There are no permanent structures or pavement on the site. There is an underground sewer line which extends in

an east/west direction through the central portion of the site. Another underground sewer line extends in a north/south direction along the east site boundary.

There are several unlined irrigation ditches which extend in an east/west direction through the central portion of the site. Generally, the northeast portion of the site consists of marshy, wetland areas.

The site is relatively flat with a gentle slope down to the east. There is approximately 5 feet of elevation difference across the site. Vegetation at the site consists of short grasses and occasional weeds. Occasional Russian Olive trees extend along the southeast portion of the site. Dense, Russian Olive trees and Tamarisk extend along the northeast corner portion of the site.

The Jordan River Parkway corridor extends along the east side of the site. The parkway corridor consists of an unpaved horse and animal trail, an asphalt paved pedestrian path and the Jordan River. Mulligans Golf Course and Driving Range extend along the south side of the site. The area consists primarily of grass covered landscaped areas. Undeveloped land, similar to the site, extends north of the site. There is a slope which extends along the west side of the site. The slope slopes moderately down to the east.

FIELD STUDY

Four borings were drilled for our previous investigation at the site and were drilled on November 3, 4, and 5, 2003. The borings were drilled with 8-inch diameter hollow-stem auger powered by an truck-mounted drill rig. Test Pits TP-1 through TP-6 were excavated on July 29, 2004 with a rubber-tired backhoe.

The borings and test pits were logged and soil samples obtained by representatives from AGEC. Logs of the subsurface conditions encountered in the borings and test pits are presented on Figures 2 and 3, respectively, with legend and notes on Figure 4.

The test pits were backfilled without significant compaction. The backfill in the test pits should be properly compacted where it will support proposed buildings, floor slabs or pavement.

SUBSURFACE CONDITIONS

Up to approximately 2 feet of topsoil was encountered at the site. Lean clay was encountered below the topsoil in all areas investigated, except Test Pit TP-4. The clay extends to a depth of up to approximately 10 feet below the existing ground surface. Sand and gravel was encountered below the topsoil in Test Pit TP-4 and below the clay and extends the maximum depth investigated, approximately 59 feet.

A moderate to large amount of organic material was encountered in the clay in Test Pit TP-2.

A description of the various soils encountered in the test pits and borings follows:

Topsoil - The topsoil consists of lean clay with small amounts of sand. It is moist to very moist, dark brown and contains roots and organics.

Lean Clay - The clay contains small amounts of sand. It is soft to very stiff, moist to wet and light gray to dark brownish gray. Lean clay with moderate to large amounts of organic material was encountered in Test Pit TP-2.

Laboratory tests conducted on samples of the clay indicate that it has natural moisture contents ranging from 31 to 177 percent and natural dry densities ranging from 33 to 85 pounds per cubic foot (pcf).

Unconfined compressive strengths of 590, 845 and 965 pounds per square foot (psf) were measured for samples of the clay tested in the laboratory.

Results of consolidation tests conducted on samples of the clay indicate that it will compress a moderate to large amount with the addition of light to moderate loads. Results of the consolidation test are presented on Figures 5 and 6.

Silt - The silt contains small to moderate amounts of sand and occasional clay layers. It is dense, wet and brown in color.

Sand and Gravel - The well and poorly graded sand and gravel contains small to moderate amounts of silt. It is dense to very dense, wet and gray to brown.

Laboratory tests conducted on samples of the sand and gravel indicate that it has natural moisture contents ranging from 8 to 24 percent and natural dry densities ranging from 103 to 131 pcf.

Results of gradation tests conducted on samples of the sand and gravel are presented on Figures 7 and 10.

Results of laboratory tests are summarized on Table I and are included on the logs of the exploratory borings and test pits, Figures 2 and 3.

SUBSURFACE WATER

Subsurface water was encountered in the test pits and borings at depths ranging from approximately 4 to 7½ feet below the ground surface when measured 4 days after excavation and up to 11 days after drilling.

Slotted PVC pipe was installed in the test pits and borings to facilitate future measurement of the subsurface water level. Water levels will fluctuate with time. The evaluation of water level fluctuations is beyond the scope of this report. Generally, the water level is expected to be highest in the spring and summer and lowest in the fall and winter months.

PROPOSED CONSTRUCTION

We understand that the site consists of approximately 32 acres and is planned to be subdivided into 89 residential building lots. We anticipate that residences will be one to three-story, wood-frame structures with the possibility of basements. We have assumed building loads consisting of wall loads of less than 3 kips per lineal foot and column loads of up to 20 kips based on typical residential construction in the area.

Paved roads are planned to extend through the proposed development. We have assumed traffic consisting primarily of relatively light passenger vehicles, two delivery trucks per day and two garbage trucks and 5 buses per week.

If the proposed construction, building loads or anticipated traffic is significantly different from what is described above, we should be notified to reevaluate the recommendations given.

RECOMMENDATIONS

Based on the subsurface conditions encountered, laboratory test results, the proposed construction and our experience in the area, the following conclusions and recommendations are given:

A. Site Grading

Final site grading plans were not available at the time of our investigation. We anticipate that up to approximately 3 feet of cut and fill may be needed to facilitate development at the site. Fill placed over relatively large areas should be placed as soon as possible prior to building construction.

1. Pavement Subgrade Preparation

Prior to placing site grading fill or base course, unsuitable fill, topsoil, organics, debris and other deleterious material should be removed.

The upper natural soil consists primarily of clay. The soil has a moderate to high moisture content and there is a relatively shallow depth to ground water at the site. Construction access difficulties can be expected during times when the upper natural soil is very moist to wet such as in the winter or spring or after periods of prolonged rainfall or when excavations extend down near the very moist to wet soil. Care should be taken not to disturb the natural soil to remain in the proposed pavement areas.

Placement of granular fill consisting predominantly of gravel with less than 15 percent passing the No. 200 sieve and possibly lowering the water level in areas of shallow ground water will generally improve site access. Approximately 1 ½ to 2 ½ feet of granular fill will likely be required to support

moderately loaded rubber-tired construction equipment above the very moist to wet clay at the site.

2. Excavation

We anticipate that excavation at the site can be accomplished with typical excavation equipment. Consideration should be given to using excavating equipment with a smooth cutting edge when excavating for building foundations to minimize the disturbance of the natural soil.

Low ground pressure construction equipment may be required when excavations extend down near the subsurface water level or the excavation equipment will need to be supported from above the excavation.

Excavations which extend below the original free-water level should be dewatered during excavation and fill and concrete placement. Fill placed below the original water level should consist of free draining gravel with less than 5 percent passing the No. 200 sieve.

3. Compaction

Compaction of materials placed at the site should equal or exceed the minimum densities as indicated below when compared to the maximum dry density as determined by ASTM D-1557.

Fill To Support	Compaction
Foundations	≥ 95%
Concrete Flatwork and Pavement	≥ 90%
Landscaping	≥ 85%
Retaining Wall Backfill	85 - 90%

To facilitate the compaction process, fill should be compacted at a moisture content within 2 percent of the optimum moisture content.

Base course should be compacted to at least 95 percent of the maximum dry density as determined by ASTM D-1557.

Fill and pavement materials should be frequently tested during construction for compaction. Fill should be placed in thin enough lifts to allow for proper compaction.

4. Materials

Materials placed as fill to support foundations should be non-expansive granular soil. The upper natural soil consists predominantly of clay and is not suitable for use as fill below buildings, but may be considered for use in pavement areas or as utility trench backfill if the topsoil, organics, debris and other deleterious materials are removed or they may be used in landscaping areas.

The natural sand and gravel are suitable for use as structural fill, site grading fill in pavement areas or as utility trench backfill if the topsoil, organics, debris and other deleterious materials are removed or they may be used in landscaping areas.

Free-draining granular fill with less than 5 percent passing the No. 200 sieve should be used as fill below the subsurface water level.

The natural soil will likely require moisture conditioning (wetting or drying) prior to use as fill. Drying of the soil may not be practical during the cold or wet times of the year.

Listed below are materials recommended for imported structural fill.

Fill to Support	Recommendations
Footings	Non-expansive granular soil Passing No. 200 Sieve < 35% Liquid Limit < 30% Maximum size 4 inches
Floor Slab (Upper 4 inches)	Sand and/or Gravel Passing No. 200 Sieve < 5% Maximum size 2 inches
Slab Support	Non-expansive granular soil Passing No. 200 Sieve < 50% Liquid Limit < 30% Maximum size 6 inches

5. Drainage

The ground surface surrounding the proposed residences should be sloped away from the buildings in all directions. Roof down spouts and drains should discharge beyond the limits of backfill.

The collection and diversion of drainage away from the pavement surface is important to the satisfactory performance of the pavement section. Proper drainage should be provided.

B. Foundations

1. Bearing Material

With the proposed construction and the subsurface conditions encountered, the proposed residences may be supported on compacted structural fill extending down to the undisturbed natural soil or on the undisturbed natural sand and gravel. Structural fill should extend out away from the edge of the footings a distance equal to the depth of fill beneath the footings.

The topsoil, organic material, unsuitable fill, debris and other deleterious material should be removed from below proposed foundation areas.

2. Bearing Pressure

Spread footings bearing on at least 2 feet of compacted structural fill or on at least 2 feet of undisturbed natural sand and gravel may be designed using an allowable net bearing pressure of 2,500 psf.

Footings should have a minimum width of 18 inches and a minimum depth of embedment of 10 inches.

3. Temporary Loading Conditions

The allowable bearing pressure may be increased by one-half for temporary loading conditions such as wind or seismic loads.

