

DEVELOPER
 DIVERSE REAL ESTATE LLC
 12955 23 MILE ROAD
 SHELBY TOWNSHIP, MI 48315
 586-615-3036 (PHONE)
 ATTN: CHRIS COUSINO

ENGINEER/SURVEYOR
 ATWELL, LLC
 TWO TOWNE SQUARE, SUITE 700
 SOUTHFIELD, MICHIGAN 48076
 248-447-2000 (PHONE)
 ATTN: ERIC LORD, PE

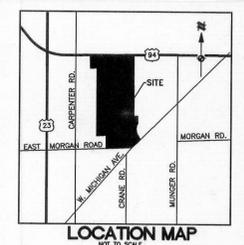
FINAL SITE PLAN

THE MEADOWS OF ARBOR RIDGE

PHASE 1

SECTION 13, T.3S., R.6E.

PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN



SITE DATA - The Meadows of Arbor Ridge

SINGLE FAMILY SUBURBAN RESIDENTIAL (THE MEADOWS OF ARBOR RIDGE)	
TOTAL PHASE 1 & 2 AREA	25.65 ACRES
TOTAL NUMBER UNITS SHOWN	70 UNITS
DENSITY	2.73 UNITS PER ACRE
FRONT YARD SETBACK	30 FT.
REAR YARD SETBACK	30 FT. - EXCEPT 15' REAR FOR PHASE 2 LOTS 28-38
SIDE YARD SETBACK	5 FT. MIN./15 FT. TOTAL
MINIMUM LOT AREA	5,730 SQ. FT. MIN.
MINIMUM LOT WIDTH	57 FT. MINIMUM AT FRONT SETBACK
BUILDING HEIGHT	35'/25' STORIES, ALL NEW STRUCTURES
SINGLE FAMILY DEVELOPMENT AREA	
LOT COVERAGE (30% MAX)	21%
NET LOT COVERAGE (40% MAX)	28%
IMPERVIOUS SURFACE AREA (INCLUDES PRIVATE ROADS AND PATHS)	241,944 SF = 21% OF TOTAL DEVELOPMENT AREA
NET LOT AREA (OVERALL)	514,784 SF
UNIT COUNT:	
TOTAL MEADOWS OF ARBOR RIDGE UNITS:	70
EXISTING ARBOR RIDGE PHASE 1 UNITS:	55
EXISTING ARBOR RIDGE PHASE 2 UNITS:	47
TOTAL UNITS FUTURE ARBOR RIDGE CROSSING:	140
GRAND TOTAL:	312

PITTSFIELD TOWNSHIP PLANNING COMMISSION
FINAL SITE PLAN
 APPROVED 7/16/15 (DATE)
 Matthew Bourke
 ZONING ADMINISTRATOR

LEGAL DESCRIPTION

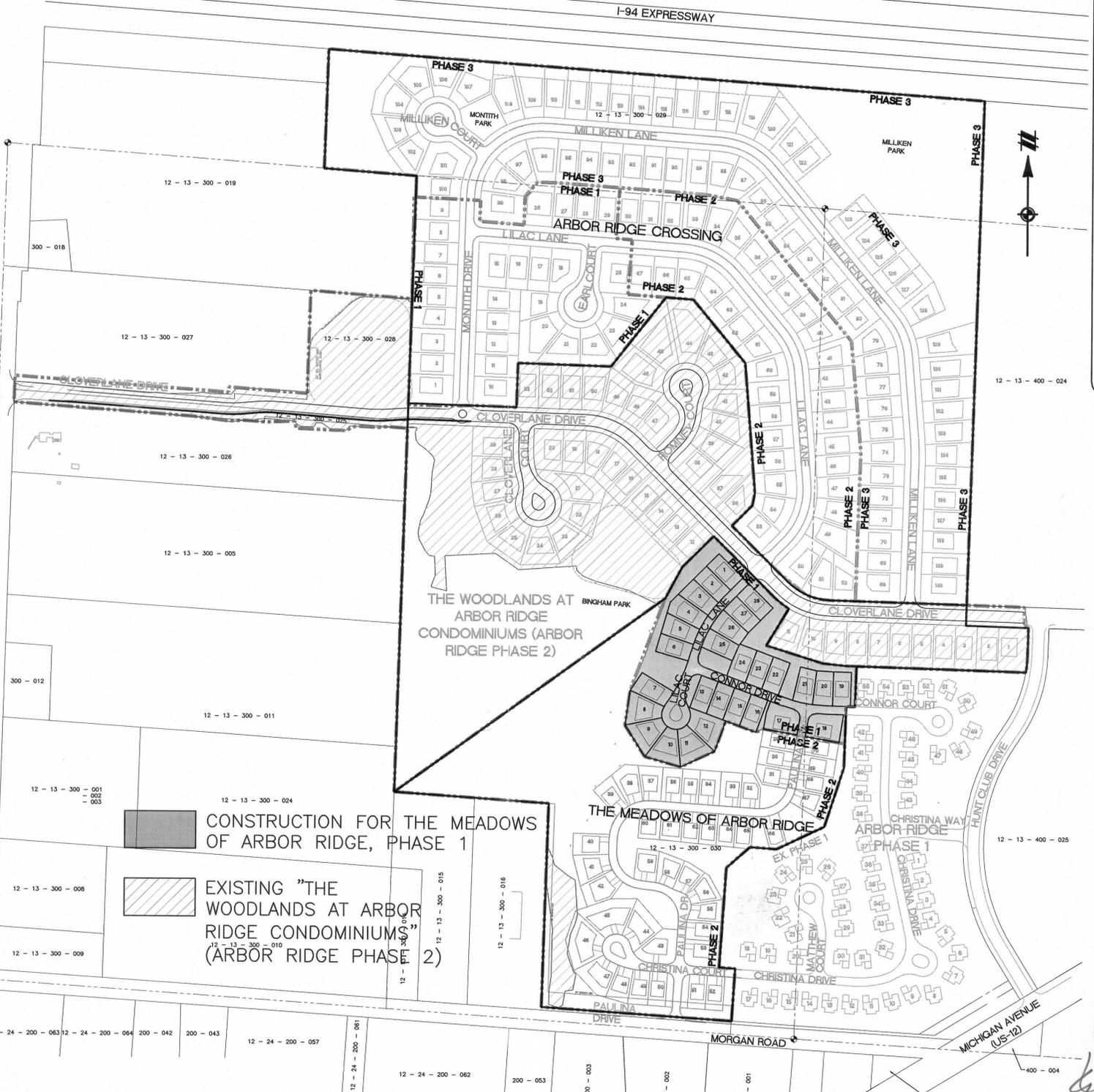
DESCRIPTION OF A 107.33 ACRE PARCEL OF LAND (PHASE 2 PLUS FUTURE PHASES) LOCATED IN SECTION 13, T.3S, R.6E, PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

Commencing at the South 1/4 corner of Section 13, T.3S, R.6E, Pittsfield Township, Washtenaw County, Michigan; thence N86°11'55"W 205.65 feet along the South line of said Section 13 and the centerline of Morgan Road (66.00 feet wide); thence N03°48'04"E 43.01 feet to a PLACE OF BEGINNING; thence N86°11'55"W 615.49 feet along the proposed Northernly right-of-way line of said Morgan Road; thence N01°42'03"E 656.97 feet; thence N86°11'55"W 500.07 feet (recorded as 500.00 feet); thence N01°41'32"E 1985.03 feet (recorded as N01°42'03"E 1984.97 feet) along the West line of the East 1/2 of the Southwest 1/4 of said Section 13; thence N85°51'20"W 298.97 feet (recorded as N85°50'34"W 299.34 feet) along the East-West line of said Section 13; thence N01°47'32"E 385.25 feet (recorded as 385.23 feet); thence S85°55'23"E 2123.39 feet along the South line of Interstate 94 (500.00 feet wide); thence S01°39'12"W 1692.64 feet to the Southernly line of Cloverlane Drive (66.00 feet wide); thence S88°19'23"E 202.07 feet along said Southernly right-of-way line to the Westernly line of Hunt Club Drive (66.00 feet wide); thence the following two courses along said Westernly line: S01°40'37"W 51.56 feet and 51.57 feet along the arc of a 416.87 foot radius, circular curve to the right, having a chord which bears S05°13'16"W 51.54 feet; thence the following eleven courses along the Northernly and Westernly line of Arbor Ridge Condominiums recorded in Liber 3127, page 722 of Washtenaw County Records: N88°19'23"W 546.79 feet, S01°40'37"W 130.00 feet, N88°19'23"W 28.94 feet, S01°40'37"W 196.98 feet, S18°03'54"W 202.34 feet, S64°39'00"W 169.84 feet, N86°11'55"W 85.46 feet, S48°48'05"W 100.65 feet, S03°48'05"W 321.65 feet, S86°11'56"E 52.33 feet, S03°48'04"W 170.08 feet to the Place of Beginning, containing 107.33 acres of land, more or less, being part of said Section 13, being subject to any easements or restrictions of record, if any.

Tax parcel number: 12-13-300-021, 12-13-300-022, 12-13-300-029, and 12-13-400-030.

NOTES

- THE PUBLIC ROAD IMPROVEMENTS SHOWN ON THESE PLANS SHALL BE CONSTRUCTED IN ACCORDANCE WITH THE MICHIGAN DEPARTMENT OF TRANSPORTATION 2003 STANDARD SPECIFICATIONS FOR CONSTRUCTION.
- MAILBOXES WILL BE LOCATED AT EACH UNIT FOR BOTH THE SINGLE-FAMILY AND DETACHED CONDOMINIUMS.
- ENGINEERING PLANS HAVE BEEN SUBMITTED TO ALL OF THE FRANCHISED UTILITY COMPANIES. ONCE THEIR DESIGNS ARE RECEIVED, THEY WILL BE INCORPORATED INTO THE PLANS.
- SUMP PUMP LEADS OR STORM SEWERS USED SOLELY TO DRAIN SUMP PUMPS SHALL NOT CONNECT TO ANY WORC OWNED STRUCTURES.
- DRIVEWAY APPROACHES WITHIN THE RIGHT OF WAY SHALL NOT HAVE A WIDTH GREATER THAN 20 FEET OR A VERTICAL PROFILE EXCEEDING ±10%.
- PROPOSED OR EXISTING DRIVEWAYS SHALL BE NO CLOSER THAN 50 FEET FROM THE RIGHT OF WAY OF AN INTERSECTING ROAD.
- NO HOME BUILDING CONSTRUCTION TRAFFIC SHALL BE ALLOWED ON THE NEW ROADS UNTIL BOTH HMA BASE AND HMA LEVELING COURSES ARE IN PLACE.
- CONSTRUCTION TRAFFIC SHALL NOT USE THE STREETS WITHIN ARBOR RIDGE PHASE 1 TO ACCESS THE SITE. ALSO, CONSTRUCTION PARKING WILL NOT BE PERMITTED IN ARBOR RIDGE PHASE 1.
- MAILBOXES LOCATED WITHIN THE R.O.W. SHALL BE IN ACCORDANCE WITH THE WORC PROCEDURES FOR INSTALLATION OF MAILBOXES AND NEWSPAPER DELIVERY BOXES ALONG COUNTY ROADS.
- NO LANDSCAPING BERMS, HEADWALLS, PRIVATE SIGNS OR PRIVATE UTILITIES SHALL BE LOCATED WITHIN THE R.O.W.
- ON STREET PARKING ALLOWED ON SIDE OF STREET OPPOSITE WATER MAIN.
- SUMP PUMP DISCHARGE LINES SHALL INCLUDE BACK FLOW PREVENTION.



SHEET INDEX

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10	12E	TREE SCHEDULE AND REMOVAL LIST
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Quantities in This Plan Set

SANITARY SEWER		
1	8" SDR 21-PVC Sanitary Sewer	960 L.F.
2	6" PVC SDR 26 House Lead	1,446 L.F.
3	4" Dia. Sanitary Manhole	7 EA.
WATER MAIN		
1	8" D.I. CL. 54 Water Main	1,207 L.F.
2	Hydrant Assembly	4 EA.
3	8" Gate Valve & Well Structure	5 EA.
STORM SEWER		
1	3" SUMP LEAD	280 L.F.
2	12" C-76 RCP Storm Sewer	1,547 L.F.
3	15" C-76 RCP Storm Sewer	304 L.F.
4	2" Dia. Inlet	10 EA.
5	4" Dia. Catch Basin	9 EA.
6	4" Dia. Manhole	4 EA.
7	Outlet Control Standpipe	1 EA.

NOTE
 ALL ELEVATIONS SHOWN ARE IN THE NGVD29 DATUM. SUBTRACT 0.40 FEET TO CONVERT TO NAVD 88 DATUM.

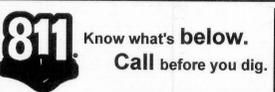


ON-SITE SOILS

Gf - Gifford sandy loam
 Ho - Hoyville silty clay loam
 HoB - Nonpore silty clay loam, 2 to 6% slopes
 OaC - Oahtemo loamy sand, 6 to 12% slopes
 Pe - Pawamo clay loam
 SpB - Spinks loamy sand, 0 to 6% slopes
 Slc - St. Clair clay loam, 6 to 12% slopes
 ThA - Thetford loamy sand, 0 to 4% slopes

Note: All soils information has been supplied by the U.S. Dept. of Agriculture Soil Conservation Service.

THE MEADOWS OF ARBOR RIDGE C.S.P.A. #14-21
 (PREVIOUSLY REVIEWED UNDER RZ #13-02)
 (PREVIOUSLY REVIEWED UNDER C.S.P.A. #04-23)
 (PREVIOUSLY REVIEWED UNDER C.S.P.A. #95-4)



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
 CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

RECEIVED 5-21-15
 Revised 5-21-15
 Revised

WORK 5-12-15
 UCR

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SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 COVER SHEET

DATE: JULY 21, 2014

REVISIONS/SUBMITTALS

12/12/14	PER TWP CONSULTANTS
04/01/15	PER TWP CONSULTANTS
05/20/15	PER TWP CONSULTANTS

SCALE: NO SCALE

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 300819S2-01_CV-PHASE 5
 JOB #: 12001809
 FILE CODE: #
 SHEET NO. 01

PAGE NO. 1

I-94 EXPRESSWAY
(300' WIDE)



Land Development & Real Estate
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Infrastructure & Transportation
Environmental & Solid Waste
Water & Natural Resources



SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
CONSTRUCTION SEQUENCE PLAN

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

SCALE: 1" = 150 FEET
DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819S2-01A-PH
JOB #: 12001809
FILE CODE:
SHEET NO. 1A

PAGE NO. 2

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ZONED R-1B
USE: RESIDENTIAL
12 - 13 - 300 - 019
JENKINS DAVID C & LINDA TRUST
4533 CARPENTER ROAD
YPSILANTI, MI 48197

ZONED R-1B
USE: RELIGIOUS
12 - 13 - 300 - 027
UNITY CHURCH OF ANN ARBOR
4599 CARPENTER ROAD
YPSILANTI, MI 48197

ZONED R-1B
USE: DETENTION BASIN
12 - 13 - 300 - 028
WASHTENAW COUNTY ROAD COMMISSION
555 N ZEEB RD
ANN ARBOR, MI 48103

ZONED R-2
USE: RESIDENTIAL VACANT
12 - 13 - 300 - 026
MICHAEL JESS
18281 SHELLEY POND CT
NORTHVILLE, MI 48166

ZONED R-2
USE: RESIDENTIAL
12 - 13 - 300 - 005
ALICE N HARRIS
425 WILKER ST
MILAN, MI 48160

ZONED I
USE: COMMERCIAL
12 - 13 - 300 - 011
CARPENTER PARK LLC
17501 MILWAUKEE RD
MANCHESTER, MI 48156

ZONED I
USE: INDUSTRIAL VACANT
12 - 13 - 300 - 024
LYONS FAMILY REAL ESTATE LLC
1934 O LANE
CLARK LAKE, MI 49234

ZONED I
USE: INDUSTRIAL VACANT
12 - 13 - 300 - 012
LYONS FAMILY REAL ESTATE LLC
1934 O LANE
CLARK LAKE, MI 49234

ZONED I
USE: COMMERCIAL
12 - 13 - 300 - 016
C.S.M. PROPERTIES
5075 CARPENTER ROAD
YPSILANTI, MI 48197

ZONED I
USE: COMMERCIAL
12 - 13 - 300 - 010
LYONS FAMILY REAL ESTATE LLC
1934 O LANE
CLARK LAKE, MI 49234

HUNT CLUB
ZONED M-1
USE: RESIDENTIAL
12 - 13 - 400 - 024
HAMPTONS OF CLOVERLANE, LLC
5700 CROOKS RD, STE 400
TROY, MI 48068

HUNT CLUB II
ZONED R-1
USE: RESIDENTIAL
12 - 13 - 400 - 025
HAMPTONS OF CLOVERLANE
5700 CROOKS RD, STE 400
TROY, MI 48068

LEGEND
APPROXIMATE LIMITS OF "THE MEADOWS" PHASE 1 CONSTRUCTION

PHASE LINES

NOTES:

- SANITARY SEWER MANHOLES AT THE BOUNDARY OF A PHASE LINE MUST INCLUDE A STUB THE LENGTH OF ONE STICK OF PIPE.
- THE WOODLANDS OF ARBOR RIDGE (ARBOR RIDGE PHASE 2)**
PHASE 2 - 47 LOTS (EXISTING)
- ARBOR RIDGE CROSSING**
PHASE 1 - 29 LOTS
PHASE 2 - 38 LOTS
PHASE 3 - 73 LOTS
TOTAL - 140 LOTS
- THE MEADOWS OF ARBOR RIDGE**
PHASE 1 - 28 UNITS
PHASE 2 - 42 UNITS
TOTAL - 70 LOTS

ARBOR RIDGE CROSSING

THE MEADOWS OF ARBOR RIDGE

THE WOODLANDS AT ARBOR RIDGE CONDOMINIUMS (ARBOR RIDGE PHASE 2)