4. Settlement

Based on the subsoil conditions encountered and the assumed building loads, we estimate that total and differential settlement will be on the order of 1 inch.

Disturbance of the soil below foundations can result in greater settlement. Care will be required not to disturb the natural soil at the base of foundation excavations to maintain settlement within tolerable limits.

5. Frost Depth

Exterior footings and footings beneath unheated areas should be placed at least 30 inches below grade for frost protection.

6. Foundation Base

The base of footing excavations should be cleared of loose or deleterious material prior to structural fill or concrete placement.

Excavations which extend below the water level should be dewatered before and during fill and concrete placement as discussed in the excavation section of the report.

7. Construction Observation

A representative of the geotechnical engineer should observe footing excavations prior to structural fill or concrete placement. This is particularly important due to potentially high organic content in the soil.

C. **Concrete Slab-on-Grade**

1. Slab Support

Concrete slabs may be supported on the undisturbed natural soil or on compacted structural fill extending down to the undisturbed natural soil.

The topsoil, organic material, unsuitable fill, debris and other deleterious material should be removed from below proposed concrete slab areas.

2. Underslab Sand and/or Gravel

A 4 inch layer of free draining sand and/or gravel (less than 5 percent passing the No. 200 sieve) should be placed below the concrete slab for ease of construction and to promote even curing of the slab concrete.

D. Lateral Earth Pressures

1. Lateral Resistance for Footings

Lateral resistance for spread footings placed on the natural soil or on compacted structural fill is controlled by sliding resistance between the footing and the foundation soils. A friction value of 0.35 may be used in design for ultimate lateral resistance.

2. Subgrade Walls and Retaining Structures

The following equivalent fluid weights are given for design of subgrade walls and retaining structures. The active condition is where the wall moves away from the soil. The passive condition is where the wall moves into the soil and the at-rest condition is where the wall does not move. The values listed below assume a horizontal surface adjacent the top and bottom of the wall.

Soil Type	Active	At-Rest	Passive
Clay & Silt	50 pcf	65 pcf	250 pcf
Sand & Gravel	40 pcf	55 pcf	300 pcf

3. Seismic Conditions

Under seismic conditions, the equivalent fluid weight should be increased by 30 pcf for active and at-rest conditions and decreased by 30 pcf for the passive condition. This assumes a mapped short period spectral response acceleration of 1.30g which represents a 2 percent probability of exceedance in a 50 year period (IBC, 2003).

4. Safety Factors

The values recommended above for active and passive conditions assume mobilization of the soil to achieve the soil strength. Conventional safety factors used for structural analysis for such items as overturning and sliding resistance should be used in design.

E. Subsurface Drains

If the lowest floor level of a structure extends below existing grade, the subgrade floor portion of the proposed structure should be protected with a perimeter drain system. The perimeter drain system should consist of at least the following items:

1. The underdrain system should consist of a perforated pipe installed in a gravel filled trench around the perimeter of the subgrade floor portion of the building.

2. The flow line of the pipe should be placed at least 18 inches below the finished floor level and should slope to a sump or outlet where water can be removed by pumping or by gravity flow.

3. If placing the gravel and drain pipe requires excavation below the bearing level of the footing, the excavation for the drain pipe and gravel should have a slope no steeper than 1:1 (horizontal to vertical) so as not to disturb the soil below the footing.

4. A filter fabric should be placed between the natural soil and the drain gravel. This will help reduce the potential for fine grain material filling in the void spaces of the gravel.

5. The subgrade floor slab should have at least 6 inches of free draining gravel placed below it and the underslab gravel should connect to the perimeter drain.

6. Consideration should be given to installing cleanouts to allow access into the perimeter drain should cleaning of the pipes be required in the future.

F. Seismicity, Faulting and Liquefaction

1. Seismicity

Listed below is a summary of the site parameters for the International Building Code 2003.

a.	Site Class	D
b.	Short Period Spectral Response Acceleration, S_S	1.30g
c.	One Second Period Spectral Response Acceleration, S_1	0.532g

2. Faulting

There are no mapped active faults extending through the property. The closest mapped fault, which is considered active, is the Wasatch Fault located approximately 4½ miles southeast of the site (Salt Lake County, 1995).

3. Liquefaction

The Salt Lake County Liquefaction Hazard Map (Salt Lake County, 1995) indicates that the site is located in an area mapped as having a "high" liquefaction potential. The "high" designation represents a greater than 50 percent probability that the soil may be subjected to seismic ground shaking sufficient to result in liquefaction in a 100 year time period.

Research indicates that the soil type most susceptible to liquefaction during a large magnitude earthquake is loose, clean sand. In order for liquefaction to occur, the soil must be saturated. The liquefaction potential for soil tends to decrease with an increase in fines content and density.

A site specific liquefaction analysis was conducted in conjunction with our previous investigation at the site. The clay and soil above the free water level are not susceptible to liquefaction. The sand and gravel encountered below the free-water level are relatively dense. Based on the subsurface conditions encountered to the depth investigated, our understanding of geologic conditions in the area and our engineering analysis, it is our professional opinion that the site has a "very low" potential for liquefaction and liquefaction is not considered a hazard for the project. Results of the site specific liquefaction analysis are presented in the Appendix.

G. Water Soluble Sulfates

Two samples of the natural soil were tested in the laboratory for water soluble sulfate content. Results of the tests indicate there is less than 0.1 percent water soluble sulfate in the samples tested. Based on the results of the tests and published literature, the natural soil possesses negligible sulfate attack potential on concrete. The concentration of water soluble sulfates present in the soil at the site indicates that sulfate resistant cement is not needed for concrete in contact with the natural soil. Other conditions may dictate the type of cement to be used in concrete for the project.

H. Pavement

Based on the subsoil conditions encountered, laboratory test results and the assumed traffic as indicated in the Proposed Construction section of the report, the following pavement support recommendations are given.

1. Subgrade Support

   The near surface soil encountered at the site consists primarily of lean clay. A CBR value of 2½ percent was used in the analysis which assumes a lean clay subgrade.

2. Pavement Thickness

   Based on the subsoil conditions, assumed traffic as described in the Proposed Construction section of the report, a design life of 20 years for flexible pavement and 30 years for rigid pavement and methods presented by the Utah Department of Transportation, a flexible pavement section consisting of 3 inches of asphaltic concrete overlying 8 inches of base course is calculated. Alternatively, a rigid pavement section consisting of 5 inches of Portland cement concrete may be used.

   Granular fill will likely be needed to facilitate construction of the pavement due to the shallow ground water and very moist to wet clay subgrade as discussed in the Subgrade Preparation section of the report. The base course thickness could be reduced to 6 inches in areas where at least 6 inches of granular borrow is provided below the base course. The base course thickness may also be reduced to 6 inches for pavement areas which will receive no significant truck traffic.

3. Pavement Materials and Construction

a. Flexible Pavement (Asphaltic Concrete)

The pavement materials should meet the Utah Department of Transportation specifications for gradation and quality. Other materials may be considered for use in the pavement section. The use of other materials may result in the need for different pavement material thicknesses.

b. Rigid Pavement (Portland Cement Concrete)

The pavement thickness assumes that the pavement will have aggregate interlock joints and that a concrete shoulder or curb will be provided.

Pavement materials should meet the Utah Department of Transportation Specifications. The pavement thickness indicated above assumes that the concrete will have a 28 day compressive strength of 4,000 pounds per square inch. Concrete should be air entrained with approximately 6 percent air. Maximum allowable slump will depend on the method of placement but should not exceed 4 inches.

4. Jointing

Joints for concrete pavement should be laid out in a square or rectangular pattern. Joint spacings should not exceed 30 times the thickness of the slab. The joint spacings indicated should accommodate the contraction of the concrete and under these conditions steel reinforcing will not be required. The depth of joints should be approximately one-fourth of the slab thickness.

LIMITATIONS

This report has been prepared in accordance with generally accepted soil and foundation engineering practices in the area for the use of the client for design purposes. The conclusions and recommendations included within the report are based on the information obtained from the test pits excavated and borings drilled at the approximate locations indicated on the site plan, the data obtained from laboratory testing and our experience in the area. Variations in the subsurface conditions may not become evident until additional excavation or exploration is conducted. If the subsurface conditions or groundwater level is found to be significantly different from what is described above, we should be notified to reevaluate our recommendations.

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, P.C.

LICENSED PROFESSIONAL ENGINEER
8/24/04
No. 264456
CHRISTOPHER J. BECKMAN
STATE OF UTAH

Christopher J. Beckman, P.E.

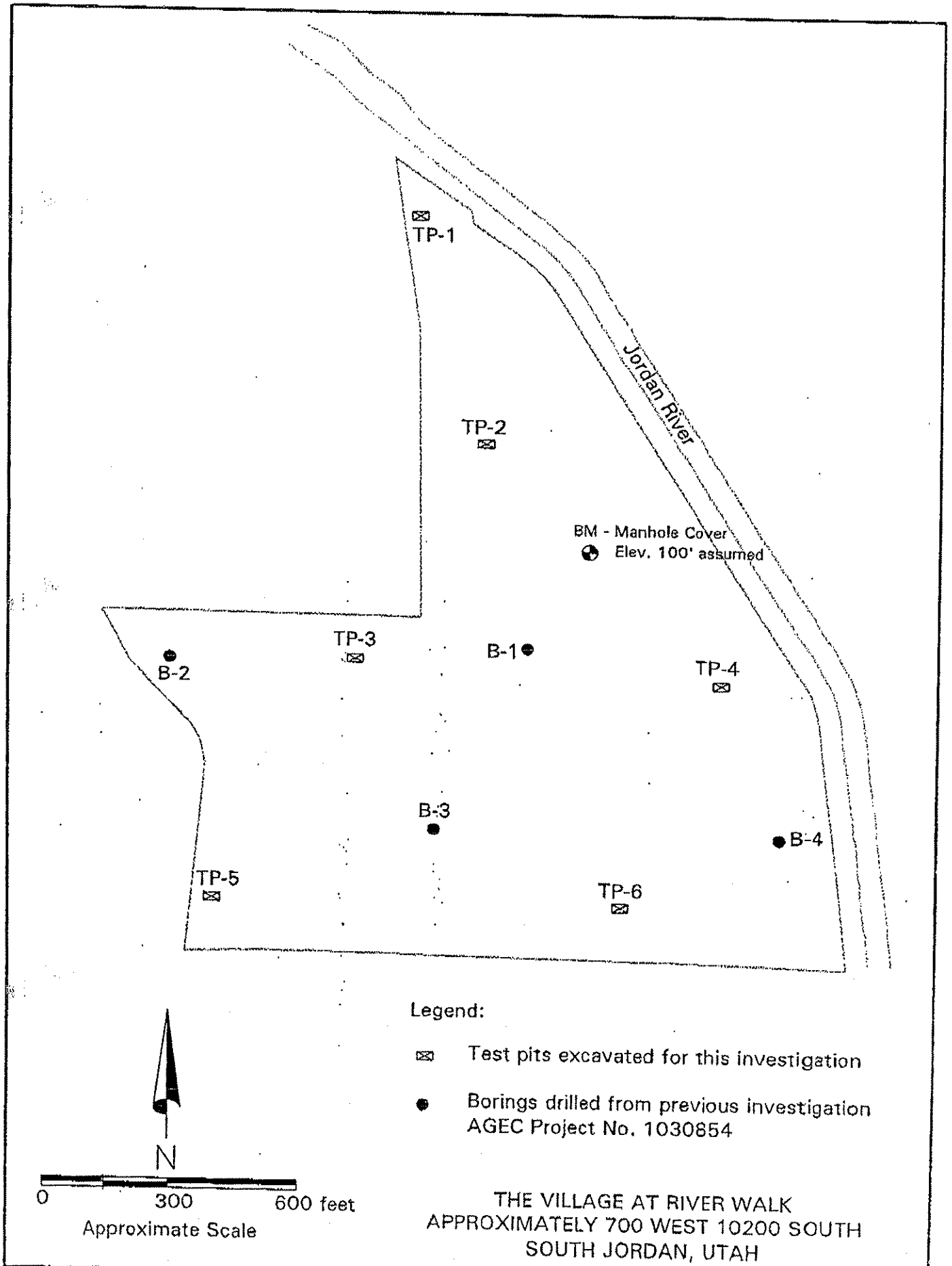
Reviewed by Jay R. McQuivey, P.E.

CJB/sc

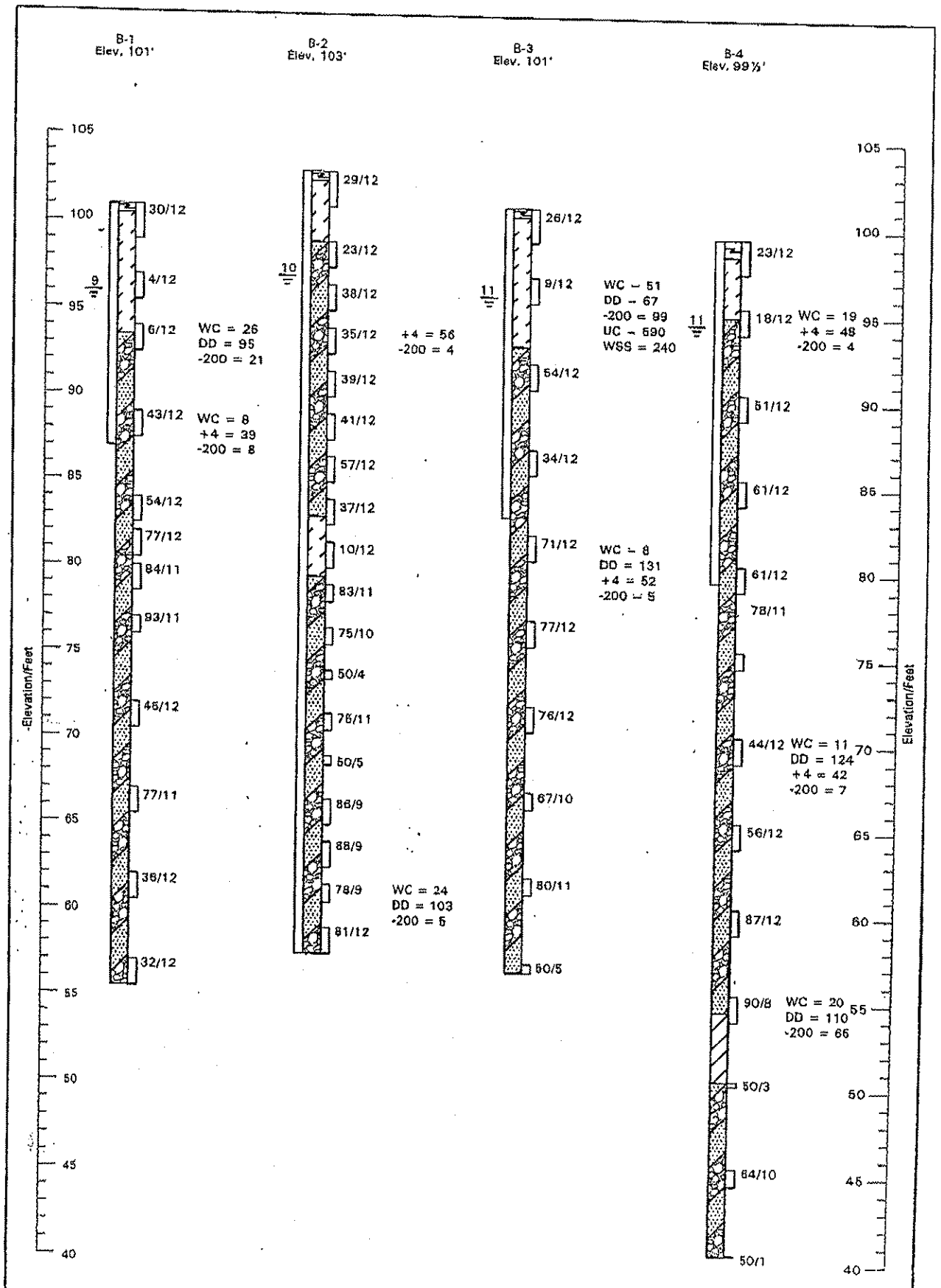
REFERENCES

International Building Code, 2003; International Code Council, Inc. Falls Church, Virginia.

Salt Lake County, 1995, Surface Rupture and Liquefaction Potential Special Study Areas Map, Salt Lake County, Utah, adopted March 31, 1989, revised March 1995, Salt Lake County Public Works - Planning Division, 2001 South State Street, Salt Lake City, Utah.



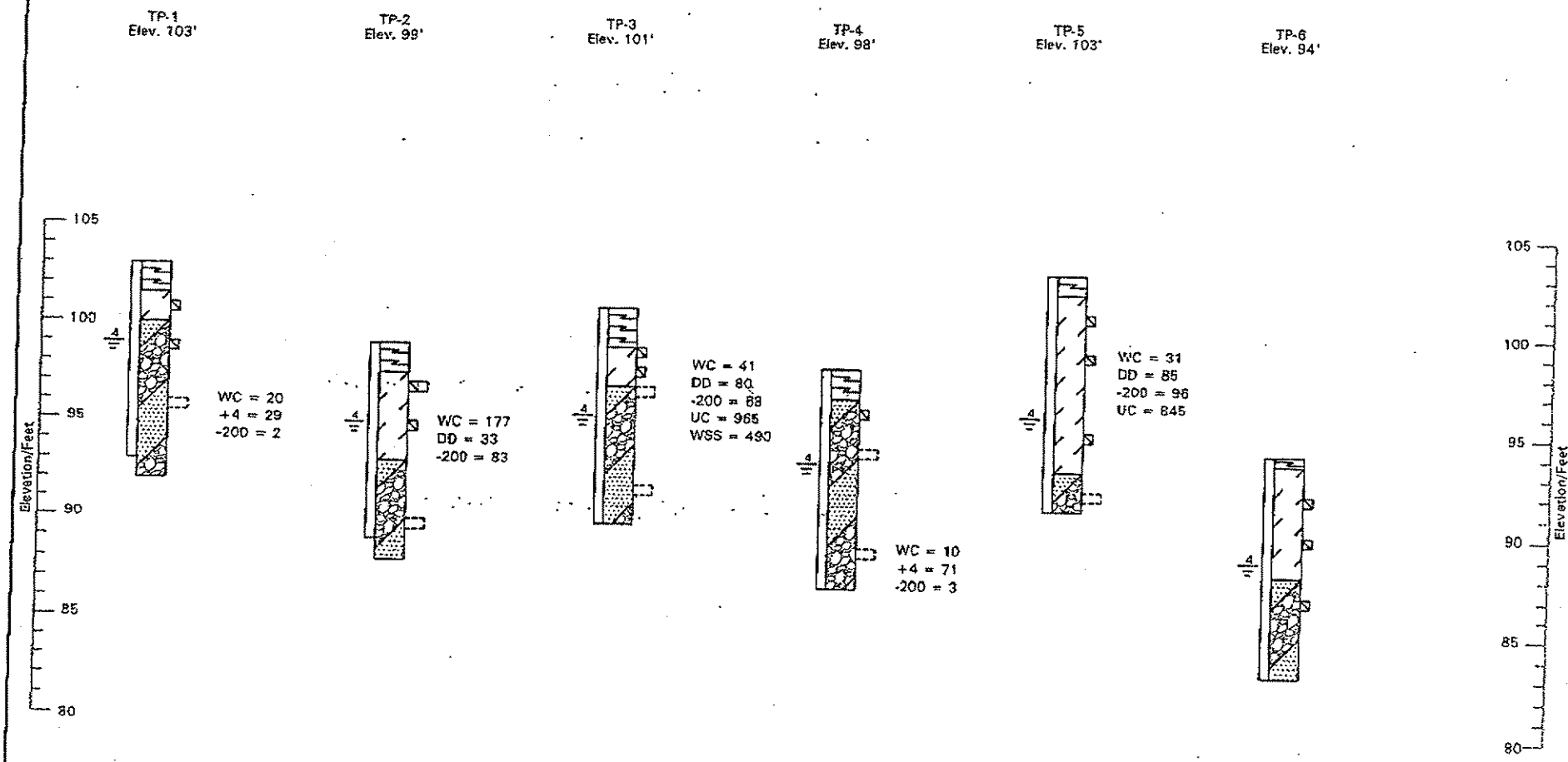
1040659	AGEC	Locations of Exploratory Test Pits and Borings	Figure 1