ARBOR RIDGE PHASE 1

DETENTION BASIN A



2 - 24 - 200 - 045

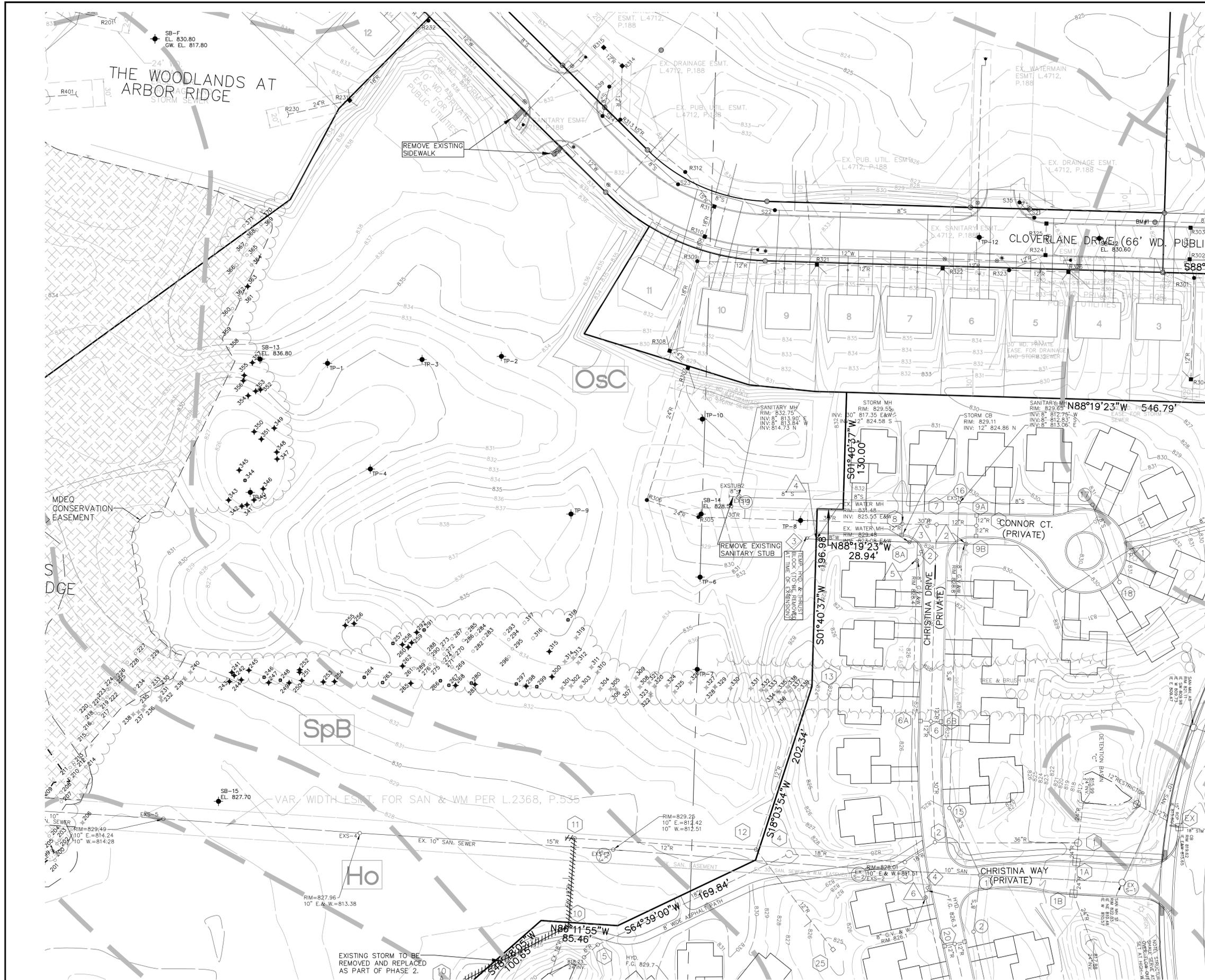
01

MORGAN ROAD (66' WIDE)

MORGAN ROAD (66' R.O.W.)

MICHIGAN AVE (100' WIDE)

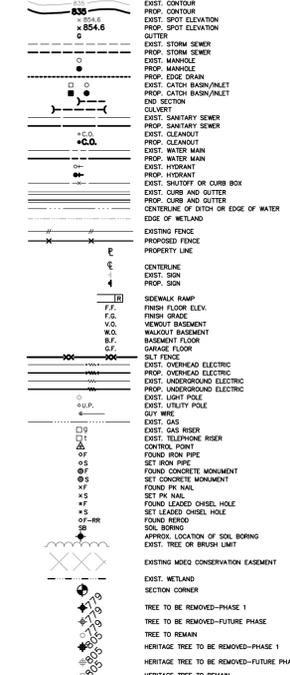
12 - 13 - 400 - 005
DETROIT EDISON CO
PO BOX 30017
DETROIT, MI 48232



BENCHMARK #1:
 ARROW ON HYDRANT AT NW CORNER
 OF HUNT CLUB & CLOVERLANE DRIVES
 ELEVATION: 820.75' (USGS) RECORD
 ELEVATION: 820.27' (NAVD 88)
 (TOPO & SPOT CHECK IS ON USGS DATUM)

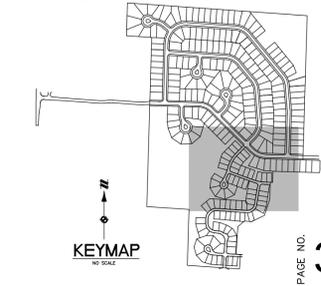
BENCHMARK #3:
 SPIKE IN NORTH FACE OF UTILITY
 POLE ON SOUTH SIDE OF MORGAN RD.
 ±700' WEST OF MICHIGAN AVENUE.
 ELEVATION: 831.24' (USGS) RECORD
 ELEVATION: 830.76' (NAVD 88)

LEGEND



EXISTING STORM SEWER STRUCTURE SCHEDULE									
NO.	TYPE	DIA	FRAME & COVER (E/W)	RIM	INV.	DIA	DIR		
1	MH	4'	1040 TYPE B COVER	824.80	815.98	36"	W		(OUT)
1A	CB	4'	7065 TYPE M1 GRATE	824.00	816.31	24"	SE		(OUT)
1B	CB	4'	7065 TYPE M1 GRATE	824.00	816.96	24"	SE		(OUT)
2	MH	4'	1040 TYPE B COVER	825.67	816.90	30"	N		(OUT)
3	MH	4'	1040 TYPE B COVER	826.60	816.16	18"	SW		(OUT)
4	MH	4'	1040 TYPE B COVER	830.50	816.40	18"	SE		(OUT)
5	MH	4'	OVERFLOW GRATE	824.00	816.82	6"	SW		(OUT)
6	MH	4'	1040 TYPE B COVER	824.78	817.02	30"	N		(OUT)
6A	INLET	2'	7065 TYPE M1 GRATE	824.51	819.00	12"	W		(OUT)
6B	INLET	2'	7065 TYPE M1 GRATE	824.51	819.00	12"	W		(OUT)
7	MH	4'	1040 TYPE B COVER	829.11	817.22	30"	W		(OUT)
8	MH	4'	1040 TYPE B COVER	829.54	817.26	30"	W		(OUT)
9	MH	4'	1040 TYPE B COVER	828.82	824.38	12"	N		(OUT)
9A	INLET	2'	7065 TYPE M1 GRATE	828.55	824.50	12"	W		(OUT)
9B	INLET	2'	7065 TYPE M1 GRATE	828.55	824.00	12"	N		(OUT)
ST-A	STUB END			831.12	817.32	30"	E		(OUT)
ST-B	STUB END			828.00	822.00	15"	E		(OUT)
ES1	CONCRETE END SECTION			827.92	815.92	24"	W		(OUT)
ES2	CONCRETE END SECTION			820.00	818.00	24"	W		(OUT)
OUT-A	4" OUTLET STRUCTURE			822.12	817.00	6"	NE		(OUT)
OUT-B	4" OUTLET STRUCTURE			821.89	815.73	12"	E		(OUT)

EXISTING STORM SEWER STRUCTURE SCHEDULE TAKEN FROM SHEET 2 OF SIEBER, KEAST & ASSOCIATES, INC. PLANS FROM JANUARY 1995, REVISION 8 DATED 8-9-95



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 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 TOPOGRAPHIC SURVEY &
 DEMOLITION PLAN

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS:
 12/12/14 PER TWP CONSULTANTS
 04/01/15 PER TWP CONSULTANTS
 05/20/15 PER TWP CONSULTANTS

SCALE: 1" = 50 FEET

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 CHECKED BY: GMS
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 JOB #: 12001809
 FILE CODE:
 SHEET NO. 7

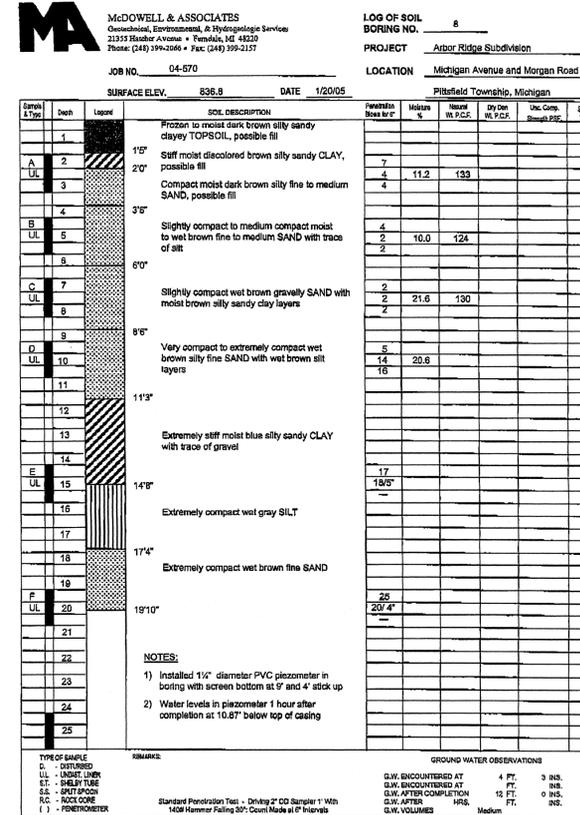
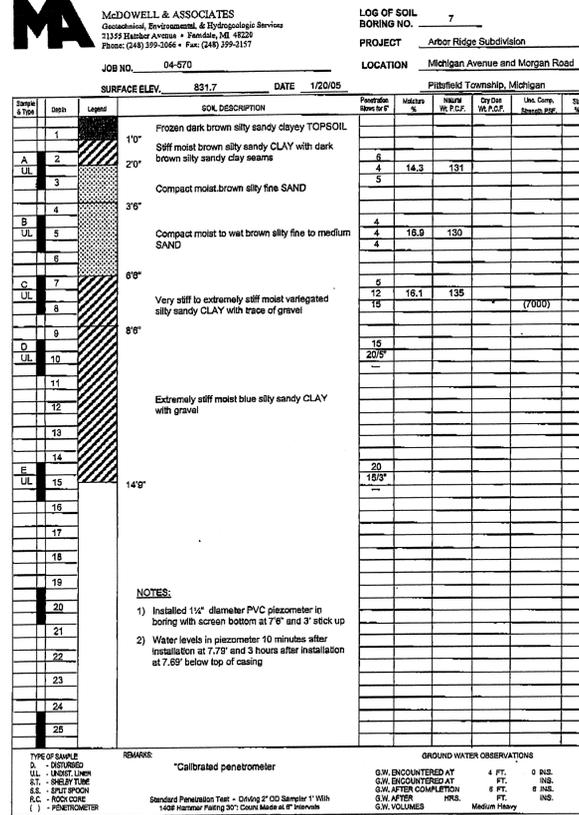
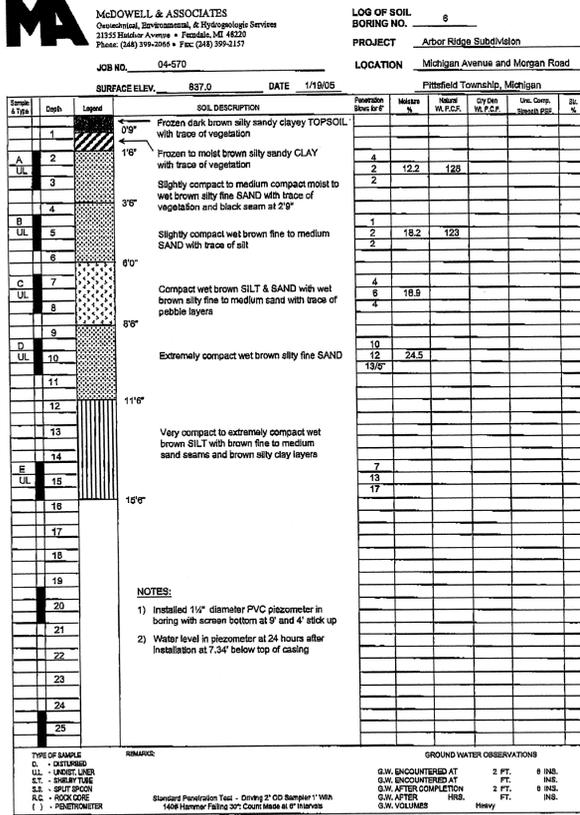
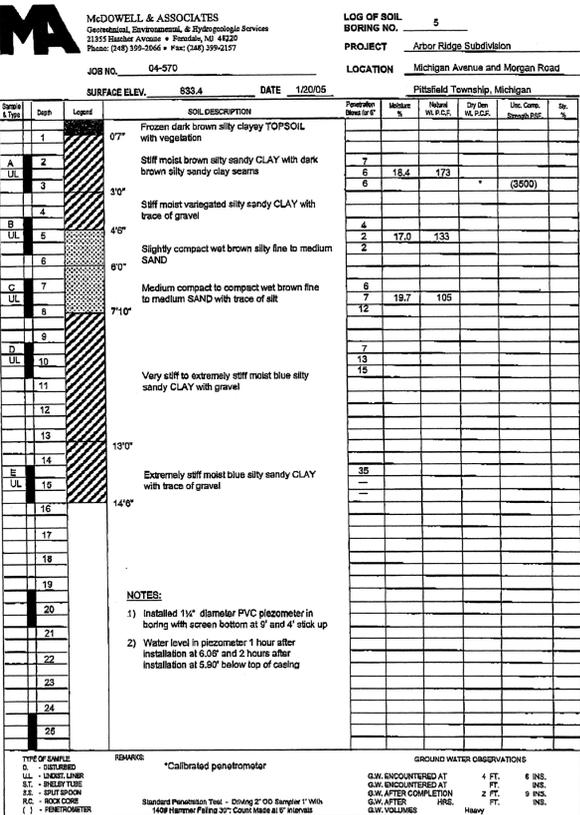
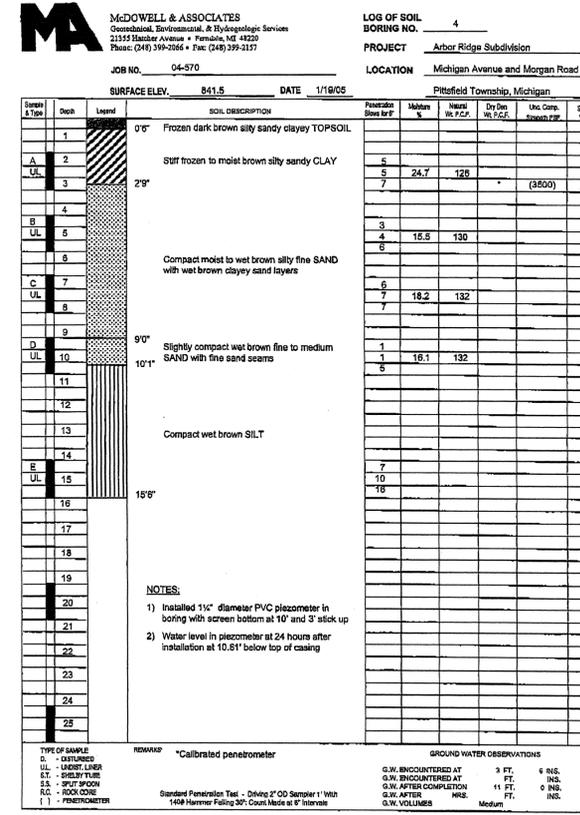
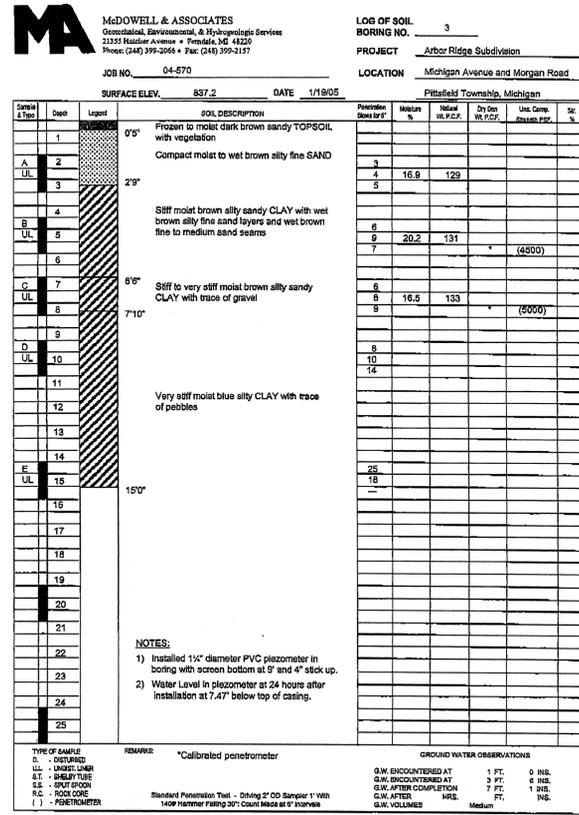
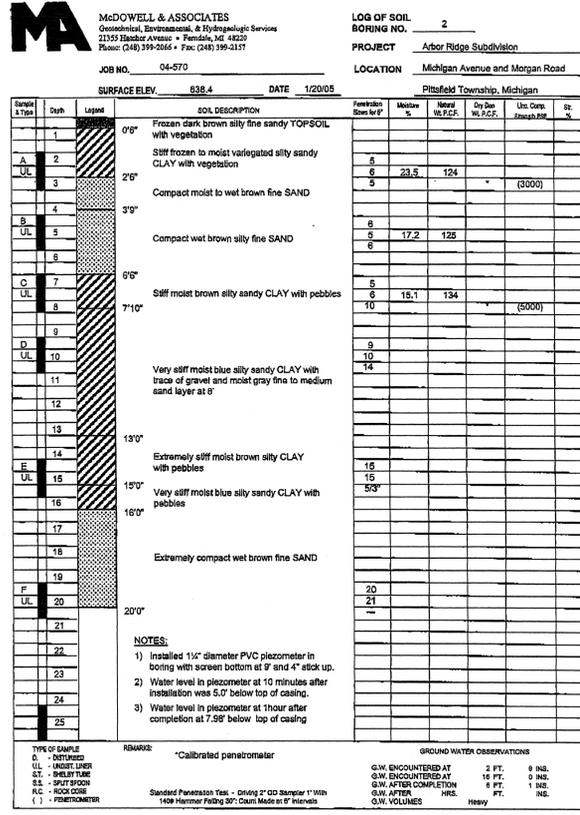
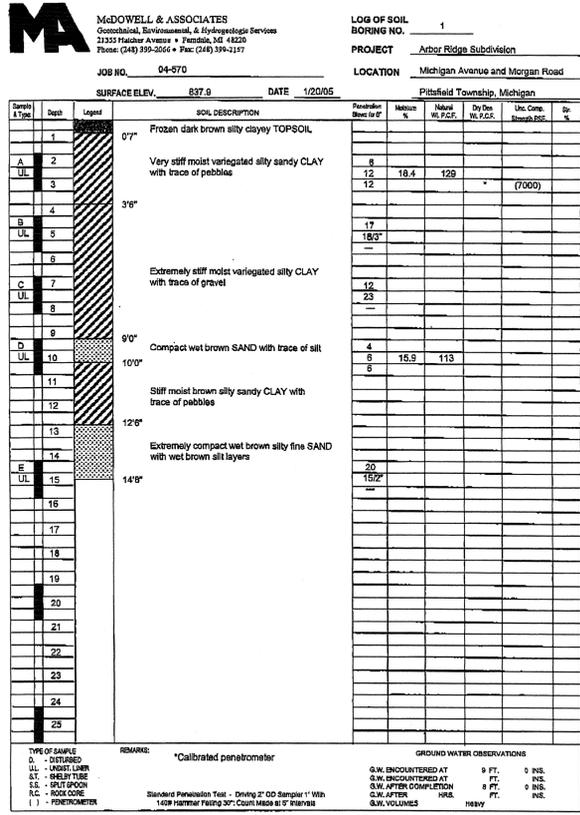
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NOTE
 ALL ELEVATIONS SHOWN ARE IN THE NGVD29 DATUM.
 SUBTRACT 0.40 FEET TO CONVERT TO NAVD 88 DATUM.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE: CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