Approximate Vertical Scale 1" = 8'

See Figure 4 for Legend and Notes

1040659	AGRA	Logs of Exploratory Borings	Figure 3



Approximate Vertical Scale 1" = 8'

See Figure 4 for Legend and Notes

1040659 | AGEC | Logs of Test Pits

Figure 3

LEGEND:

Topsoil; lean clay, small amounts of sand, moist to very moist, dark brown, roots and organics.

Lean Clay (CL); small amounts of sand, soft to very stiff, moist to wet, light gray to dark brownish gray. Moderate to large amounts of organic material was encountered in the clay in Test Pit TP-2.

Silt (ML); small to moderate amounts of sand, occasional clay layers, dense, wet, brown.

Well and Poorly Graded Sand and Gravel (SP/GP); small to moderate amounts of silt, dense to very dense, wet, gray to brown.

10/12 California Drive sample taken. The symbol 10/12 indicates that 10 blows from a 140 pound hammer falling 30 inches were required to drive the sampler 12 inches.

Indicates relatively undisturbed hand drive sample taken.

Indicates relatively undisturbed block sample taken.

Indicates disturbed sample taken.

Indicates slotted 1½ inch PVC pipe installed in the test pit or boring to the depth shown.

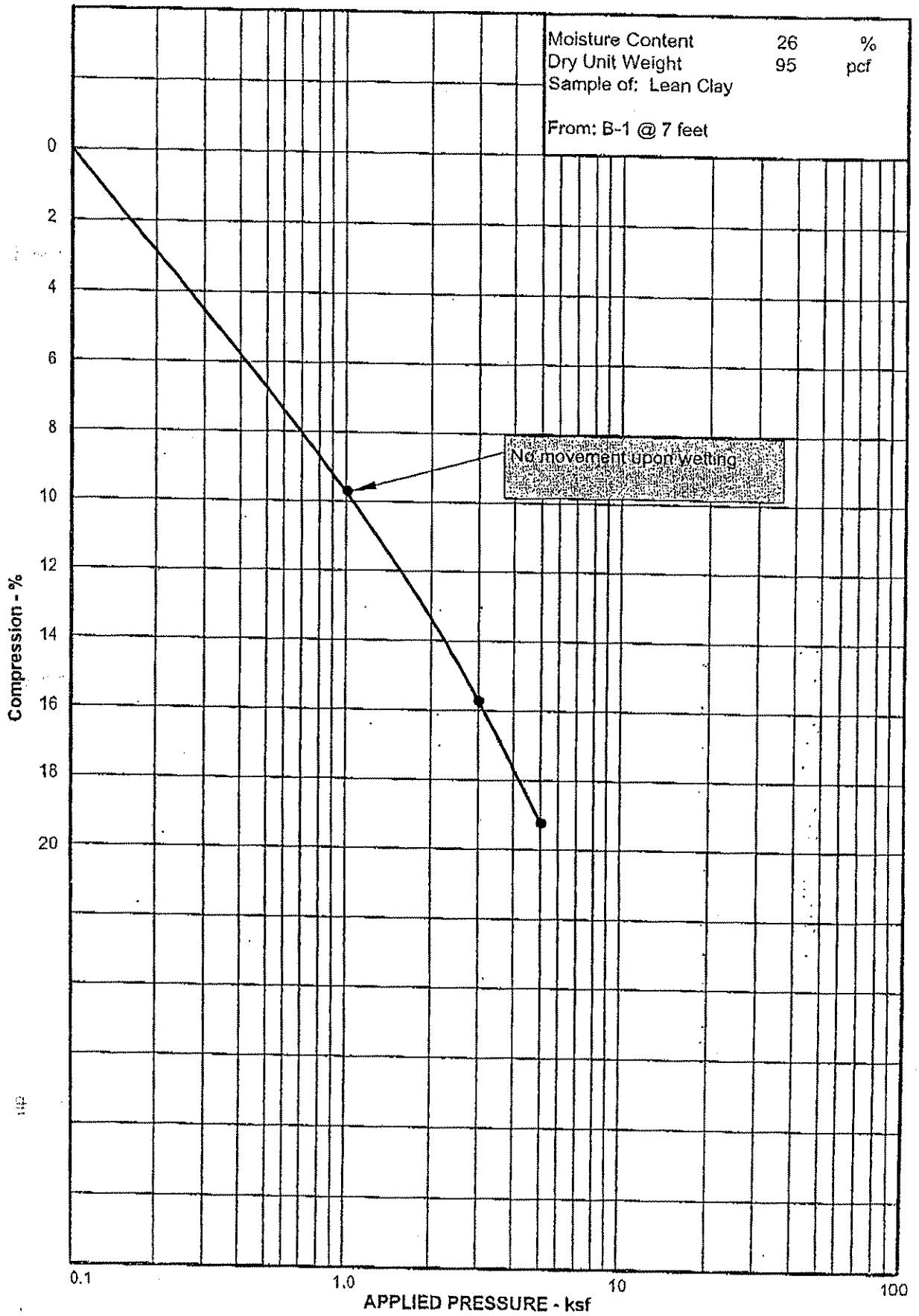
11 Indicates the depth to free water and the number of days after excavation/drilling the measurement was taken.

NOTES:

1. Test pits were excavated on July 29, 2004 with a rubber-tired backhoe. Borings were drilled on November 3, 4 and 5, 2003 with 8-inch diameter hollowstem auger provided by a truck mounted drill rig.
2. Locations of test pits and borings were measured approximately by pacing from features shown on the site plan provided.
3. Elevations of test pits and borings were measured with an automatic level and refer to the bench mark shown on Figure 1.
4. The test pit and boring locations and elevations should be considered accurate only to the degree implied by the method used.
5. The lines between the materials shown on the test pit and boring logs represent the approximate boundaries between material types and the transitions may be gradual.
6. Water level readings shown on the logs were made at the time and under the conditions indicated. Fluctuations in the water level may occur with time.
7. WC = Water Content (%);
   DD = Dry Density (pcf);
   +4 = Percent Retained on No. 4 Sieve;
   -200 = Percent Passing No. 200 Sieve;
   UC = Unconfined Compressive Strength (psf);
   WSS = Water Soluble Sulfates (ppm).

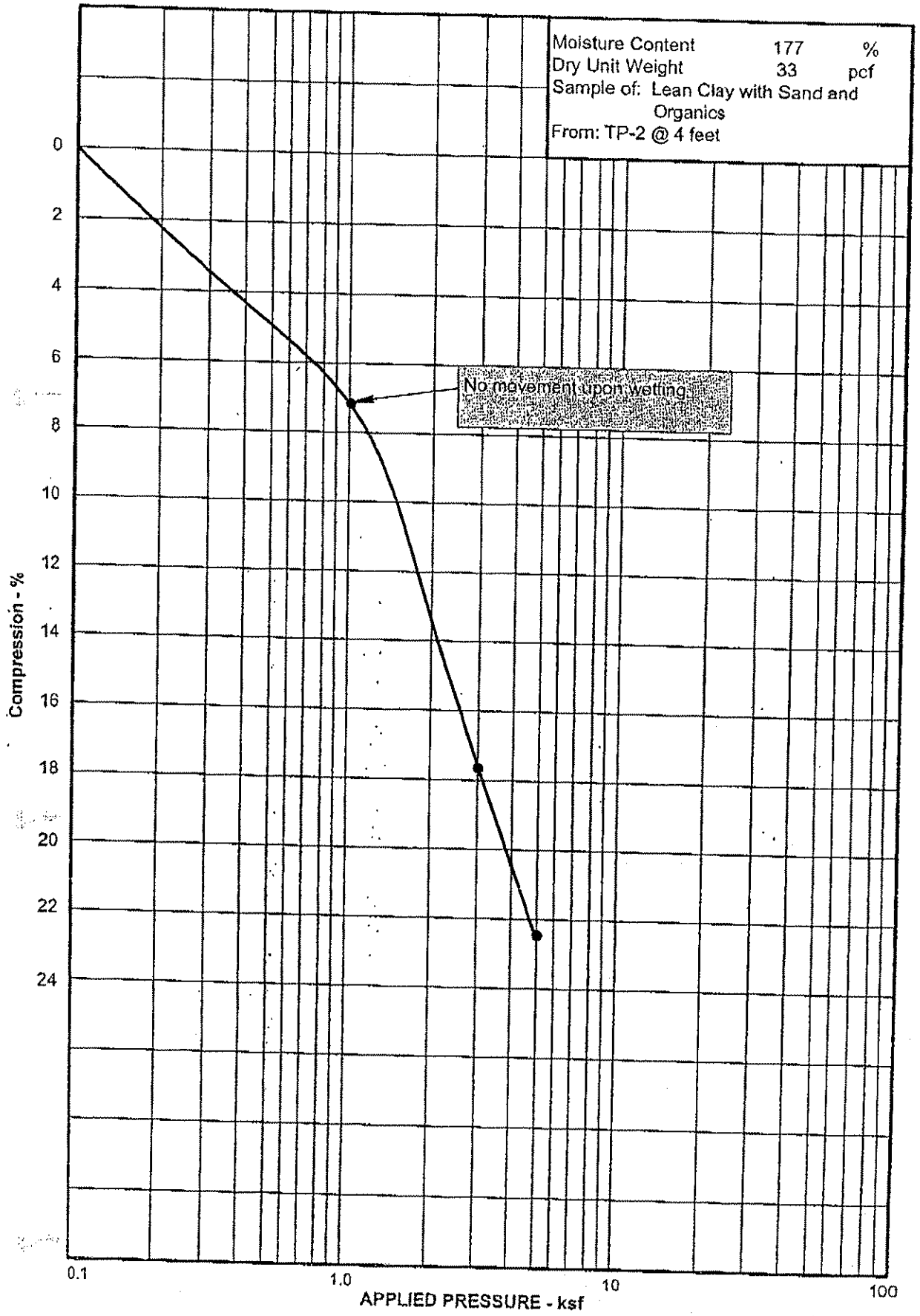
1040659	AGES	Legend and Notes of Exploratory Test Pits and Borings	Figure 4

Applied Geotechnical Engineering Consultants, Inc.



Project No. 1040659 CONSOLIDATION TEST RESULTS Figure 5

Applied Geotechnical Engineering Consultants, Inc.

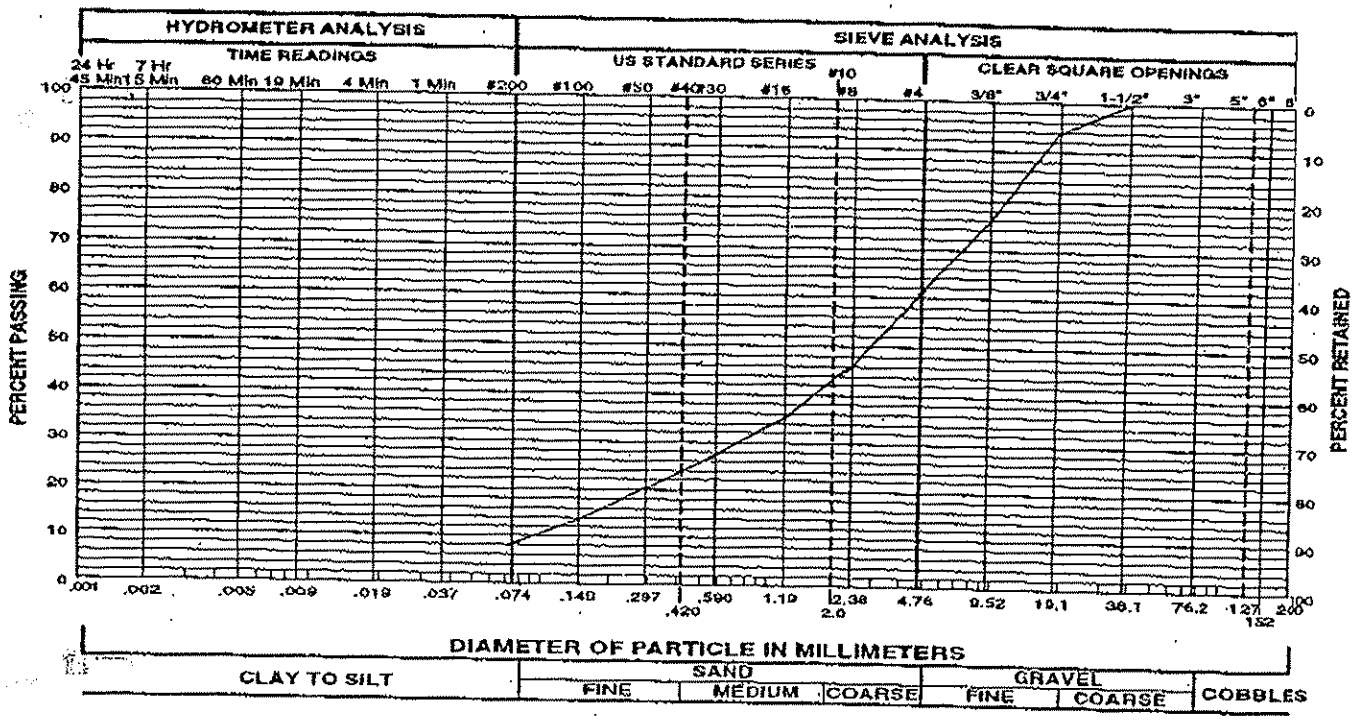


Project No. 1040659

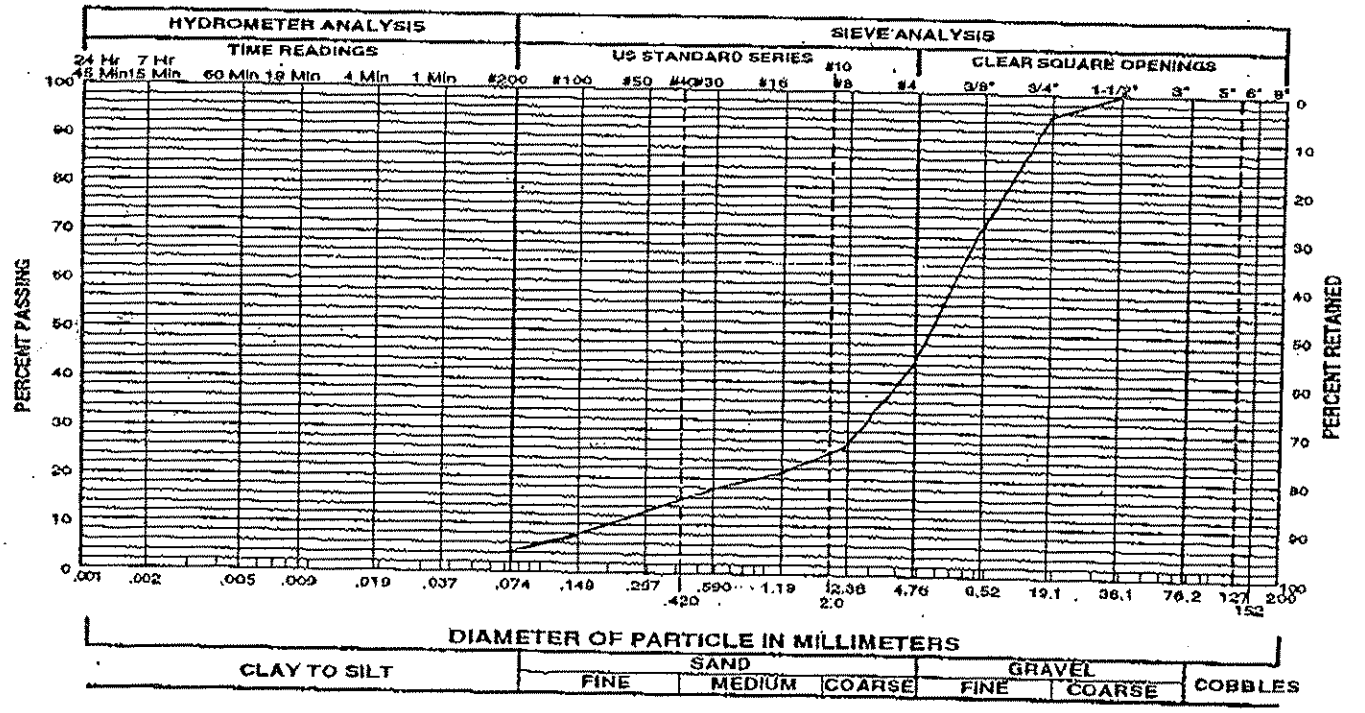
CONSOLIDATION TEST RESULTS

Figure 6

Applied Geotechnical Engineering Consultants, Inc.