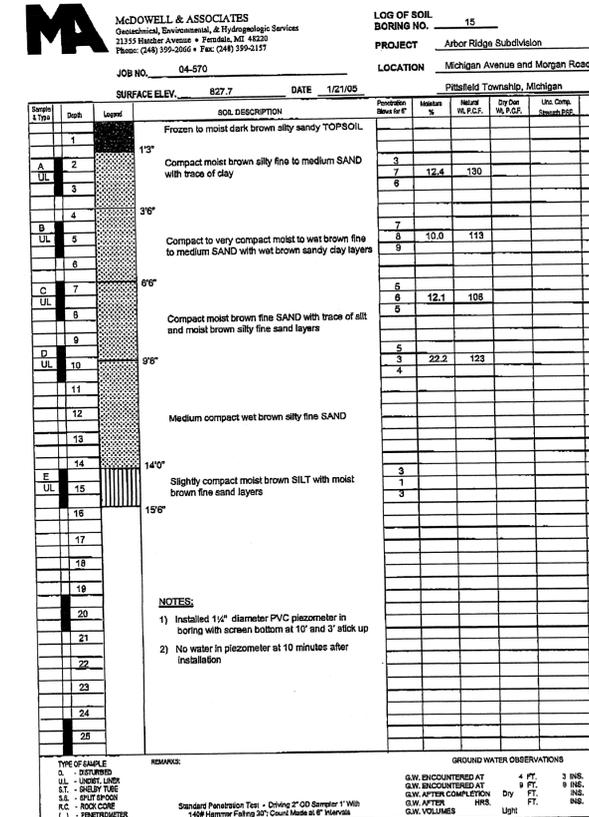
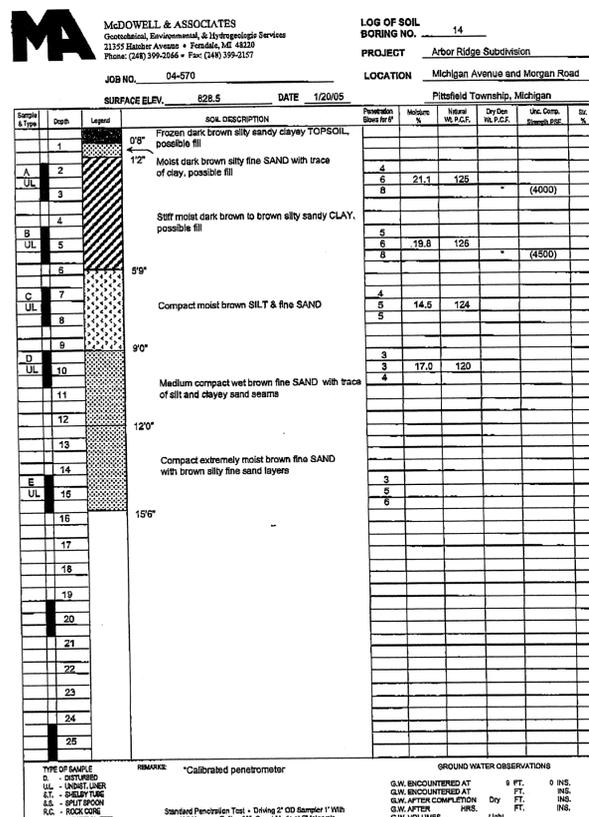
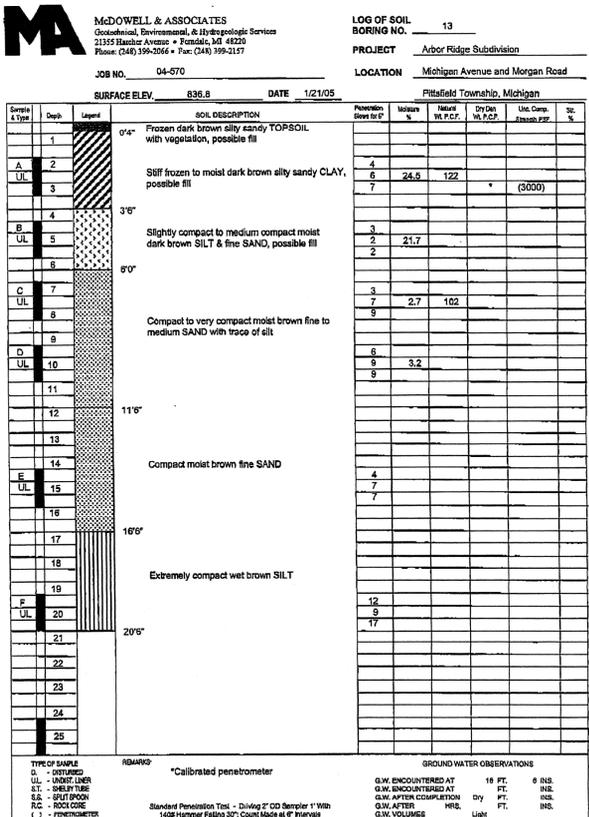
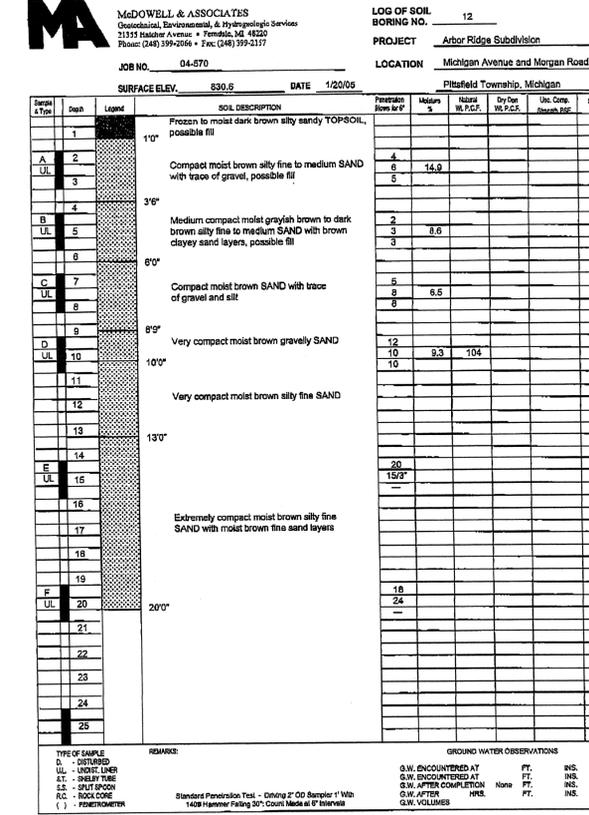
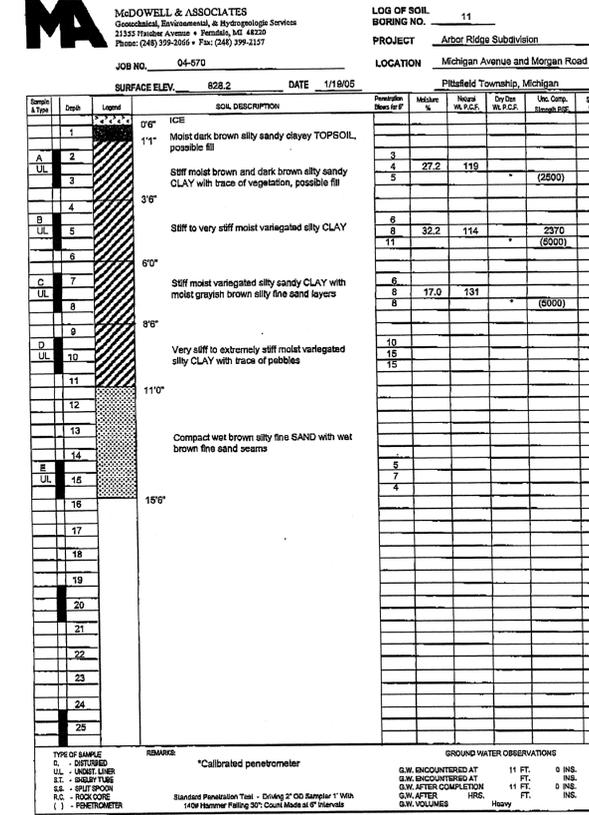
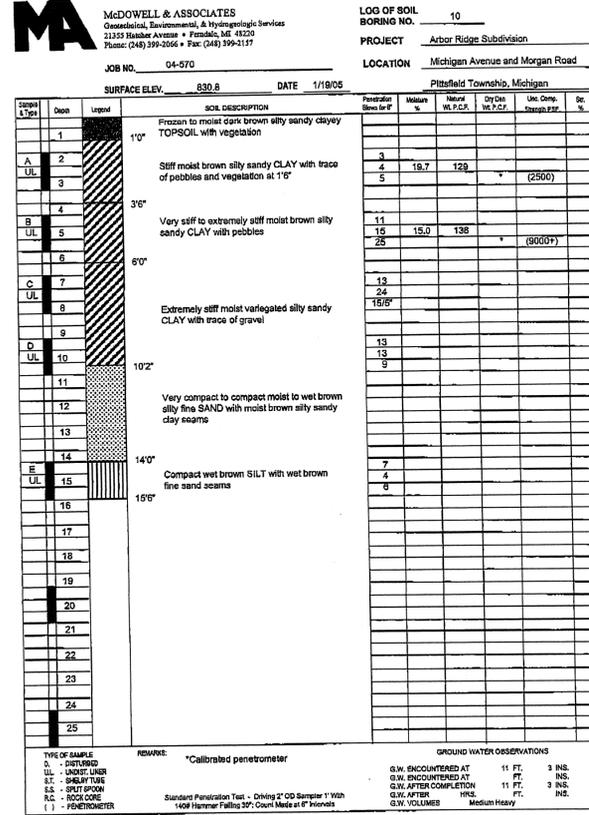
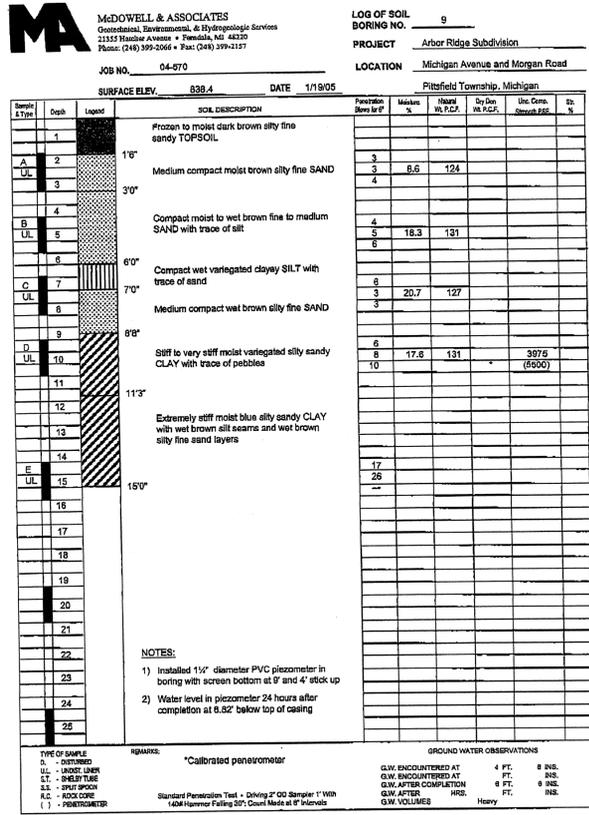
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SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
SOIL BORING INFORMATION

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS:
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

SCALE: NO SCALE
DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819SF2-02A-TP
JOB #: 12001809
FILE CODE:
SHEET NO. 10A



MA McDOWELL & ASSOCIATES
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Phone: (248) 399-2066 • Fax: (248) 399-2127

LOG OF SOIL BORING NO. A
PROJECT: Soils Exploration
Proposed Retention/Detention Ponds
Arbor Ridge Subdivision
LOCATION: Michigan Road and Michigan Avenue
Pittsfield Township, Michigan

JOB NO. 04-495 DATE 11-4-04

SURFACE ELEV. 830.5

Sample #	Depth	Legend	SOIL DESCRIPTION	Penetration Blows by F'	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	U.C. Comp. Strength P.S.F.	Sr
1	07"		Moist dark brown clayey sandy TOPSOIL with vegetation						
2	14"		Compact moist brown clayey fine to medium SAND						
3	21"		Very stiff moist brown sandy CLAY with pebbles						
4	28"		Extremely compact moist brown clayey fine to medium SAND with gravel						
5	35"		Extremely stiff moist brown sandy CLAY with pebbles						
6	42"		Extremely stiff moist brown sandy CLAY with pebbles						
7	49"		Extremely stiff moist brown sandy CLAY with pebbles						
8	56"		Extremely stiff moist brown sandy CLAY with pebbles						
9	63"		Extremely stiff moist brown sandy CLAY with pebbles						
10	70"		Extremely stiff moist brown sandy CLAY with pebbles						
11	77"		Extremely stiff moist brown sandy CLAY with pebbles						
12	84"		Extremely stiff moist brown sandy CLAY with pebbles						
13	91"		Extremely stiff moist brown sandy CLAY with pebbles						
14	98"		Extremely stiff moist brown sandy CLAY with pebbles						
15	105"		Extremely stiff moist brown sandy CLAY with pebbles						
16	112"		Extremely stiff moist brown sandy CLAY with pebbles						
17	119"		Extremely stiff moist brown sandy CLAY with pebbles						
18	126"		Extremely stiff moist brown sandy CLAY with pebbles						
19	133"		Extremely stiff moist brown sandy CLAY with pebbles						
20	140"		Extremely stiff moist brown sandy CLAY with pebbles						
21	147"		Extremely stiff moist brown sandy CLAY with pebbles						
22	154"		Extremely stiff moist brown sandy CLAY with pebbles						
23	161"		Extremely stiff moist brown sandy CLAY with pebbles						
24	168"		Extremely stiff moist brown sandy CLAY with pebbles						
25	175"		Extremely stiff moist brown sandy CLAY with pebbles						

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30". Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT 9 FT. 6 INS. G.W. ENCOUNTERED AT 9 FT. 6 INS. G.W. AFTER COMPLETION Dry FT. INS. G.W. AFTER 13 FT. 5 INS. G.W. VOLUMES Light

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LOG OF SOIL BORING NO. B
PROJECT: Soils Exploration
Proposed Retention/Detention Ponds
Arbor Ridge Subdivision
LOCATION: Michigan Road and Michigan Avenue
Pittsfield Township, Michigan

JOB NO. 04-495 DATE 11-4-04

SURFACE ELEV. 834.4

Sample #	Depth	Legend	SOIL DESCRIPTION	Penetration Blows by F'	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	U.C. Comp. Strength P.S.F.	Sr
1	07"		Moist dark brown clayey sandy TOPSOIL with roots						
2	14"		Compact to very compact moist brown clayey fine to medium SAND with occasional clay seams						
3	21"		Very stiff moist brown sandy CLAY						
4	28"		Very stiff moist brown sandy CLAY						
5	35"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
6	42"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
7	49"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
8	56"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
9	63"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
10	70"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
11	77"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
12	84"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
13	91"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
14	98"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
15	105"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
16	112"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
17	119"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
18	126"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
19	133"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
20	140"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
21	147"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
22	154"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
23	161"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
24	168"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						
25	175"		Extremely stiff moist brown sandy CLAY with trace of pebbles and occasional sand lenses						

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30". Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT 17 FT. 0 INS. G.W. ENCOUNTERED AT 22 FT. 6 INS. G.W. AFTER COMPLETION 23 FT. 6 INS. G.W. AFTER 13 FT. 5 INS. G.W. VOLUMES Light Cave-in at 23'3"

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LOG OF SOIL BORING NO. F
PROJECT: Soils Exploration
Proposed Retention/Detention Ponds
Arbor Ridge Subdivision
LOCATION: Michigan Road and Michigan Avenue
Pittsfield Township, Michigan

JOB NO. 04-495 DATE 11-4-04

SURFACE ELEV. 830.8

Sample #	Depth	Legend	SOIL DESCRIPTION	Penetration Blows by F'	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	U.C. Comp. Strength P.S.F.	Sr
1	07"		Moist brown clayey fine to medium SAND						
2	14"		Stiff moist brown sandy CLAY with pebbles						
3	21"		Stiff moist brown sandy CLAY with pebbles						
4	28"		Stiff moist brown sandy CLAY with pebbles						
5	35"		Stiff moist brown sandy CLAY with pebbles						
6	42"		Stiff moist brown sandy CLAY with pebbles						
7	49"		Stiff moist brown sandy CLAY with pebbles						
8	56"		Stiff moist brown sandy CLAY with pebbles						
9	63"		Stiff moist brown sandy CLAY with pebbles						
10	70"		Stiff moist brown sandy CLAY with pebbles						
11	77"		Stiff moist brown sandy CLAY with pebbles						
12	84"		Stiff moist brown sandy CLAY with pebbles						
13	91"		Stiff moist brown sandy CLAY with pebbles						
14	98"		Stiff moist brown sandy CLAY with pebbles						
15	105"		Stiff moist brown sandy CLAY with pebbles						
16	112"		Stiff moist brown sandy CLAY with pebbles						
17	119"		Stiff moist brown sandy CLAY with pebbles						
18	126"		Stiff moist brown sandy CLAY with pebbles						
19	133"		Stiff moist brown sandy CLAY with pebbles						
20	140"		Stiff moist brown sandy CLAY with pebbles						
21	147"		Stiff moist brown sandy CLAY with pebbles						
22	154"		Stiff moist brown sandy CLAY with pebbles						
23	161"		Stiff moist brown sandy CLAY with pebbles						
24	168"		Stiff moist brown sandy CLAY with pebbles						
25	175"		Stiff moist brown sandy CLAY with pebbles						