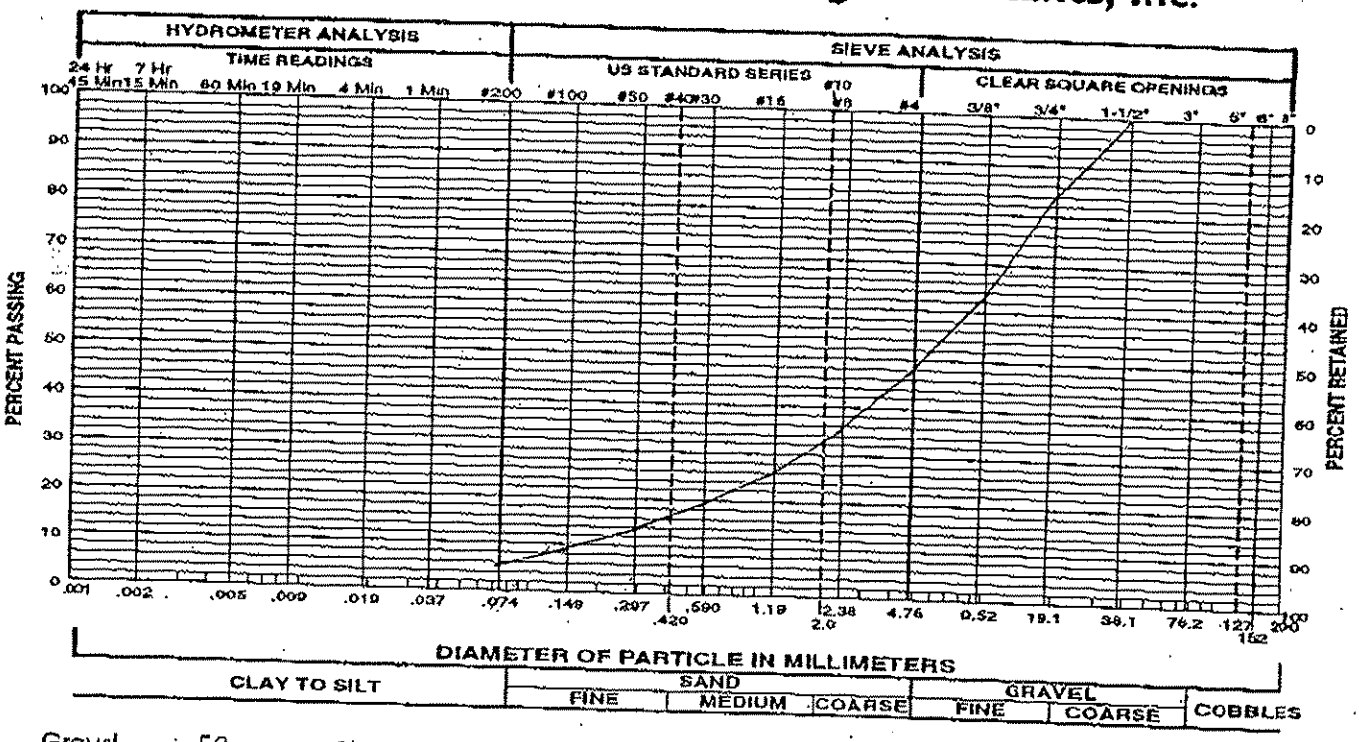
Gravel 39 % Sand 53 % Silt and Clay 8 %
Liquid Limit - % Plasticity Index - %
Sample of Well Graded Sand with Silt and Gravel From B-1 @ 11 feet



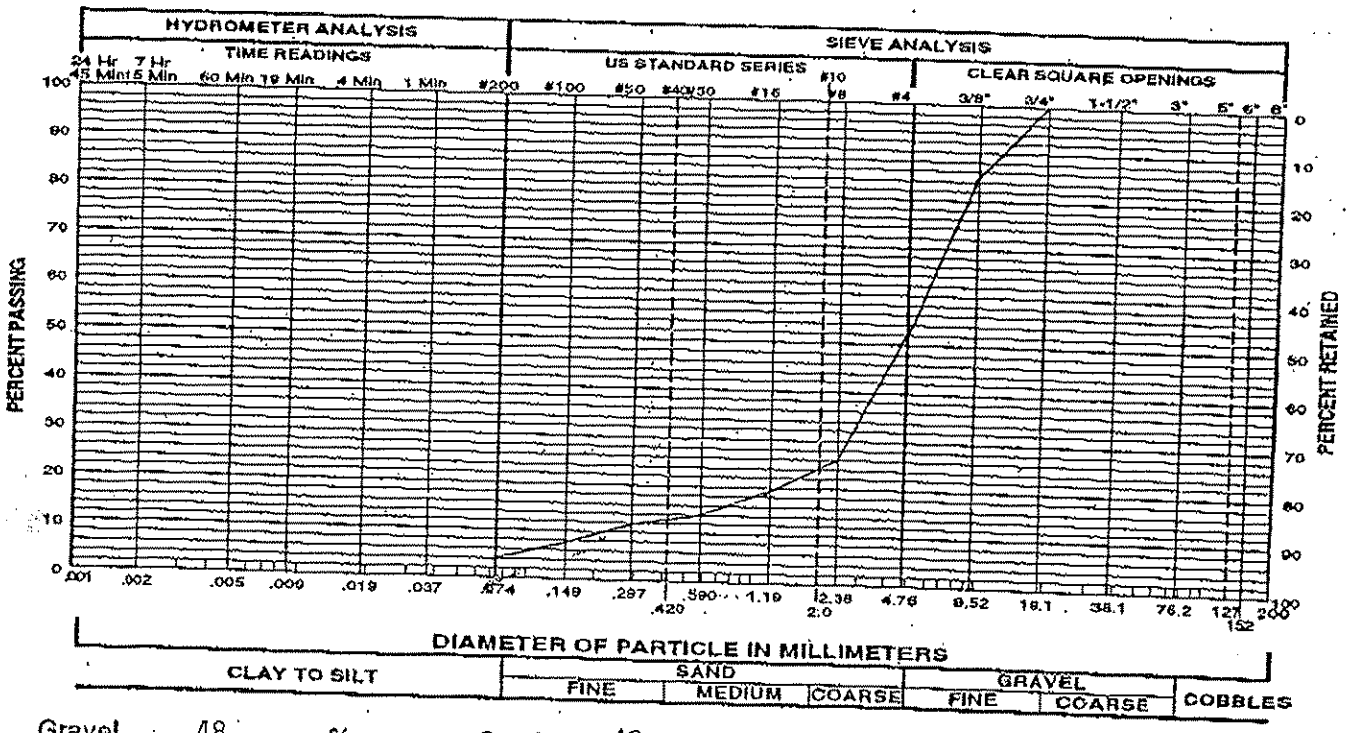
Gravel 56 % Sand 40 % Silt and Clay 4 %
Liquid Limit - % Plasticity Index - %
Sample of Poorly Graded Gravel with Sand From B-2 @ 9 feet

Project No. 1040659 **GRADATION TEST RESULTS** Figure 7

Applied Geotechnical Engineering Consultants, Inc.



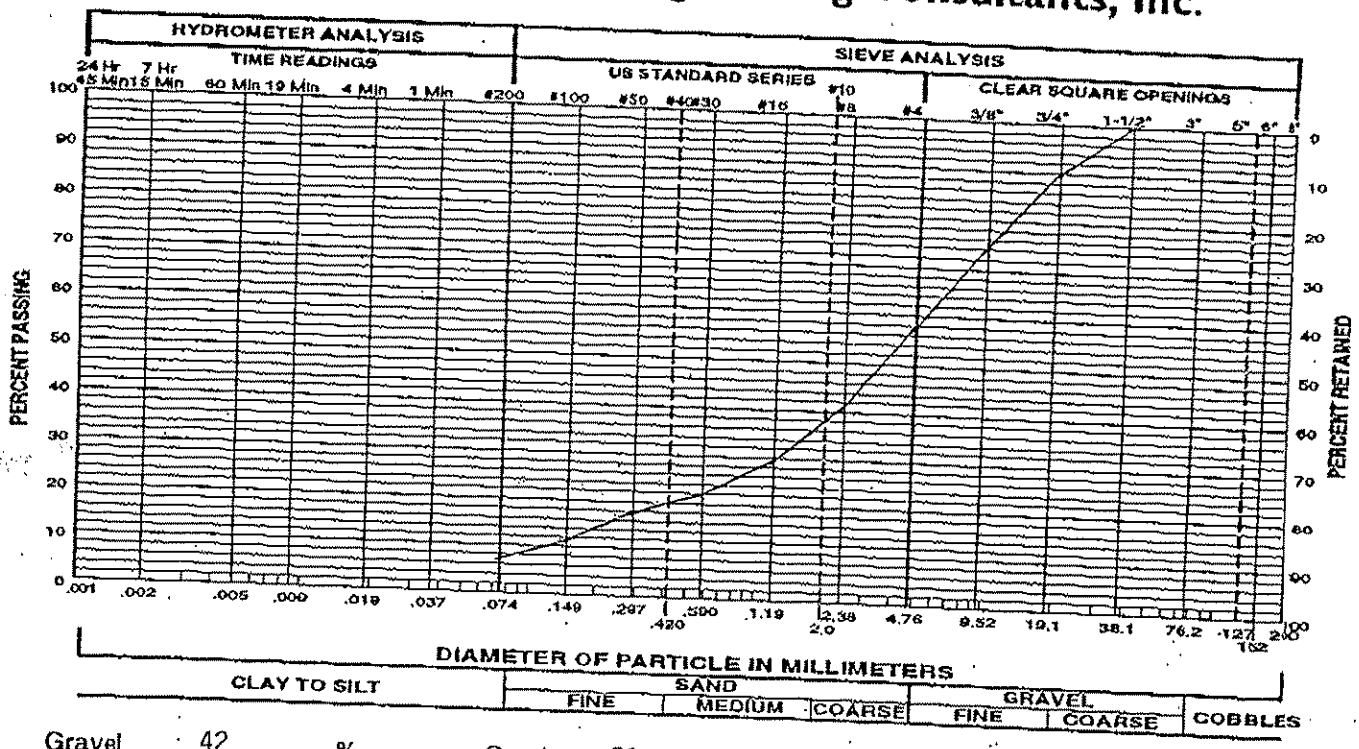
Gravel 52 % Sand 43 % Silt and Clay 5 %
Liquid Limit - % Plasticity Index - %
Sample of Well Graded Gravel with Sand From B-3 @ 19 feet



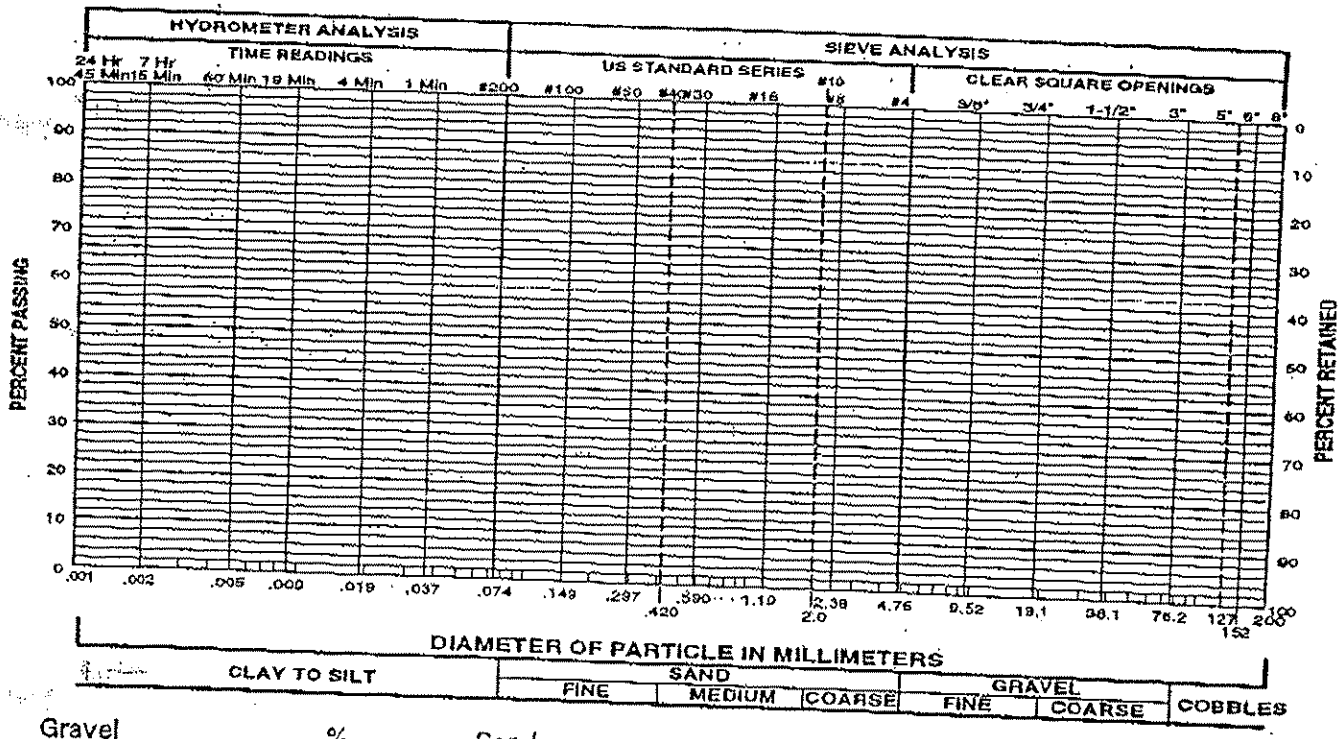
Gravel 48 % Sand 48 % Silt and Clay 4 %
Liquid Limit - % Plasticity Index - %
Sample of Poorly Graded Gravel with Sand From B-4 @ 4 feet

Project No. 1040659 **GRADATION TEST RESULTS** Figure 8

Applied Geotechnical Engineering Consultants, Inc.



Gravel 42 %
Liquid Limit - %
Sand 51 %
Plasticity Index - %
Silt and Clay 7 %
Sample of Well Graded Sand with Silt and Gravel
From B-4 @ 29 feet



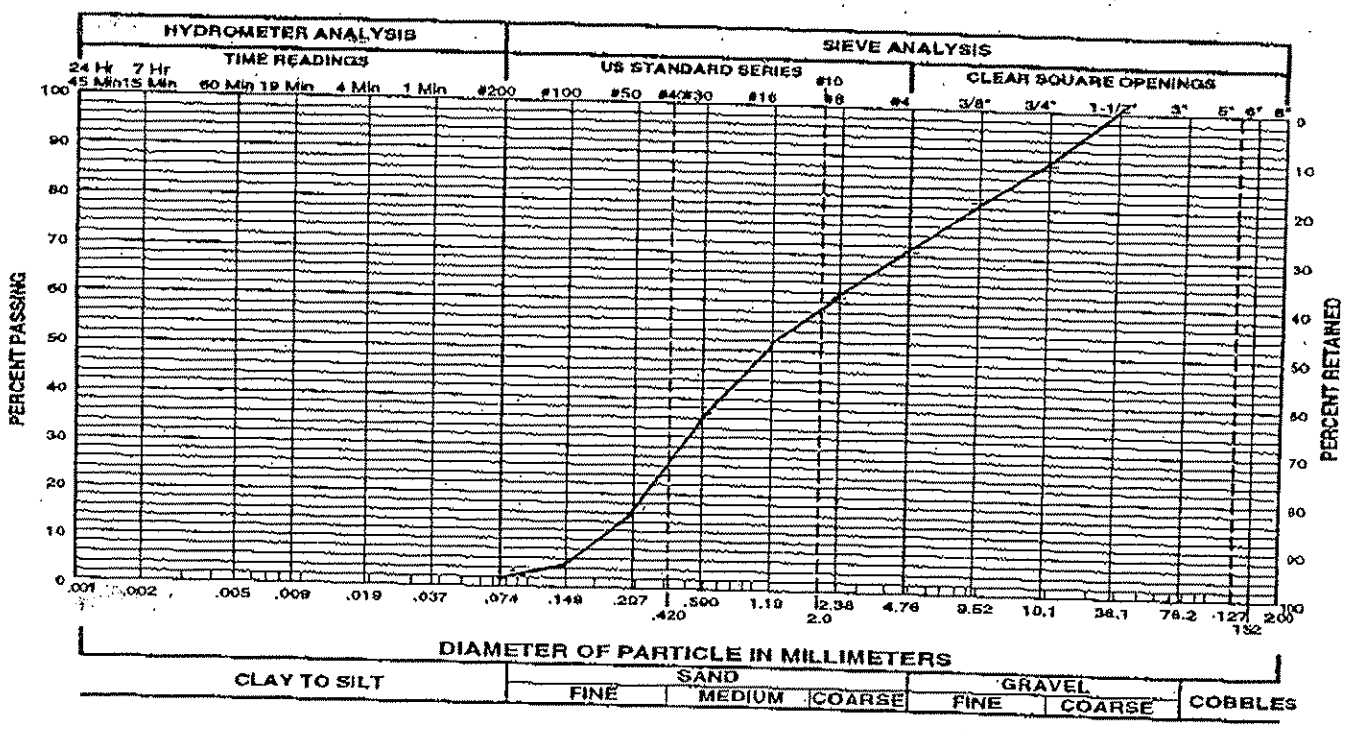
Gravel _____ %
Liquid Limit _____ %
Sand _____ %
Plasticity Index _____ %
Silt and Clay _____ %
Sample of _____
From _____

Project No. 1040659

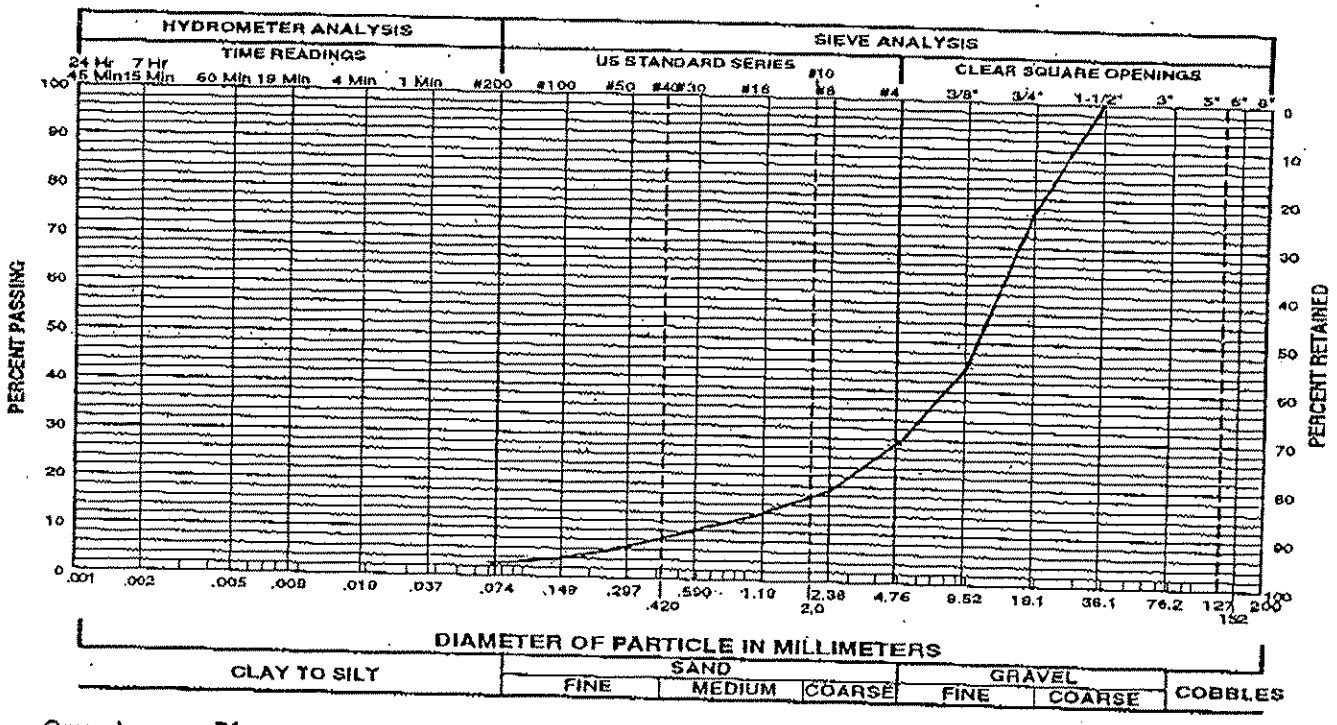
GRADATION TEST RESULTS

Figure 9

Applied Geotechnical Engineering Consultants, P.C.