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30". Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT 13 FT. 0 INS. G.W. ENCOUNTERED AT 13 FT. 5 INS. G.W. AFTER COMPLETION 13 FT. 5 INS. G.W. AFTER 13 FT. 5 INS. G.W. VOLUMES Heavy Cave-in at 13'3"

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LOG OF TEST PIT NO. TP-1
PROJECT: Soils Investigation
Michigan Avenue and Morgan Road
LOCATION: Michigan Avenue and Morgan Road
Pittsfield Township, Michigan

JOB NO. 04-570 DATE 2-11-05

SURFACE ELEV. 830.5

Sample #	Depth	Legend	SOIL DESCRIPTION	Penetration Blows by F'	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	U.C. Comp. Strength P.S.F.	Sr
1	10"		FROST						
2	19"		Moist brown silty CLAY with slight discoloration and vegetation, fill						
3	28"		Moist brown silty CLAY with trace of pebbles						
4	37"		Moist brown silty CLAY with trace of pebbles						
5	46"		Moist brown silty CLAY with trace of pebbles						
6	55"		Moist brown silty CLAY with trace of pebbles						
7	64"		Moist brown silty CLAY with trace of pebbles						
8	73"		Moist brown silty CLAY with trace of pebbles						
9	82"		Moist brown silty CLAY with trace of pebbles						
10	91"		Moist brown silty CLAY with trace of pebbles						
11	100"		Moist brown silty CLAY with trace of pebbles						
12	109"		Moist brown silty CLAY with trace of pebbles						
13	118"		Moist brown silty CLAY with trace of pebbles						
14	127"		Moist brown silty CLAY with trace of pebbles						
15	136"		Moist brown silty CLAY with trace of pebbles						
16	145"		Moist brown silty CLAY with trace of pebbles						
17	154"		Moist brown silty CLAY with trace of pebbles						
18	163"		Moist brown silty CLAY with trace of pebbles						
19	172"		Moist brown silty CLAY with trace of pebbles						
20	181"		Moist brown silty CLAY with trace of pebbles						
21	190"		Moist brown silty CLAY with trace of pebbles						
22	199"		Moist brown silty CLAY with trace of pebbles						
23	208"		Moist brown silty CLAY with trace of pebbles						
24	217"		Moist brown silty CLAY with trace of pebbles						
25	226"		Moist brown silty CLAY with trace of pebbles						

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30". Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT 9 FT. 6 INS. G.W. ENCOUNTERED AT 9 FT. 6 INS. G.W. AFTER COMPLETION Dry FT. INS. G.W. AFTER 13 FT. 5 INS. G.W. VOLUMES none

Note: Test pit excavated just outside of tree line.

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LOG OF TEST PIT NO. TP-2
PROJECT: Soils Investigation
Michigan Avenue and Morgan Road
LOCATION: Michigan Avenue and Morgan Road
Pittsfield Township, Michigan

JOB NO. 04-570 DATE 2-11-05

SURFACE ELEV. 834.4

Sample #	Depth	Legend	SOIL DESCRIPTION	Penetration Blows by F'	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	U.C. Comp. Strength P.S.F.	Sr
1	07"		FROST						
2	14"		Moist brown silty CLAY with trace of pebbles						
3	21"		Moist brown silty CLAY with trace of pebbles						
4	28"		Moist brown silty CLAY with trace of pebbles						
5	35"		Moist brown silty CLAY with trace of pebbles						
6	42"		Moist brown silty CLAY with trace of pebbles						
7	49"		Moist brown silty CLAY with trace of pebbles						
8	56"		Moist brown silty CLAY with trace of pebbles						
9	63"		Moist brown silty CLAY with trace of pebbles						
10	70"		Moist brown silty CLAY with trace of pebbles						
11	77"		Moist brown silty CLAY with trace of pebbles						
12	84"		Moist brown silty CLAY with trace of pebbles						
13	91"		Moist brown silty CLAY with trace of pebbles						
14	98"		Moist brown silty CLAY with trace of pebbles						
15	105"		Moist brown silty CLAY with trace of pebbles						
16	112"		Moist brown silty CLAY with trace of pebbles						
17	119"		Moist brown silty CLAY with trace of pebbles						
18	126"		Moist brown silty CLAY with trace of pebbles						
19	133"		Moist brown silty CLAY with trace of pebbles						
20	140"		Moist brown silty CLAY with trace of pebbles						
21	147"		Moist brown silty CLAY with trace of pebbles						
22	154"		Moist brown silty CLAY with trace of pebbles						
23	161"		Moist brown silty CLAY with trace of pebbles						
24	168"		Moist brown silty CLAY with trace of pebbles						
25	175"		Moist brown silty CLAY with trace of pebbles						

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30". Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT 17 FT. 0 INS. G.W. ENCOUNTERED AT 22 FT. 6 INS. G.W. AFTER COMPLETION 23 FT. 6 INS. G.W. AFTER 13 FT. 5 INS. G.W. VOLUMES none

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LOG OF TEST PIT NO. TP-3
PROJECT: Soils Investigation
Michigan Avenue and Morgan Road
LOCATION: Michigan Avenue and Morgan Road
Pittsfield Township, Michigan

JOB NO. 04-570 DATE 2-11-05

SURFACE ELEV. 830.8

Sample #	Depth	Legend	SOIL DESCRIPTION	Penetration Blows by F'	Moisture %	Natural Wt. P.C.F.	Dry Den. Wt. P.C.F.	U.C. Comp. Strength P.S.F.	Sr
1	07"		FROST						
2	14"		Moist brown silty CLAY with slight discoloration, fill						
3	21"		Moist brown silty CLAY with slight discoloration, fill						
4	28"		Moist brown silty CLAY with slight discoloration, fill						
5	35"		Moist brown silty CLAY with slight discoloration, fill						
6	42"		Moist brown silty CLAY with slight discoloration, fill						
7	49"		Moist brown silty CLAY with slight discoloration, fill						
8	56"		Moist brown silty CLAY with slight discoloration, fill						
9	63"		Moist brown silty CLAY with slight discoloration, fill						
10	70"		Moist brown silty CLAY with slight discoloration, fill						
11	77"		Moist brown silty CLAY with slight discoloration, fill						
12	84"		Moist brown silty CLAY with slight discoloration, fill						
13	91"		Moist brown silty CLAY with slight discoloration, fill						
14	98"		Moist brown silty CLAY with slight discoloration, fill						
15	105"		Moist brown silty CLAY with slight discoloration, fill						
16	112"		Moist brown silty CLAY with slight discoloration, fill						
17	119"		Moist brown silty CLAY with slight discoloration, fill						
18	126"		Moist brown silty CLAY with slight discoloration, fill						
19	133"		Moist brown silty CLAY with slight discoloration, fill						
20	140"		Moist brown silty CLAY with slight discoloration, fill						
21	147"		Moist brown silty CLAY with slight discoloration, fill						
22	154"		Moist brown silty CLAY with slight discoloration, fill						
23	161"		Moist brown silty CLAY with slight discoloration, fill</						

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LOG OF TEST PIT NO. TP-5
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	0'		FROST						
2	1'9"		Moist brown silty CLAY						
3	2'5"								
4			Moist brown fine SAND						
5									
6	6'0"								
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT FT. INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES none HRS. FT. INS.

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LOG OF TEST PIT NO. TP-6
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	0'10"		FROST						
2			Moist brown silty CLAY with oxidized streaks, fill						
3									
4	3'0"		Moist black silty TOPSOIL						
5	3'2"								
6			Moist brown silty CLAY						
7	5'7"		Moist brown silty fine SAND						
8	7'0"								
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT FT. INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES none HRS. FT. INS.

Note: At Soil Boring 14.

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LOG OF TEST PIT NO. TP-7
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	0'4"		FROST						
2									
3									
4			Moist brown silty fine SAND with oxidized streaks						
5									
6									
7									
8	7'0"								
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT FT. INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES none HRS. FT. INS.

Note: South of Soil Boring 14.

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LOG OF TEST PIT NO. TP-8
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	0'0"		FROST						
2			Moist dark brown silty CLAY, fill						
3									
4	3'0"								
5			Moist brown sandy silty CLAY with trace of pebbles						
6									
7									
8	8'0"								
9									
10									
11									
12									
13									
14									
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TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT FT. INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES none HRS. FT. INS.

Note: East of Soil Boring 14.

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LOG OF TEST PIT NO. TP-9
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	0'10"		FROST						
2			Moist brown silty fine SAND						
3	2'5"								
4			Moist brown silty CLAY						
5									
6	6'0"								
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT FT. INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES none HRS. FT. INS.

Note: Test Pit 9 west of Soil Boring 14.

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LOG OF TEST PIT NO. TP-10
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	0'10"		FROST						
2									
3			Moist brown silty CLAY with occasional pebbles						
4									
5	5'0"								
6									
7									
8									
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT FT. INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES none HRS. FT. INS.

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LOG OF TEST PIT NO. TP-11
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth	Legend	SOIL DESCRIPTION	Penetration Blow(s) ft	Moisture %	Natural W.P.C.F.	Dry Den W.P.C.F.	U.C. Comp. Strength P.S.F.	Sr %
1	1'0"		FROST						
2									
3			Moist brown silty CLAY with sandy seams and layers						
4									
5	4'0"								
6			Moist to wet brown silty fine SAND						
7									
8	7'0"								
9									
10									
11									
12									
13									
14									
15									
16									
17									
18									
19									
20									
21									
22									
23									
24									
25									

TYPE OF SAMPLE: 0 - DISTURBED, 1 - UNDISTURBED, U.L. - UNDESIRED LAYER, S.T. - SHALLOW TUBE, S.S. - SPLIT SPOON, R.C. - ROCK CORE, () - PERCUTANET

REMARKS: Standard Penetration Test - Driving 2" OD Sampler 1" With 140# Hammer Falling 30" Count Made at 6" Intervals

GROUND WATER OBSERVATIONS: G.W. ENCOUNTERED AT 7 FT. 0 INS., G.W. ENCOUNTERED AT FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. AFTER COMPLETION FT. INS., G.W. VOLUMES medium HRS. FT. INS.

Note: Water Level = 11.08' from top of casing. Stick Up = 3"11"

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LOG OF TEST PIT NO. TP-12
PROJECT Soils Investigation
JOB NO. 04-570 LOCATION Michigan Avenue and Morgan Road
Pittsfield Township, Michigan
DATE 2-11-05

Sample #/Type	Depth
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TREE SCHEDULE

LEGEND

1234 WOODLAND TREES TO BE REMOVED

1234 INVASIVE SPECIES

REMOVE TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE
Y 1	10'	BOX ELDER	ACER NEGUNDO	FAIR		Y 119	8"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 237	8"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 355	8"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 685	21"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 2	9"	BOX ELDER	ACER NEGUNDO	FAIR		Y 120	8' & 14"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 238	9"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 356	8"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 686	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 3	8"	BOX ELDER	ACER NEGUNDO	FAIR		Y 121	13"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 239	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 357	10"	AMERICAN CRABAPPLE	PRUNUS CORONARIS	POOR		Y 687	9"	SUGAR MAPLE	ACER SACCHARINUM	GOOD	
Y 4	8"	BOX ELDER	ACER NEGUNDO	GOOD		Y 122	14"	BLACK WILLOW	JUGLANS NIGRA	POOR		Y 240	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 358	8"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 688	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 5	8' & 9"	BOX ELDER	ACER NEGUNDO	FAIR		Y 123	13"	BLACK WILLOW	JUGLANS NIGRA	VERY POOR		Y 241	10"	CHINESE ELM	ULMUS PUMILA	POOR		Y 359	15"	RED OAK	QUERCUS RUBRA	GOOD		Y 689	9"	CHINESE ELM	ULMUS PUMILA	GOOD	
Y 6	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 124	11"	BLACK WILLOW	JUGLANS NIGRA	VERY POOR		Y 242	14"	CHINESE ELM	ULMUS PUMILA	POOR		Y 360	8' & 9"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 690	9"	CHINESE ELM	ULMUS PUMILA	GOOD	
Y 7	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 125	15"	BLACK WILLOW	JUGLANS NIGRA	VERY POOR		Y 243	14"	CHINESE ELM	ULMUS PUMILA	POOR		Y 361	8"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 691	9"	CHINESE ELM	ULMUS PUMILA	GOOD	
Y 8	12"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 126	12"	BLACK WILLOW	JUGLANS NIGRA	VERY POOR		Y 244	15"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 362	9"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 692	9"	CHINESE ELM	ULMUS PUMILA	GOOD	
Y 9	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 127	10' & 14"	BLACK WILLOW	JUGLANS NIGRA	VERY POOR		Y 245	9"	CHINESE ELM	ULMUS PUMILA	POOR		Y 363	12"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 693	29"	RED OAK	QUERCUS RUBRA	GOOD	Y
Y 10	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 128	14"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 246	16' & 17"	RED OAK	QUERCUS RUBRA	FAIR	Y	Y 364	11"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 694	24"	RED OAK	QUERCUS RUBRA	GOOD	Y
Y 11	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 129	14"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 247	8' & 15"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y 365	11"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 695	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 12	42"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 130	9"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 248	16"	RED OAK	QUERCUS RUBRA	GOOD		Y 366	25"	RED MAPLE	QUERCUS RUBRA	FAIR	Y	Y 696	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 13	8"	BOX ELDER	ACER NEGUNDO	VERY POOR		Y 131	26"	SWAMP OAK	QUERCUS BICOLOR	FAIR	Y	Y 249	8"	SWAMP OAK	QUERCUS BICOLOR	FAIR	Y	Y 367	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 697	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 14	18"	WHITE ASH	FRAXINUS AMERICANA	DEAD DISEASED		Y 132	30"	SWAMP OAK	QUERCUS BICOLOR	FAIR	Y	Y 250	16"	BOX ELDER	ACER NEGUNDO	POOR		Y 368	12"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 698	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 15	8"	WHITE ASH	FRAXINUS AMERICANA	DEAD DISEASED		Y 133	32' & 18"	SWAMP OAK	QUERCUS BICOLOR	FAIR	Y	Y 251	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 369	9"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 699	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 16	9"	WHITE ASH	FRAXINUS AMERICANA	DEAD DISEASED		Y 134	8"	BLACK CHERRY	PRUNUS SEROTINA	FAIR	Y	Y 252	11"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 370	8"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 700	13' & 16"	RED OAK	QUERCUS RUBRA	GOOD	Y
Y 17	8"	BOX ELDER	ACER NEGUNDO	VERY POOR		Y 135	8"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 253	22' & 14"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 371	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 701	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 18	10"	BOX ELDER	ACER NEGUNDO	VERY POOR		Y 136	8"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 254	9"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 372	10"	RED OAK	QUERCUS RUBRA	GOOD		Y 702	13"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 19	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 137	8"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 255	12"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 373	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 703	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 20	10"	BLACK CHERRY	PRUNUS SEROTINA	GOOD		Y 138	9"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 256	9"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 374	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 704	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 21	12"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 139	12"	SILVER MAPLE	ACER SACCHARINUM	POOR		Y 257	29"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 375	29"	RED OAK	QUERCUS RUBRA	GOOD		Y 705	10"	CHINESE ELM	ULMUS PUMILA	GOOD	
Y 22	33' & 33"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 140	25"	SWAMP OAK	QUERCUS BICOLOR	FAIR	Y	Y 258	14"	RED OAK	QUERCUS RUBRA	GOOD		Y 376	10"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 706	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 23	9"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 141	15' & 33"	SWAMP OAK	QUERCUS BICOLOR	FAIR	Y	Y 259	15"	RED OAK	QUERCUS RUBRA	GOOD		Y 377	8"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 707	13"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 24	8"	RED OAK	QUERCUS RUBRA	POOR		Y 142	13"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y 260	14"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y 378	9"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 708	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 25	20' & 22"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 143	9"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 261	13"	RED OAK	QUERCUS RUBRA	GOOD		Y 379	10"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 709	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 26	8"	CHINESE ELM	ULMUS PUMILA	VERY POOR		Y 144	12"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 262	20"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 380	11"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 710	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 27	14"	BOX ELDER	ACER NEGUNDO	DEAD DISEASED		Y 145	19"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 263	20"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y 381	8"	BOX ELDER	ACER NEGUNDO	VERY POOR		Y 711	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 28	27"	PRAIRIE HAWTHORN	CRATAEGUS CRUSGALLI	FAIR	Y	Y 146	8"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 264	36', 24' & 22"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y 382	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 712	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 29	15"	BLACK CHERRY	PRUNUS SEROTINA	GOOD		Y 147	14"	RED OAK	QUERCUS RUBRA	FAIR		Y 265	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y 383	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 713	23"	RED OAK	QUERCUS RUBRA	VERY POOR	Y
Y 30	8' & 13"	BOX ELDER	ACER NEGUNDO	VERY POOR		Y 148	14"	RED OAK	QUERCUS RUBRA	FAIR		Y 266	10"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 384	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 714	38"	RED OAK	QUERCUS RUBRA	VERY POOR	Y
Y 31	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 149	11"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 267	19"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 385	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 715	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 32	8"	BLACK LOCUST	ROBINA PSEUDOACACIA	FAIR		Y 150	40"	WHITE ASH	FRAXINUS AMERICANA	DEAD DISEASED		Y 268	13"	RED OAK	QUERCUS RUBRA	GOOD		Y 386	10"	RED OAK	QUERCUS RUBRA	GOOD		Y 716	15' & 24"	RED OAK	QUERCUS RUBRA	VERY POOR	Y
Y 33	8"	BLACK LOCUST	ROBINA PSEUDOACACIA	FAIR		Y 151	9"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 269	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 387	11"	RED OAK	QUERCUS RUBRA	GOOD		Y 717	18"	RED OAK	QUERCUS RUBRA	GOOD	
Y 34	9"	BOX ELDER	ACER NEGUNDO	POOR		Y 152	12"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 270	13"	RED OAK	QUERCUS RUBRA	GOOD		Y 388	9"	RED OAK	QUERCUS RUBRA	GOOD		Y 718	15', 16' & 26"	RED OAK	QUERCUS RUBRA	GOOD	
Y 35	10"	BOX ELDER	ACER NEGUNDO	POOR		Y 153	9"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 271	11"	RED OAK	QUERCUS RUBRA	GOOD		Y 389	10"	RED OAK	QUERCUS RUBRA	GOOD		Y 719	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 36	10"	BLACK CHERRY	PRUNUS SEROTINA	GOOD		Y 154	11"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 272	11"	RED OAK	QUERCUS RUBRA	GOOD		Y 390	11"	RED OAK	QUERCUS RUBRA	GOOD		Y 720	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 37	12' & 12"	BOX ELDER	ACER NEGUNDO	POOR		Y 155	10"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 273	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 391	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 721	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 38	13"	BOX ELDER	ACER NEGUNDO	POOR		Y 156	12"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 274	12"	RED OAK	QUERCUS RUBRA	GOOD		Y 392	8"	RED OAK	QUERCUS RUBRA	GOOD		Y 722	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 39	12"	BOX ELDER	ACER NEGUNDO	POOR		Y 157	12"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 275	13"	RED OAK	QUERCUS RUBRA	GOOD		Y 393	8"	CHINESE ELM	ULMUS PUMILA	POOR		Y 723	23"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y
Y 40	11"	CHINESE ELM	ULMUS PUMILA	VERY POOR		Y 158	35"	SWAMP OAK	QUERCUS BICOLOR	GOOD	Y	Y 276	13"	RED OAK	QUERCUS RUBRA	GOOD		Y 394	13"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y 724	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 41	8"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 159	12"	SWAMP OAK	QUERCUS BICOLOR	GOOD	Y	Y 277	8"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 395	13"	RED OAK	QUERCUS RUBRA	GOOD		Y 725	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 42	11"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 160	10"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 278	8' & 11"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 396	9"	RED OAK	QUERCUS RUBRA	GOOD		Y 726	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 43	11"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR		Y 161	10"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 279	11"	BLACK LOCUST	ROBINA PSEUDOACACIA	GOOD		Y 397	12' & 13"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 727	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 44	14"	BOX ELDER	ACER NEGUNDO	VERY POOR		Y 162	9"	SILVER MAPLE	ACER SACCHARINUM	GOOD		Y 280	26"	BLACK CHERRY	PRUNUS SEROTINA	FAIR	Y	Y 398	36"	WHITE OAK	QUERCUS ALBA	FAIR	Y	Y 728	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 45	13"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y 163	18"	BLACK CHERRY	PRUNUS SEROTINA	FAIR	Y	Y 281	13"	BLACK CHERRY	PRUNUS SEROTINA	FAIR	Y	Y 399	10"	WHITE ASH	FRAXINUS AMERICANA	DEAD DISEASED		Y 729	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
Y 46	11"	BLACK LOCUST	ROBINA PSEUDOACACIA	FAIR		Y 164	10"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 282	15"	RED OAK	QUERCUS RUBRA	GOOD		Y 400	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 730	30"	WHITE OAK	QUERCUS ALBA	GOOD	Y
Y 47	13"	BLACK LOCUST	ROBINA PSEUDOACACIA	FAIR		Y 165	10"	SILVER MAPLE	ACER SACCHARINUM	FAIR		Y 283	23"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 401	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y 731	12"	CHINESE ELM	ULMUS PUMILA	GOOD	
Y 48	12"	CHINESE ELM	ULMUS PUMILA	FAIR		Y 166	8"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y 284	24"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 402	16"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 732	12"	RED OAK	QUERCUS RUBRA	GOOD	
Y 49	8' & 17"	BLACK LOCUST	ROBINA PSEUDOACACIA	POOR		Y 167	8"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y 285	19"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y 403	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y 733	29"	RED OAK	QUERCUS RUBRA	GOOD	
Y 50	14' & 17"	BLACK LOCUST																											

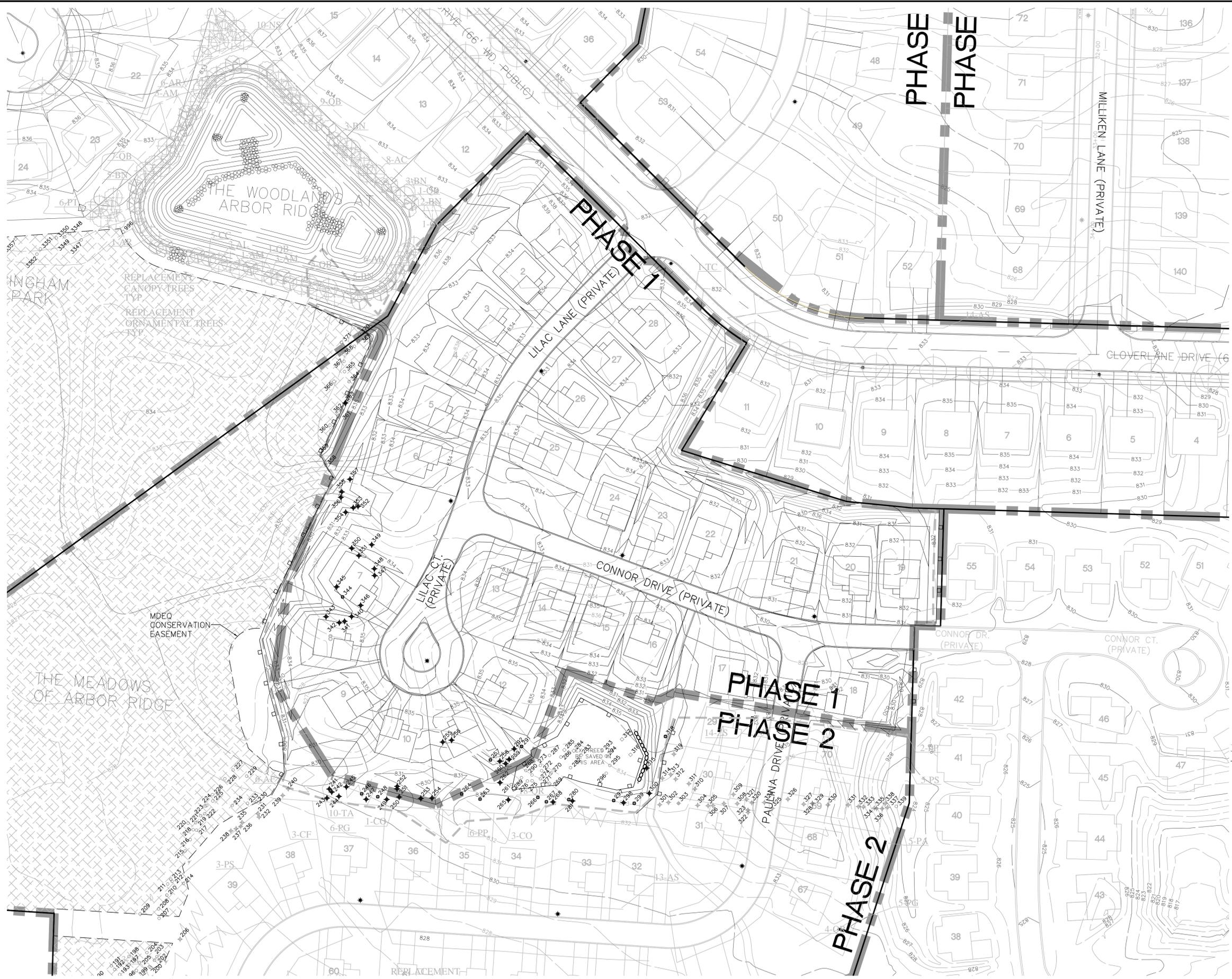
TREE SCHEDULE

LEGEND

WOODLAND TREES TO BE REMOVED

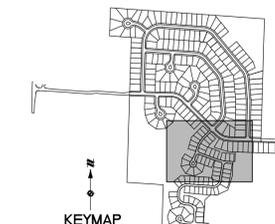
INVASIVE SPECIES

REMOVE	TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE	TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE	TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE	REMOVE	TAG	SIZE	COMMON NAME	BOTANICAL NAME	CONDITION	HERITAGE
	803	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	921	38"	RED OAK	QUERCUS RUBRA	VERY POOR	Y	Y	3430	9"	RED OAK	QUERCUS RUBRA	GOOD		Y	3430	9"	RED OAK	QUERCUS RUBRA	GOOD	
	804	19"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	922	9"	BLACK CHERRY	PRUNUS SEROTINA	GOOD		Y	3431	10"	RED OAK	QUERCUS RUBRA	GOOD		Y	3431	10"	RED OAK	QUERCUS RUBRA	GOOD	
	805	40"	BLACK CHERRY	PRUNUS SEROTINA	FAIR	Y	Y	923	8' & 8"	BLACK CHERRY	PRUNUS SEROTINA	GOOD		Y	3432	18"	RED OAK	QUERCUS RUBRA	GOOD		Y	3432	18"	RED OAK	QUERCUS RUBRA	GOOD	
	806	16"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	924	8"	PNG CHERRY	PRUNUS PENSYLVANICA	GOOD		Y	3433	14"	RED OAK	QUERCUS RUBRA	GOOD		Y	3433	14"	RED OAK	QUERCUS RUBRA	GOOD	
	807	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	925	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3434	15"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y	3434	15"	BLACK CHERRY	PRUNUS SEROTINA	POOR	
	808	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	926	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3435	11"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR		Y	3435	11"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	
	809	19"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y		927	30"	WHITE OAK	QUERCUS ALBA	GOOD	Y	Y	3436	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3436	8"	CHINESE ELM	ULMUS PUMILA	GOOD	
	810	15"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	928	21"	WHITE OAK	QUERCUS ALBA	GOOD	Y	Y	3437	19"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3437	19"	CHINESE ELM	ULMUS PUMILA	GOOD	
	811	14"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	929	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3438	23"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y	3438	23"	BLACK CHERRY	PRUNUS SEROTINA	POOR	
	812	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	930	11"	CHINESE ELM	ULMUS PUMILA	POOR		Y	3439	18"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3439	18"	RED OAK	QUERCUS RUBRA	GOOD	Y
	813	30"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y		931	28"	RED OAK	QUERCUS RUBRA	FAIR	Y	Y	3440	36"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	Y	Y	3440	36"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	Y
	814	13"	SHAGBARK HICKORY	CARYA OVATA	POOR		Y	932	20"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y	3441	27"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	Y	Y	3441	27"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	Y
	815	12"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	933	8"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	3442	9"	RED OAK	QUERCUS RUBRA	POOR		Y	3442	9"	RED OAK	QUERCUS RUBRA	POOR	
	816	8"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	934	8"	SHAGBARK HICKORY	CARYA OVATA	FAIR		Y	3443	11' & 26"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3443	11' & 26"	RED OAK	QUERCUS RUBRA	GOOD	Y
	817	8"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	935	8"	RED OAK	QUERCUS RUBRA	FAIR		Y	3444	20"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y	Y	3444	20"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y
	818	15"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y	936	14"	SHAGBARK HICKORY	CARYA OVATA	FAIR		Y	3445	19"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y	Y	3445	19"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y
	819	16"	RED OAK	QUERCUS RUBRA	GOOD	Y		937	15"	SHAGBARK HICKORY	CARYA OVATA	FAIR		Y	3446	9"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y	3446	9"	BLACK CHERRY	PRUNUS SEROTINA	POOR	
	820	24"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y		938	12"	PIGNOT HICKORY	CARYA GLABRA	GOOD		Y	3447	15"	RED OAK	QUERCUS RUBRA	GOOD		Y	3447	15"	RED OAK	QUERCUS RUBRA	GOOD	
	821	9"	RED OAK	QUERCUS RUBRA	GOOD		Y	939	14" & 14"	RED OAK	QUERCUS RUBRA	GOOD		Y	3448	20"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3448	20"	RED OAK	QUERCUS RUBRA	GOOD	Y
	822	37"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y		940	20' & 20"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3449	10"	RED OAK	QUERCUS RUBRA	GOOD		Y	3449	10"	RED OAK	QUERCUS RUBRA	GOOD	
	823	9"	CHINESE ELM	ULMUS PUMILA	POOR		Y	941	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3450	30"	RED OAK	QUERCUS RUBRA	GOOD		Y	3450	30"	RED OAK	QUERCUS RUBRA	GOOD	
	824	13"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	942	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3451	11"	RED OAK	QUERCUS RUBRA	GOOD		Y	3451	11"	RED OAK	QUERCUS RUBRA	GOOD	
	825	22"	RED OAK	QUERCUS RUBRA	POOR		Y	943	8"	SHAGBARK HICKORY	CARYA OVATA	FAIR		Y	3452	8"	RED OAK	QUERCUS RUBRA	GOOD		Y	3452	8"	RED OAK	QUERCUS RUBRA	GOOD	
	826	30"	SHAGBARK HICKORY	PRUNUS SEROTINA	POOR	Y		944	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3453	8"	DOMESTIC APPLE	MALUS SYLVESTRIS	VERY POOR		Y	3453	8"	DOMESTIC APPLE	MALUS SYLVESTRIS	VERY POOR	
	827	28"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y		945	32"	WHITE OAK	QUERCUS ALBA	GOOD	Y	Y	3454	34 & 13"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3454	34 & 13"	RED OAK	QUERCUS RUBRA	GOOD	Y
	828	13"	SHAGBARK HICKORY	CARYA OVATA	FAIR		Y	946	27"	WHITE OAK	QUERCUS ALBA	GOOD	Y	Y	3455	25"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3455	25"	RED OAK	QUERCUS RUBRA	GOOD	Y
	829	13"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	947	20"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3456	13"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3456	13"	CHINESE ELM	ULMUS PUMILA	GOOD	
	830	9"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	948	8"	CHINESE ELM	ULMUS PUMILA	POOR		Y	3457	10"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR		Y	3457	10"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	
	831	13"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	949	19"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3458	27"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3458	27"	RED OAK	QUERCUS RUBRA	GOOD	Y
	832	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	950	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3459	24"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3459	24"	RED OAK	QUERCUS RUBRA	GOOD	Y
	833	36"	WHITE OAK	QUERCUS ALBA	GOOD	Y		951	15"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3460	15"	RED OAK	QUERCUS RUBRA	GOOD		Y	3460	15"	RED OAK	QUERCUS RUBRA	GOOD	
	834	11"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y	952	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3461	11"	RED OAK	QUERCUS RUBRA	GOOD		Y	3461	11"	RED OAK	QUERCUS RUBRA	GOOD	
	835	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	953	21"	RED OAK	QUERCUS RUBRA	POOR	Y	Y	3462	39' & 20"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3462	39' & 20"	RED OAK	QUERCUS RUBRA	GOOD	Y
	836	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	954	13"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3463	21"	RED OAK	QUERCUS RUBRA	GOOD	Y	Y	3463	21"	RED OAK	QUERCUS RUBRA	GOOD	Y
	837	13"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	955	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3464	12"	RED OAK	QUERCUS RUBRA	GOOD		Y	3464	12"	RED OAK	QUERCUS RUBRA	GOOD	
	838	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	956	9"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3465	8"	RED OAK	QUERCUS RUBRA	GOOD		Y	3465	8"	RED OAK	QUERCUS RUBRA	GOOD	
	839	12"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	957	14"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3466	12"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR		Y	3466	12"	BLACK CHERRY	PRUNUS SEROTINA	VERY POOR	
	840	14"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	958	18"	BLACK CHERRY	PRUNUS SEROTINA	POOR	Y	Y	3467	18"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y	3467	18"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y
	841	24"	SHAGBARK HICKORY	CARYA OVATA	FAIR	Y		959	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3468	8', 9' & 10"	WHITE OAK	QUERCUS ALBA	GOOD		Y	3468	8', 9' & 10"	WHITE OAK	QUERCUS ALBA	GOOD	
	842	12"	RED OAK	QUERCUS RUBRA	FAIR		Y	960	16' & 18"	RED OAK	QUERCUS RUBRA	POOR	Y	Y	3469	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3469	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD	
	843	15"	RED OAK	QUERCUS RUBRA	POOR		Y	961	11"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3470	14"	SUGAR MAPLE	ACER SACCCHARINUM	GOOD	Y	Y	3470	14"	SUGAR MAPLE	ACER SACCCHARINUM	GOOD	Y
	844	8"	RED OAK	QUERCUS RUBRA	GOOD		Y	962	15"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3471	10"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3471	10"	CHINESE ELM	ULMUS PUMILA	GOOD	
	845	14"	BLACK CHERRY	PRUNUS SEROTINA	FAIR		Y	963	14"	RED OAK	QUERCUS RUBRA	GOOD		Y	3472	11"	CHINESE ELM	ULMUS PUMILA	POOR		Y	3472	11"	CHINESE ELM	ULMUS PUMILA	POOR	
	846	14"	RED OAK	QUERCUS RUBRA	GOOD		Y	964	14"	SHAGBARK HICKORY	CARYA OVATA	GOOD	Y	Y	3473	13"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3473	13"	CHINESE ELM	ULMUS PUMILA	GOOD	
	847	12"	RED OAK	QUERCUS RUBRA	GOOD		Y	965	20"	PIGNOT HICKORY	CARYA GLABRA	FAIR	Y	Y	3474	8"	RED OAK	QUERCUS RUBRA	GOOD		Y	3474	8"	RED OAK	QUERCUS RUBRA	GOOD	
	848	8"	BLACK CHERRY	PRUNUS SEROTINA	POOR		Y	3475	10"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	3475	8"	CHINESE ELM	ULMUS PUMILA	FAIR		Y	3475	8"	CHINESE ELM	ULMUS PUMILA	FAIR	
	849	10"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3476	13"	PIGNOT HICKORY	CARYA GLABRA	GOOD		Y	3476	13"	COTTONWOOD	POPULUS DELTOIDES	POOR		Y	3476	13"	COTTONWOOD	POPULUS DELTOIDES	POOR	
	850	12"	BLACK CHERRY	PRUNUS SEROTINA	GOOD		Y	3477	14"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3477	13"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3477	13"	CHINESE ELM	ULMUS PUMILA	GOOD	
	851	13"	RED OAK	QUERCUS RUBRA	GOOD		Y	3478	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3478	8"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3478	8"	CHINESE ELM	ULMUS PUMILA	GOOD	
	852	14"	CHINESE ELM	ULMUS PUMILA	GOOD		Y	3479	8"	SHAGBARK HICKORY	CARYA OVATA	GOOD		Y	3479	8"	CHINESE ELM	ULMUS PUMILA									



LEGEND

- SILT FENCE
- 779 ⊕ TREE TO BE REMOVED-FUTURE PHASE 1
- 779 ⊕ TREE TO BE REMOVED-FUTURE PHASE 2
- 779 ⊕ TREE TO REMAIN
- 805 ⊕ HERITAGE TREE TO BE REMOVED-FUTURE PHASE 1
- 805 ⊕ HERITAGE TREE TO BE REMOVED-FUTURE PHASE 2
- 805 ⊕ HERITAGE TREE TO REMAIN
- EXIST. TREE OR BRUSH LIMIT
- 835 --- EXIST. CONTOUR
- 835 --- PROP. CONTOUR
- TREE PROTECTION FENCE
- LIMITS OF DISTURBANCE
- 286 STANDARD TREE
- 285 HERITAGE TREE
- ⊕ 281 STANDARD TREE TO BE REMOVED
- 280 HERITAGE TREE TO BE REMOVED