Gravel 29 % Sand 69 % Silt and Clay 2 %
Liquid Limit - % Plasticity Index - %
Sample of Poorly-graded Sand with Gravel From TP-1 @ 7 feet



Gravel 71 % Sand 26 % Silt and Clay 3 %
Liquid Limit - % Plasticity Index - %
Sample of Poorly-graded Gravel with Sand From TP-4 @ 9 feet

Project No. 1040659 **GRADATION TEST RESULTS** Figure 10

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, P.C.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 104065

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (ppm)	SAMPLE CLASSIFICATION
BORING	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
B-1	7	26	95			21					Lean Clay/Silty Sand
	12	8		39	53	8					Well Graded Sand with Silt and Gravel
B-2	9			56	40	4					Poorly Graded Gravel with Sand
	41½	24	103			5					Poorly Graded Sand
B-3	4	51	67	99					590	240	Lean Clay
	19	8	131	52	43	5					Well Graded Gravel with Sand
B-4	4	19		48	48	4					Poorly Graded Gravel with Sand
	29	11	124	42	51	7					Well Graded Sand with Silt and Gravel
	44	20	110			65					Sandy Silt

APPLIED GEOTECHNICAL ENGINEERING CONSULTANTS, P.C.

TABLE I

SUMMARY OF LABORATORY TEST RESULTS

PROJECT NUMBER 104065

SAMPLE LOCATION		NATURAL MOISTURE CONTENT (%)	NATURAL DRY DENSITY (PCF)	GRADATION			ATTERBERG LIMITS		UNCONFINED COMPRESSIVE STRENGTH (PSF)	WATER SOLUBLE SULFATE (ppm)	SAMPLE CLASSIFICATION
TEST PIT	DEPTH (FEET)			GRAVEL (%)	SAND (%)	SILT/ CLAY (%)	LIQUID LIMIT (%)	PLASTICITY INDEX (%)			
TP-1	7	20		29	69	2					Poorly-graded Sand with Gravel
TP-2	4	177	33			83					Lean Clay with Sand and Organics
TP-3	3	41	80			68			965	490	Sandy Lean Clay
TP-4	9	10		71	26	3					Poorly-graded Gravel with Sand
TP-5	4	31	85			96			845		Lean Clay

APPENDIX

LIQUEFACTION ANALYSIS

Project No. 1040659

LIQUEFACTION POTENTIAL AND LIQUEFACTION INDUCED SETTLEMENT

Project No.: 1040659
Project Name: VILLAGE AT RIVER WALK
Date: 19-Aug-04
Time: 3:28 PM
Site PGA for 10% in 50 yrs: 0.246 g
Site PGA for 2% in 50 yrs: g

Earthquake Magnitude: 7.2
Magitude Scaling Factor: 1.11
Hammer Energy Ratio: 1
Soil Total Unit Wt, pcf: 120
Hole Diameter, in: 3.75 95.25 1

Salt Lake Liq. Hazard Rating

Liq. Potential	PGA
Very Low	>0.33g
Low	0.23g-0.33g
Moderate	0.13g-0.23g
High	<0.13g

Liquefaction potential based on Youd, T. L. and I. M. Idriss, 1997; Proceedings of the NCEER workshop on liquefaction resistance of soils, Technical Report NCEER-97-0022

Liquefaction induced settlement based on Tokimatsu, A. M. and H. B. Seed, 1987; Evaluation of settlements in sands due to earthquake shaking. Journal of Geotechnical Engineering, Vol. 113, No. 8, pp. 861-878

Boring	Sample Depth, ft	N	Sample Type, 1=DS 2=SPT	% Fines	Soil Type	Water Depth, ft	Total Stress, tsf	Effective Stress, tsf	LIQUEFACTION POTENTIAL: Corrections to SPT: Over-burden Press., C_N	Energy Ratio, C_E	Bore Dia., C_B	Rod Length, C_R	Sample Type, C_S	Total SPT Corr.	$(N_1)_{60}$	$(N_1)_{60cs}$	$CRR_{7.5}$	CRR_M	r_d	Acc. To Cause Liq., a_L	Salt Lake Liq. Potential	LIQUEFACTION INDUCED SETTLEMENT: $(N_1)_{60cs}$	10% in 50 Yr CSR	Layer Thick., ft	Vol. Strain, %	Sett., in	Cum. Sett., in
B-2	1	29	1	90	cl	6	0.060	0.060	2.00	1	1	0.75	0.82	1.23	35.7	47.8	0.457	0.507	1.00	0.781	Very Low	47.8	0.160			0.00	0.00
	5	23	1	5	sp/gp	6	0.300	0.300	1.83	1	1	0.75	0.82	1.12	25.8	25.8	0.287	0.329	0.99	0.512	Very Low	25.8	0.158			0.00	0.00
	7.5	38	1	5	sp/gp	6	0.450	0.403	1.57	1	1	0.75	0.82	0.97	36.8	36.8	0.457	0.507	0.98	0.710	Very Low	36.8	0.176			0.00	0.00
	10	35	1	4	sp/gp	6	0.600	0.475	1.45	1	1	0.75	0.82	0.89	31.2	31.2	0.457	0.507	0.98	0.631	Very Low	31.2	0.198			0.00	0.00
	12.5	39	1	5	sp/gp	6	0.750	0.547	1.35	1	1	0.77	0.82	0.85	33.3	33.3	0.457	0.507	0.97	0.585	Very Low	33.3	0.213			0.00	0.00
	15	41	1	5	sp/gp	6	0.900	0.619	1.27	1	1	0.82	0.82	0.86	35.1	35.1	0.457	0.507	0.97	0.554	Very Low	35.1	0.225			0.00	0.00
	17.5	57	1	5	sp/gp	6	1.050	0.691	1.20	1	1	0.86	0.82	0.85	48.4	48.4	0.457	0.507	0.96	0.533	Very Low	48.4	0.234			0.00	0.00
	20	37	1	5	sp/gp	6	1.200	0.763	1.14	1	1	0.89	0.82	0.83	30.8	30.8	0.457	0.507	0.96	0.519	Very Low	30.8	0.241			0.00	0.00
	22.5	10	1	90	cl	6	1.350	0.835	1.09	1	1	0.91	0.82	0.82	8.2	14.8	0.160	0.178	0.95	0.178	Moderate	14.8	0.246	CLAY		0.00	0.00
	25	83	1	5	sp/gp	6	1.500	0.907	1.05	1	1	0.94	0.82	0.81	67.0	67.0	0.457	0.507	0.94	0.501	Very Low	67.0	0.249			0.00	0.00
	27.5	75	1	5	sp/gp	6	1.650	0.979	1.01	1	1	0.95	0.82	0.79	59.1	59.1	0.457	0.507	0.93	0.497	Very Low	59.1	0.251			0.00	0.00
	30	50	1	5	sp/gp	6	1.800	1.051	0.98	1	1	0.95	0.82	0.76	38.2	38.2	0.457	0.507	0.92	0.495	Very Low	38.2	0.252			0.00	0.00
	32.5	75	1	5	sp/gp	6	1.950	1.123	0.94	1	1	0.96	0.82	0.74	55.6	55.6	0.457	0.507	0.91	0.495	Very Low	55.6	0.252			0.00	0.00
	35	50	1	5	sp/gp	6	2.100	1.195	0.91	1	1	0.96	0.82	0.72	36.0	36.0	0.457	0.507	0.89	0.499	Very Low	36.0	0.250			0.00	0.00
	37.5	86	1	5	sp/gp	6	2.250	1.267	0.89	1	1	0.98	0.82	0.70	60.4	60.4	0.457	0.507	0.87	0.504	Very Low	60.4	0.248			0.00	0.00
	40	88	1	5	sp/gp	6	2.400	1.339	0.86	1	1	0.97	0.82	0.69	60.3	60.3	0.457	0.507	0.85	0.512	Very Low	60.3	0.244			0.00	0.00
	42.5	76	1	5	sp/gp	6	2.550	1.411	0.84	1	1	0.97	0.82	0.67	52.3	52.3	0.457	0.507	0.83	0.521	Very Low	52.3	0.239			0.00	0.00
	45	81	1	5	sp/gp	6	2.700	1.483	0.82	1	1	0.97	0.82	0.66	53.1	53.1	0.457	0.507	0.80	0.533	Very Low	53.1	0.234			0.00	0.00