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SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 TREE REMOVAL PLAN

DATE: JULY 21, 2014

REVISIONS/SUBMITTALS

12/12/14	PER TWP CONSULTANTS
04/01/15	PER TWP CONSULTANTS
05/20/15	PER TWP CONSULTANTS

SCALE
 0 25 50
 1" = 50 FEET

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 300819SF2-02B-TL
 JOB #: 12001809

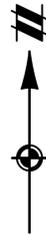
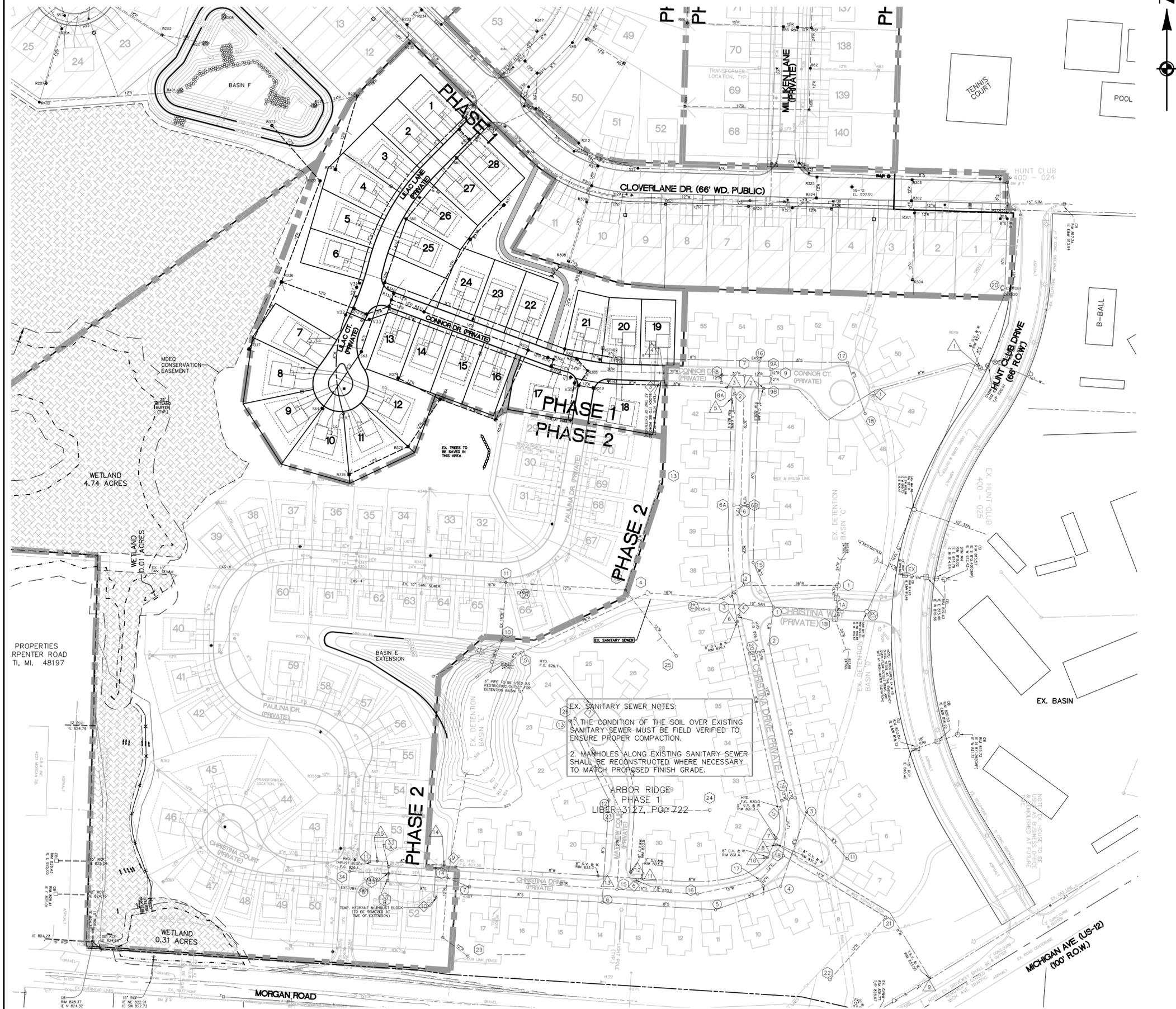
FILE CODE:
 SHEET NO.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
 CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OR OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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EX. SANITARY SEWER NOTES:
 1. THE CONDITION OF THE SOIL OVER EXISTING SANITARY SEWER MUST BE FIELD VERIFIED TO ENSURE PROPER COMPACTION.
 2. MANHOLES ALONG EXISTING SANITARY SEWER SHALL BE RECONSTRUCTED WHERE NECESSARY TO MATCH PROPOSED FINISH GRADE.

ARBOR RIDGE
 PHASE 1
 LIBER 3127, PG 722

- 1 EXISTING WATER STRUCTURES
- 1 EXISTING SANITARY STRUCTURES
- 1 EXISTING STORM STRUCTURES
- 1 EXISTING HYDRANT

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SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 OVERALL UTILITY PLAN

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS:
 12/12/14 PER TWP CONSULTANTS
 04/01/15 PER TWP CONSULTANTS
 05/20/15 PER TWP CONSULTANTS

SCALE
 0 40 80
 1" = 80 FEET

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 300819SF2-03A-G
 JOB #: 12001809
 FILE CODE:
 SHEET NO.

SEQUENCE OF CONSTRUCTION FOR SOIL EROSION CONTROL

START DAY	END DAY	DESCRIPTION
06-01-15	06-04-15	1. INSTALL STONE TRACKING PAD/LAYDOWN AREA ATOP GEOTEXTILE LINER (MUD-MAT) AND SIGNAGE.
06-01-15	06-04-15	2. INSTALL SILT AND PROTECTIVE FENCING.
06-01-15	06-04-15	3. INSTALL INLET PROTECTION FILTERS.
06-06-15	06-08-15	4. PREPARE TEMPORARY PARKING & STORAGE AREAS.
06-04-15	06-11-15	5. STRIP AND STOCKPILE TOPSOIL.
06-04-15	06-11-15	6. EXCAVATE DETENTION SYSTEM, INSTALL APPROVED OUTLET BEFORE PAVING IS STARTED.
06-13-15	06-27-15	7. INSTALL UNDERGROUND UTILITIES (I.E. SANITARY, STORM, AND WATER MAIN).
06-22-15	06-28-15	8. DEWATER EXISTING RETENTION BASIN B PRIOR TO INSTALLING PROPOSED POND OUTLETS R421 AND R127. SEE DEWATERING NOTES (THIS SHEET).
06-27-15	06-28-15	9. PLACE ADDITIONAL INLET FILTERS.
06-27-15	07-04-15	10. INSTALL FRANCHISE UTILITIES (ELECTRIC, TELEPHONE, AND CABLE T.V.).
06-29-15	07-06-15	11. FINALIZE PAVEMENT SUB-GRADE PREPARATION
07-12-15	07-19-15	12. INSTALL CURB & GUTTER
07-12-15	07-19-15	13. PAVE SITE
07-19-15	07-19-15	14. FINALIZE BUILDING EXTERIOR & GRADING, ESTABLISH VEGETATION FOR ALL DISTURBED AREAS AND ROAD/R.O.W.s
09-01-15	09-08-15	15. CLEAN OUT STORM SEWER SYSTEM.
09-01-15	09-08-15	16. REMOVE SILT FENCE AND CATCH BASIN FILTERS, REPAIR DISTURBED AREAS AS NECESSARY.
09-08-15	09-15-15	17. CLEAN PAVED AREAS AND COORDINATE FINAL INSPECTION FOR CLOSEOUT.

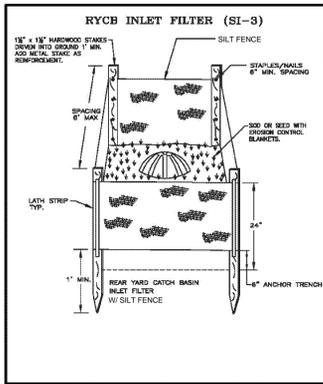
*SCHEDULE TO BE MAINTAINED BY CONTRACTOR.

MAINTENANCE NOTES

- A FIELD PRECONSTRUCTION MEETING MUST BE HELD WITH THE SESC INSPECTOR PRIOR TO ANY EARTH CHANGE ACTIVITY.
- INLET PROTECTION DEVICES AND BARRIERS SHALL BE REPAIRED OR REPLACED IF THEY SHOW SIGNS OF UNDERMINING OR DETERIORATION.
- STABILIZATION MUST BE STARTED WITHIN FIVE (5) DAYS OF FINAL GRADE. USE 4-INCHES OF TOPSOIL, MINIMUM.
- ALL SEEDED AREAS SHALL BE CHECKED REGULARLY TO SEE THAT A GOOD STAND IS MAINTAINED. AREAS SHOULD BE FERTILIZED, WATERED, AND RESEEDED AS NEEDED.
- SILT FENCES SHALL BE REPAIRED TO THEIR ORIGINAL CONDITIONS IF DAMAGED. SEDIMENT SHALL BE REMOVED FROM THE SILT FENCES WHEN IT REACHES ONE-HALF THE HEIGHT OF THE SILT FENCE.
- THE CONSTRUCTION TRACKING PAD SHALL BE MAINTAINED IN A CONDITION WHICH WILL PREVENT TRACKING OR FLOW OF MUD ONTO PUBLIC RIGHTS-OF-WAY.
- A "BEAVER DAM" SHOULD BE USED IN ADDITION TO THE SILT SACK FOR ALL CURB STYLE CATCH BASINS.

NOTE:

- SEE ATTACHED PITTSFIELD TOWNSHIP SOIL EROSION CONTROL DETAILS AND NOTES FOR ADDITIONAL METHODS AND REQUIREMENTS.
- FOR EXISTING SOILS INFORMATION, SEE SHEETS 2-11.
- SEE DEMOLITION PLAN FOR TREE PROTECTION FENCE LOCATIONS.
- SILT SACKS SHALL BE USED FOR ALL EXISTING AND PROPOSED CATCH BASINS (OR APPROVED EQUAL).



NOTE:
ALL REAR YARD CATCH BASINS, ONCE CONSTRUCTED AND GRADED TO, MUST BE SURROUNDED BY SILT FENCE, (TYP.) IN ADDITION TO THE SILT SACK.

Soil Erosion Control Maintenance Tasks and Schedule

During Construction
TO BE PERFORMED BY CONTRACTOR

TASKS	COMPONENTS	SCHEDULE
INSPECT FOR SEDIMENT ACCUMULATION	DAIRED AREAS	WEEKLY
REMOVAL OF SEDIMENT ACCUMULATION	PERFORATED AREAS	AS NEEDED AND PRIOR TO TURNOVER
INSPECT FOR FLOWABLES AND DEBRIS	STORM DRAINAGE SYSTEM	QUARTERLY
CLEANING FOR FLOWABLES AND DEBRIS	STORM DRAINAGE SYSTEM	QUARTERLY AND AT TURNOVER
INSPECTION FOR EROSION	SILT FENCE	WEEKLY
RESTORATION PERMANENT VEGETATION ON EXPOSED SLOPES	STORM DRAINAGE SYSTEM	AS NEEDED AND PRIOR TO TURNOVER
CLEAN DRIVES AND PARKING LOTS	SILT FENCE	WEEKLY OR AS DETERMINED BY REMEDIATION AGENCY
WATER DISTURBED AREAS TO PROVIDE DUST CONTROL	ALL DISTURBED AREAS OF SITE	AS NEEDED
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND CORRECT TO AS-BUILT PLANS (BY A PROFESSIONAL ENGINEER REPORTING TO THE OWNER)	STORM DRAINAGE SYSTEM	ANNUALLY AND AT TURNOVER
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED	SILT FENCE	WHEN 40-50% FULL

* "AS NEEDED" MEANS WHEN SEDIMENT HAS ACCUMULATED TO A MAXIMUM OF ONE FOOT DEPTH.

Permanent Maintenance
TO BE PERFORMED BY LESSEE/OWNER

TASKS	COMPONENTS	SCHEDULE
INSPECT FOR SEDIMENT ACCUMULATION	PERFORATED AREAS	SEMI-ANNUALLY/AS NEEDED*
REMOVAL OF SEDIMENT ACCUMULATION	PERFORATED AREAS	ANNUALLY/AS NEEDED*
INSPECT FOR FLOWABLES AND DEBRIS	STORM DRAINAGE SYSTEM	ANNUALLY
CLEANING FOR FLOWABLES AND DEBRIS	STORM DRAINAGE SYSTEM	ANNUALLY
INSPECTION FOR EROSION	STORM DRAINAGE SYSTEM	SEMI-ANNUALLY
RESTORATION PERMANENT VEGETATION ON EXPOSED SLOPES	STORM DRAINAGE SYSTEM	AS NEEDED
CLEAN DRIVES AND PARKING LOTS	STORM DRAINAGE SYSTEM	QUARTERLY
WORKING	STORM DRAINAGE SYSTEM	AS NEEDED
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND CORRECT TO AS-BUILT PLANS (BY A PROFESSIONAL ENGINEER REPORTING TO THE OWNER)	STORM DRAINAGE SYSTEM	ANNUALLY
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED BY ANNUAL WET WEATHER INSPECTION	STORM DRAINAGE SYSTEM	AS NEEDED
REMOVAL OF TRASH AND DEBRIS	STORM DRAINAGE SYSTEM	WEEKLY
KEEP RECORDS OF ALL INSPECTIONS AND MAINTENANCE ACTIVITIES AND REPORT TO PROPERTY OWNER	STORM DRAINAGE SYSTEM	ANNUALLY
KEEP RECORDS OF ALL COSTS FOR INSPECTIONS, MAINTENANCE AND REPAIRS. REPORT TO PROPERTY OWNER	STORM DRAINAGE SYSTEM	ANNUALLY
PROPERTY OWNER REMAINS COST EFFECTIVENESS OF THE PREVENTATIVE MAINTENANCE PROGRAM AND MAKES NECESSARY ADJUSTMENTS	STORM DRAINAGE SYSTEM	ANNUALLY
OWNER TO HAVE A PROFESSIONAL ENGINEER CARRY OUT EMERGENCY INSPECTIONS UPON IDENTIFICATION OF SEVERE PROBLEMS	STORM DRAINAGE SYSTEM	AS NEEDED

Calculated Soil Loss

The following are calculated soil loss for the construction site.

Site Information:
County: Washtenaw
Site: Arbor Ridge Meadows
Site ID: 001
Soil: Oshemo (OsC)
Slope: 3%
Slope Length: 300 ft.
Mulch Type: Straw/hay
Mulch Rate: 1.5 (tons/acre)
Acreage: 7.5 acre(s)

Calculated Soil Loss:
R = 100
K = 0.17
LS = 0.09
C = 0.08
P = 1

Erosion Factors:
Tolerable Soil Loss: T = 5 (tons/acre/year)
Calculated Soil Loss: A = 0.70 (tons/acre/year)
Potential soil loss (total): 5.28 (tons/year)

Calculated Soil Loss

The following are calculated soil loss for the construction site.

Site Information:
County: Washtenaw
Site: Arbor Ridge Meadows
Site ID: 001
Soil: Sprinks (SpB)
Slope: 3%
Slope Length: 150 ft.
Mulch Type: Straw/hay
Mulch Rate: 1.5 (tons/acre)
Acreage: 5 acre(s)

Calculated Soil Loss:
R = 100
K = 0.15
LS = 0.5
C = 0.12
P = 1

Erosion Factors:
Tolerable Soil Loss: T = 5 (tons/acre/year)
Calculated Soil Loss: A = 0.90 (tons/acre/year)
Potential soil loss (total): 0.45 (tons/year)

NOTE:

SILT FENCE SHALL BE INSTALLED AND MAINTAINED AROUND PERIMETER OF STOCKPILE, IF STOCKPILE WILL BE LARGE AND IS EXPECTED TO BE ON SITE FOR A PERIOD OF TIME.

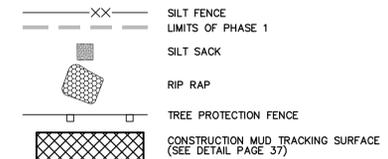
BASIN F DEWATERING NOTES

IMMEDIATELY PRIOR TO INSTALLING STORM SEWER RUN R373-R372, DEWATER RETENTION BASIN F. EXISTING WATER FROM RETENTION BASIN F SHALL BE PUMPED TO NEWLY INSTALLED R372 STORM STRUCTURE. PUMPED DISCHARGE RATE SHALL BE RESTRICTED TO A MAXIMUM OF 850 GPM.

ON-SITE SOILS

- SpB SPINKS LOAMY SAND, 0 TO 6 % SLOPES
- OsC OSHEMO LOAMY SAND, 6 TO 12 % SLOPES

SOIL EROSION CONTROL LEGEND



AREA OF DISTURBANCE = 8 ACRES

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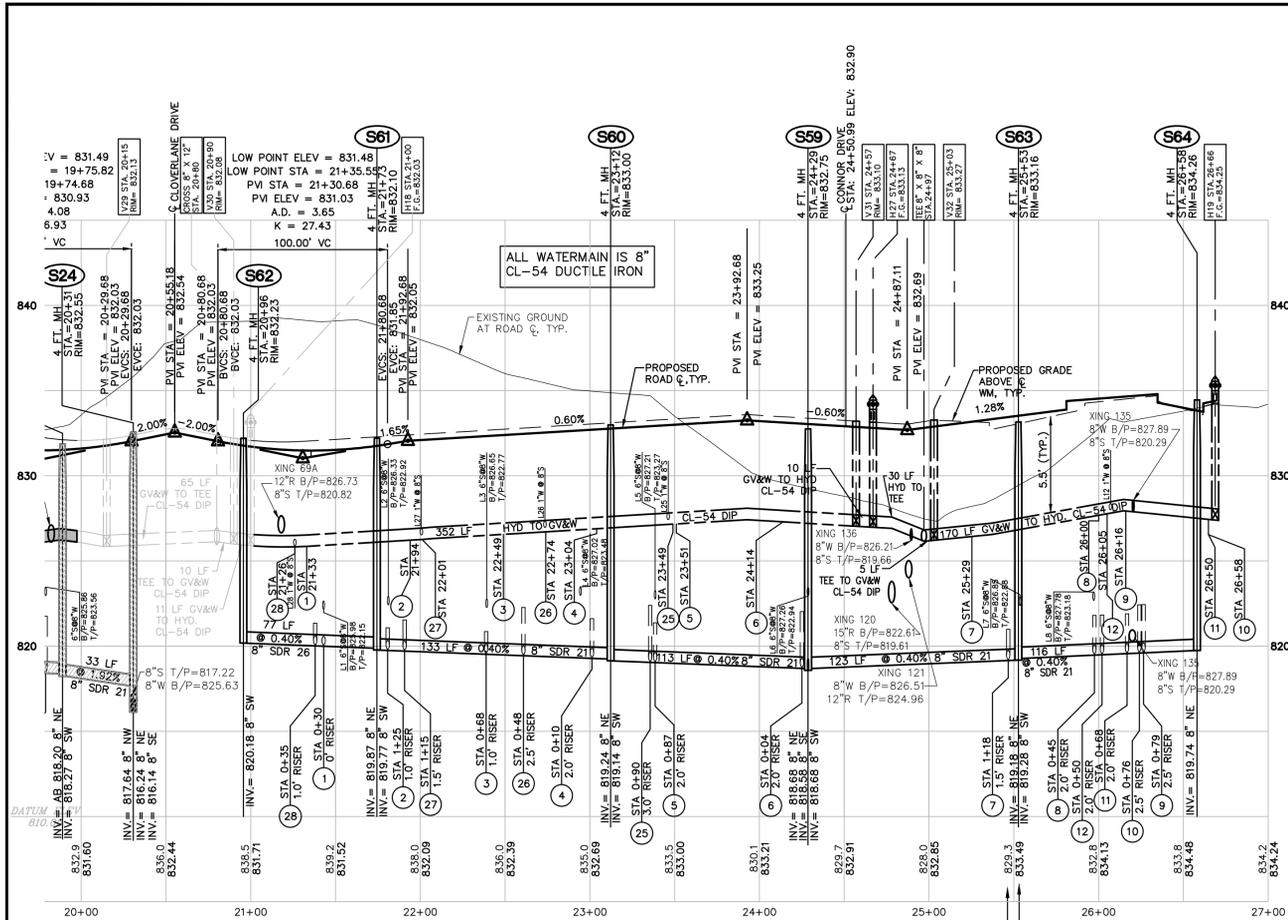
SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
SOIL EROSION CONTROL PLAN

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS:
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

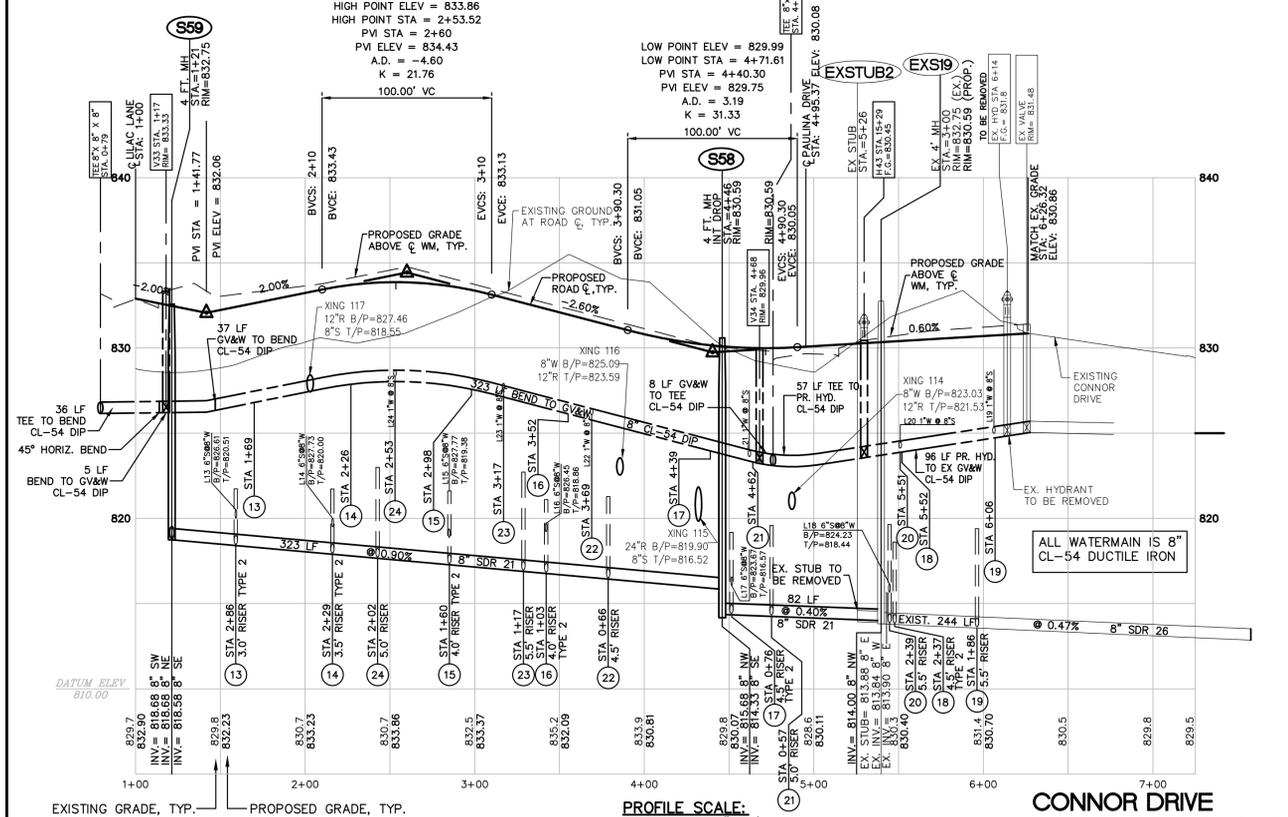
SCALE: 1" = 50 FEET

DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819SF2-05-SE
JOB #: 12001809
FILE CODE:
SHEET NO. 23



LILAC COURT AND LILAC LANE
SANITARY PROFILE S24 TO S64
WATERMAIN PROFILE CROSSING TO H19

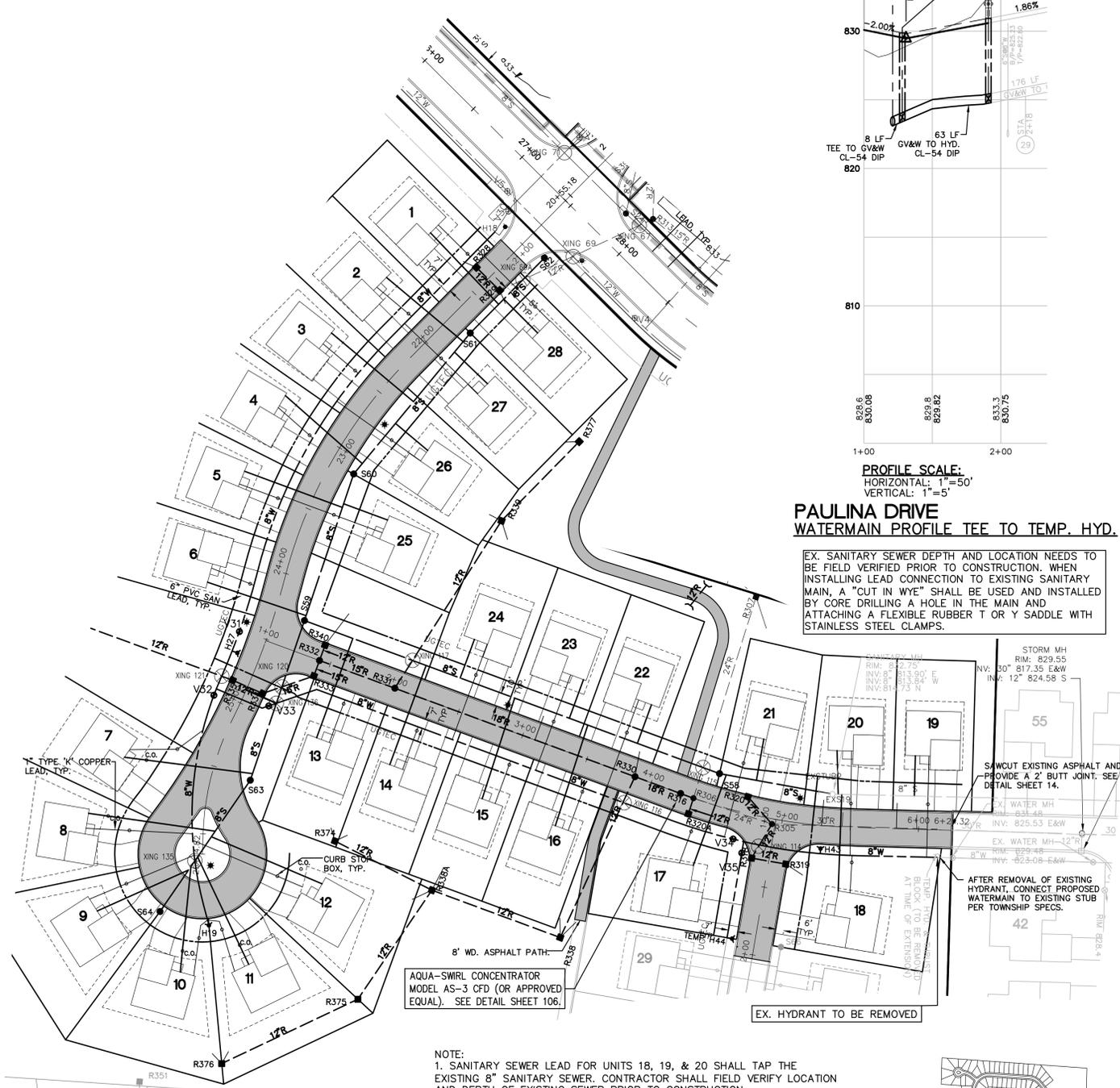
PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'



CONNOR DRIVE
SANITARY PROFILE S59 TO EXS19
WATERMAIN PROFILE TEE TO EX. VALVE

PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'

NOTE:
 SANITARY LEADS TO LOTS 18, 19 & 20 MAY HAVE BEEN PREVIOUSLY
 CONSTRUCTED. CONTRACTOR TO VERIFY POTENTIAL EXISTING SANITARY
 LEADS AND USE IF FEASIBLE

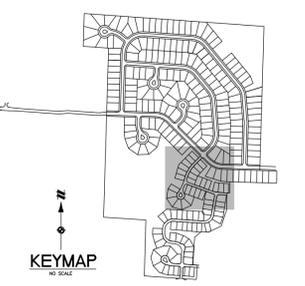


PAULINA DRIVE
WATERMAIN PROFILE TEE TO TEMP. HYD.

PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'

EX. SANITARY SEWER DEPTH AND LOCATION NEEDS TO
 BE FIELD VERIFIED PRIOR TO CONSTRUCTION. WHEN
 INSTALLING LEAD CONNECTION TO EXISTING SANITARY
 MAIN, A "OUT IN WYE" SHALL BE USED AND INSTALLED
 BY CORE DRILLING A HOLE IN THE MAIN AND
 ATTACHING A FLEXIBLE RUBBER T OR Y SADDLE WITH
 STAINLESS STEEL CLAMPS.

- NOTE:
- SANITARY SEWER LEAD FOR UNITS 18, 19, & 20 SHALL TAP THE EXISTING 8" SANITARY SEWER. CONTRACTOR SHALL FIELD VERIFY LOCATION AND DEPTH OF EXISTING SEWER PRIOR TO CONSTRUCTION.
 - MDOT CLASS II GRANULAR MATERIAL, COMPACTED TO 95% MAXIMUM UNIT WEIGHT USING THE MDOT CONTROLLED DENSITY METHOD. THIS MATERIAL WILL BE USED TO BACKFILL ALL UTILITIES IN THE ROAD CORRIDOR. THE ROAD CORRIDOR IS FROM FRONT OF HOUSE TO FRONT OF HOUSE PER PITTSFIELD TOWNSHIP.
 - ALL UTILITY CROSSINGS MUST HAVE A MINIMUM 18 INCHES OF CLEARANCE BETWEEN PIPES.
 - SUMP PUMP DISCHARGE LINES SHALL INCLUDE BACK FLOW PREVENTION.
 - SUMP PUMP AND ROOF DRAINS OUTLETING INTO CENTER-ROAD MANHOLES MUST BE INSTALLED PRIOR TO THE ROAD CONSTRUCTION.
 - ALL 8" SANITARY SEWER TO BE SDR 26 FOR DEPTHS LESS THAN 15'. FOR DEPTHS GREATER THAN 15', SANITARY SEWER PIPE TO BE SDR 21. ALL SANITARY LEADS TO BE SDR 26.
 - ALL WATER MAIN TO BE CLASS 54 DUCTILE IRON PIPE. WATER SERVICE LEADS TO BE TYPE K COPPER. PUSH-ON JOINTS, ALONG WITH POLYWRAP AND TRACER WIRE ARE REQUIRED.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
 CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

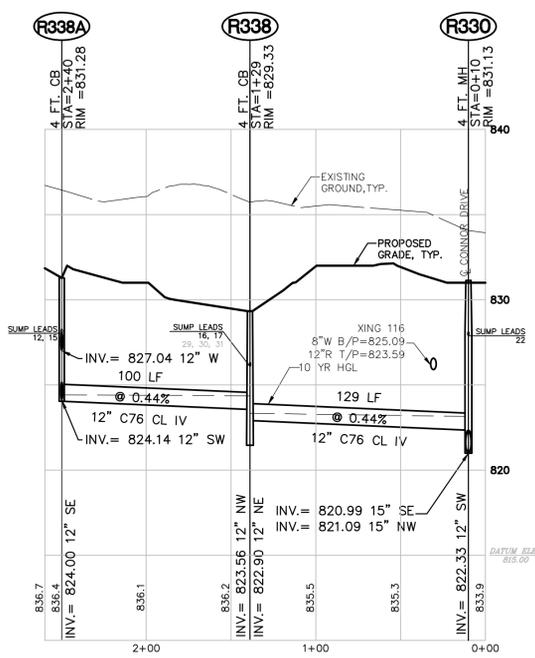
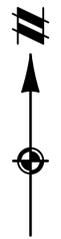
DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 LILAC COURT AND LANE, PAULINA
 DRIVE & CONNOR DRIVE
 ROAD, SANITARY AND WATERMAIN
 PLAN AND PROFILE

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS:
 12/12/14 FOR TWP CONSULTANTS
 04/01/15 FOR TWP CONSULTANTS
 05/20/15 FOR TWP CONSULTANTS

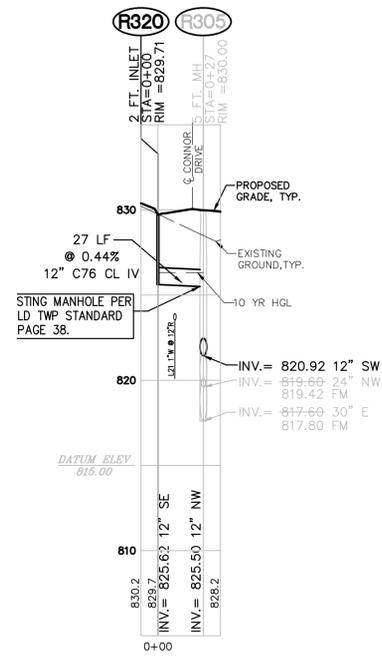
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 1" = 50 FEET

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 30081952-06A-SWRS
 JOB #: 12001809
 FILE CODE:
 SHEET NO.

PAGE NO. **14**
 SHEET NO. **28**



STORM PROFILE R338A TO R330
 PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'

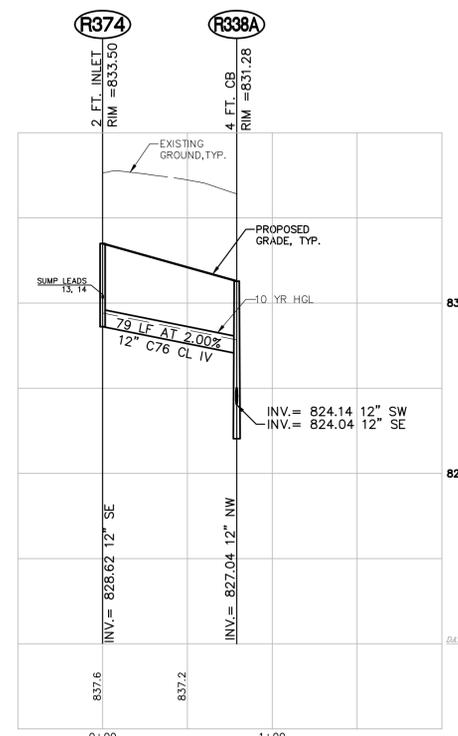


STORM PROFILE R320 TO R305
 PROFILE SCALE:
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 VERTICAL: 1"=5'

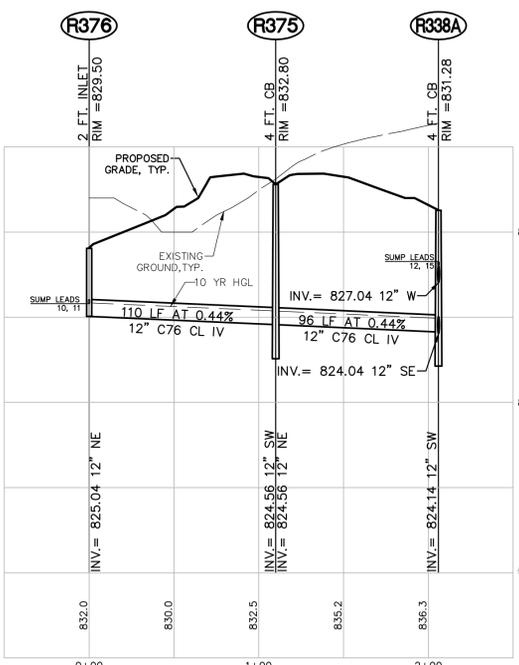
- NOTES:**
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 - ALL UTILITY CROSSINGS MUST HAVE A MINIMUM 18 INCHES OF CLEARANCE BETWEEN PIPES.

SEE SHEET 72 FOR DETENTION BASIN E PROFILE

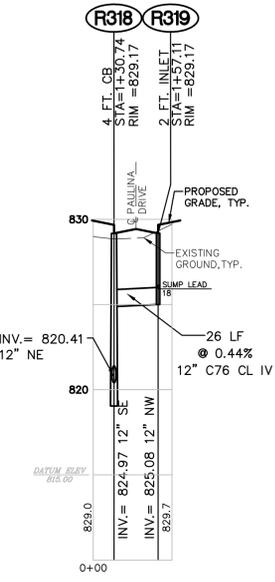
SEE SHEET 52 FOR CONTINUATION



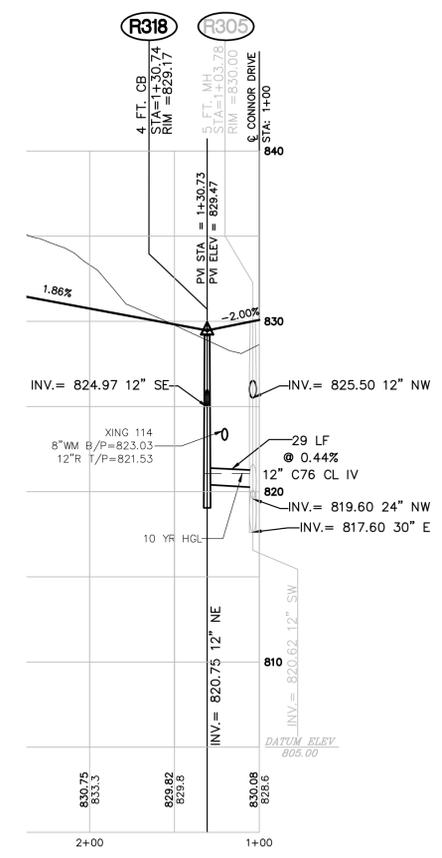
STORM PROFILE R374 TO R338A
 PROFILE SCALE:
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 VERTICAL: 1"=5'



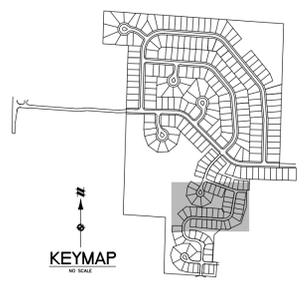
STORM PROFILE R376 TO R338A
 PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'



STORM PROFILE R319 TO R318
 PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'



STORM PROFILE R318 TO R305
 PROFILE SCALE:
 HORIZONTAL: 1"=50'
 VERTICAL: 1"=5'



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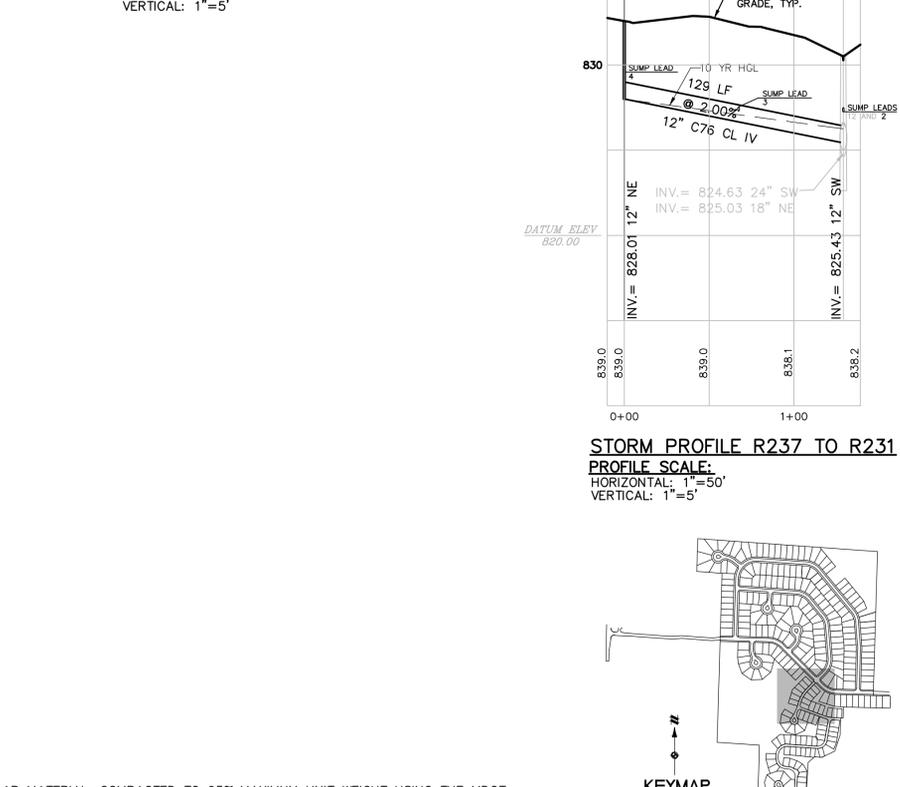
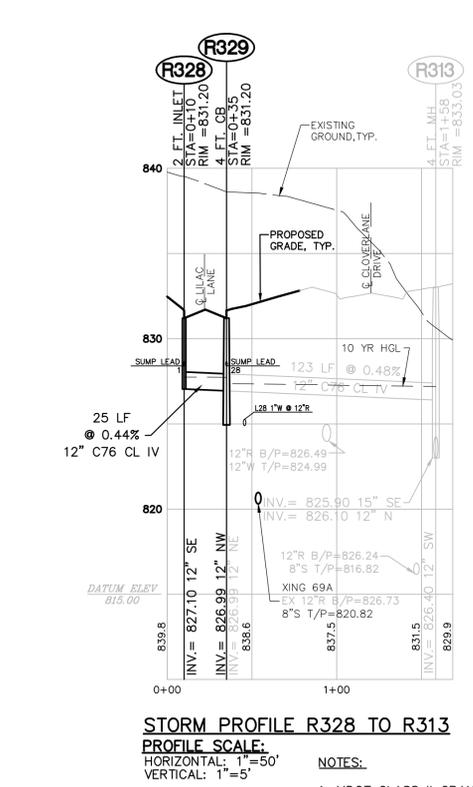
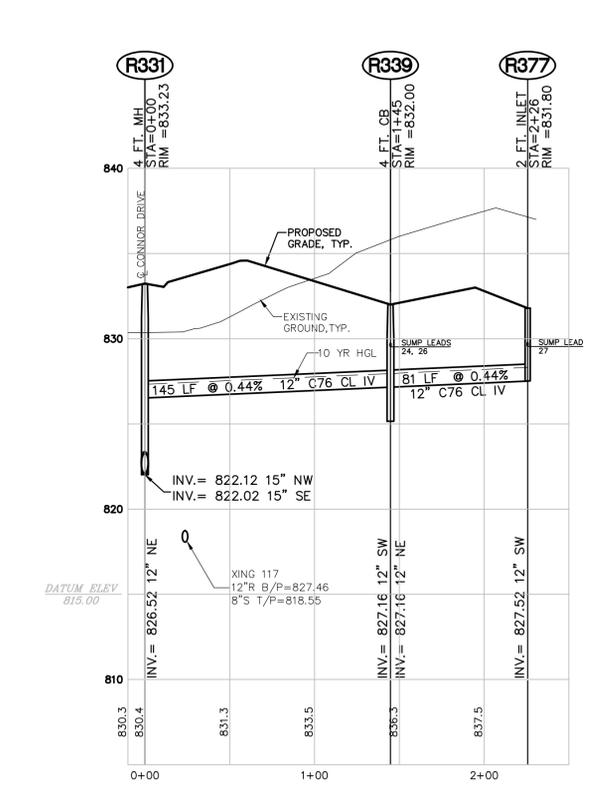
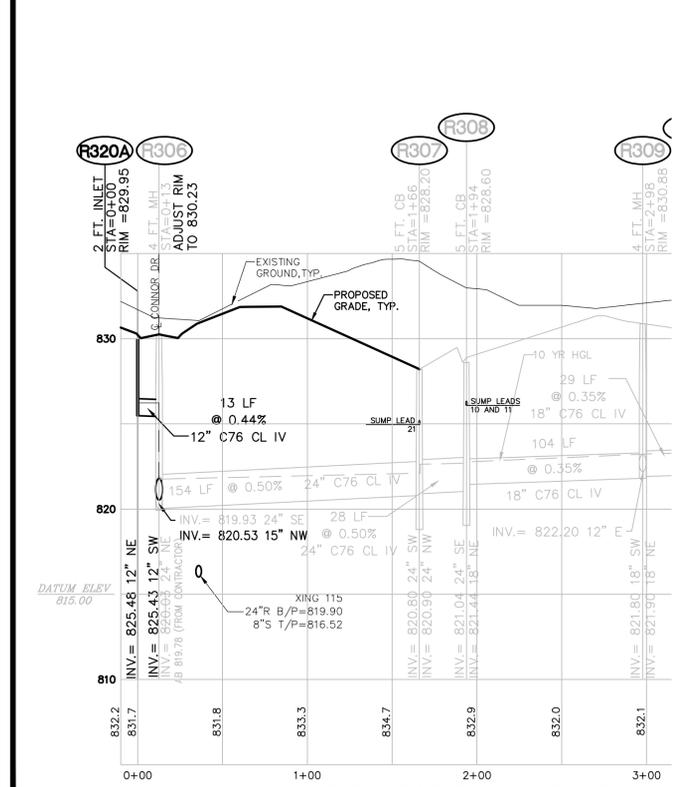
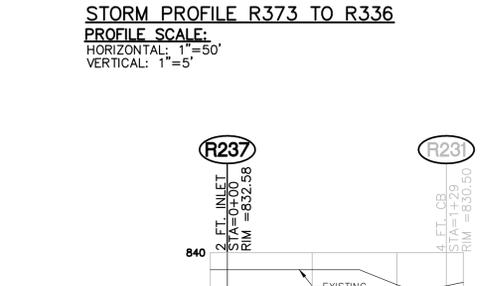
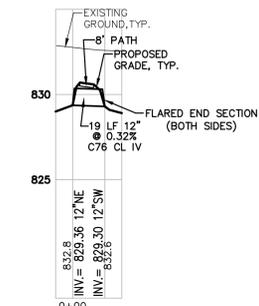
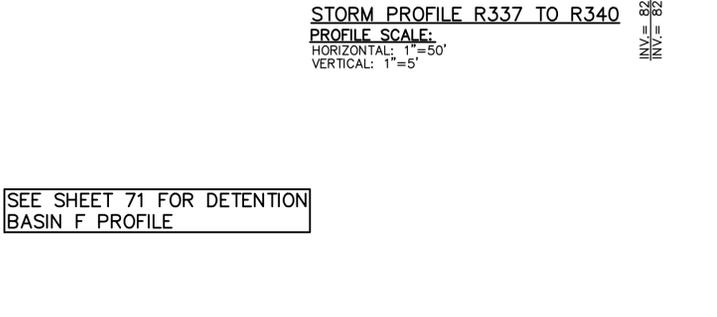
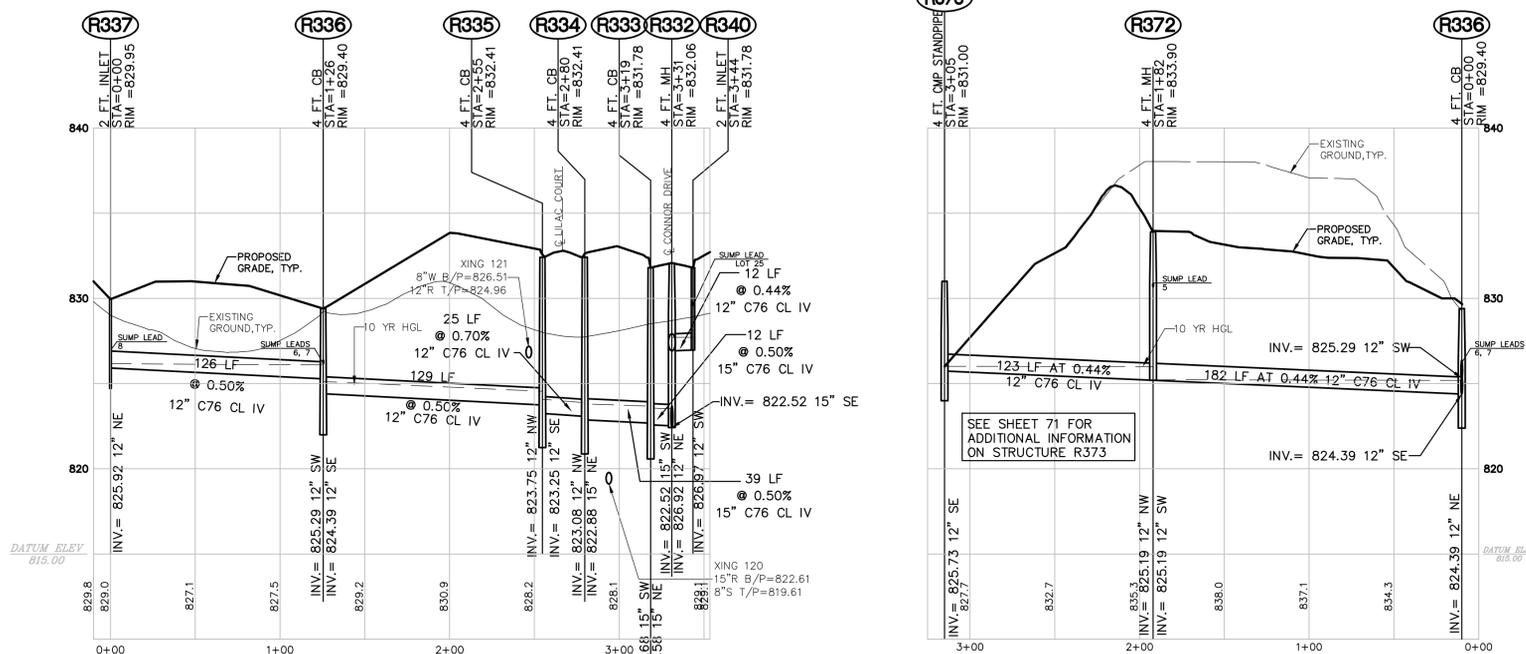
SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 OFF ROAD STORM SEWER
 PLAN AND PROFILE

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS:
 12/12/14 PER TWP CONSULTANTS
 04/01/15 PER TWP CONSULTANTS
 05/20/15 PER TWP CONSULTANTS

SCALE:
 1" = 50 FEET

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 30081952-08-R
 JOB #: 12001809
 FILE CODE:
 SHEET NO.



- NOTES:
- MDOT CLASS II GRANULAR MATERIAL, COMPACTED TO 95% MAXIMUM UNIT WEIGHT USING THE MDOT CONTROLLED DENSITY METHOD. THIS MATERIAL WILL BE USED TO BACKFILL ALL UTILITIES IN THE ROAD CORRIDOR. THE ROAD CORRIDOR IS FROM FRONT OF HOUSE TO FRONT OF HOUSE PER PITTSFIELD TOWNSHIP.
 - ALL UTILITY CROSSINGS MUST HAVE A MINIMUM 18 INCHES OF CLEARANCE BETWEEN PIPES.

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DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 OFF ROAD STORM SEWER
 PLAN AND PROFILE

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS:
 12/12/14 PER TWP CONSULTANTS
 04/01/15 PER TWP CONSULTANTS
 05/20/15 PER TWP CONSULTANTS

SCALE:
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 PROJECT MANAGER: EL
 CAD: 30081952-08-R
 JOB #: 12001809
 FILE CODE:
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PAGE NO. 17

STORM SEWER STRUCTURE SCHEDULE

Structure	R1	R2	R3	R4	R5	R6	R7	R8	R9	R10	R11	R12	R13	R14	R15	R16	R17	R18	R19	R20
Structure	END SECTION	4 FT. MH																		
Type	NO SUMP																			
Bar Grate	NO SUMP																			
Casing	NO SUMP																			
Flow Out	24" SE INV. 822.00	24" SE INV. 822.39	24" SE INV. 823.17	24" SE INV. 823.01	24" SE INV. 823.59	24" SE INV. 824.08	24" SE INV. 825.09	19" SE INV. 826.31	19" SE INV. 830.13	12" SE INV. 827.62	12" SE INV. 828.85	12" SE INV. 837.14	12" SE INV. 829.58	12" SE INV. 830.35	12" SE INV. 830.44	12" SE INV. 830.96	12" SE INV. 833.00	12" SE INV. 831.33	12" SE INV. 833.00	12" SE INV. 833.00
Flow In																				
Flow 2 In																				
Flow 3 In																				

NOTE: THIS FINAL SITE PLAN ONLY APPLIES TO PHASE 1 (UNITS 1-28) OF THE MEADOWS AT ARBOR RIDGE. FINAL SITE PLAN APPROVAL FOR PHASE 2 SHALL BE OBTAINED SEPARATELY FROM THE TOWNSHIP.

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DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
STORM STRUCTURE SCHEDULE

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

SCALE
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NO SCALE

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PROJECT MANAGER: EL
JOB #: 12001809
FILE CODE:
SHEET NO. 65A

SANITARY SEWER STRUCTURE SCHEDULE

Structure:	S1	S2	S3	S4	S5	S6	S7	S8	S9	S10	S11	S12	S13	S14	S15	S16	S17	S18	S19	S20
Type:	4 FT. MH																			
Rm:	RM 825.30	RM 823.80	RM 836.90	RM 837.53	RM 840.59	RM 842.15	RM 842.50	RM 841.16	RM 840.33	RM 841.08	RM 841.40	RM 841.20	RM 840.14	RM 838.82	RM 818.45	RM 818.85	RM 818.85	RM 818.00	RM 818.00	RM 818.00
Casting:	EJW 1040-AGS																			
Pipe Out:	10" E INV. 814.06	8" N INV. 814.89	8" NE INV. 815.81	8" SE INV. 819.73	8" SE INV. 821.27	8" SE INV. 822.56	8" SE INV. 823.14	8" E INV. 824.61	8" E INV. 825.82	8" NE INV. 826.39	8" NE INV. 826.82	8" NE INV. 827.69	8" NW INV. 827.32	8" SE INV. 827.88	8" S INV. 811.77	8" E INV. 812.02	8" S INV. 812.39			
Pipe In:	8" S INV. 814.20	8" SW INV. 814.99	8" NW INV. 817.31	8" NW INV. 819.83	8" NW INV. 821.37	8" NW INV. 822.66	8" W INV. 823.24	8" W INV. 824.71	8" SW INV. 825.92	8" SW INV. 826.49	8" SW INV. 826.92	8" NW INV. 826.92	8" NW INV. 827.42	8" SE INV. 827.88	8" S INV. 811.77	8" E INV. 812.02	8" S INV. 812.39			
Structure:	S21	S22	S23	S24	S25	S26	S27	S28	S29	S30	S31	S32	S33	S34	34A	S35	S36	S37	S38	S39
Type:	4 FT. MH																			
Rm:	RM 830.85	RM 831.65	RM 830.90	RM 832.55	RM 831.75	RM 835.38	RM 839.81	RM 840.04	RM 839.53	RM 838.94	RM 836.74	RM 835.74	RM 834.28	RM 840.92	RM 840.58	RM 831.03	RM 831.97	RM 834.09	RM 836.16	RM 831.85
Casting:	EJW 1040-AGS																			
Pipe Out:	8" E INV. 813.78	8" E INV. 815.04	8" SE INV. 815.59	8" SE INV. 816.14	8" SE INV. 817.02	8" SE INV. 818.23	8" SE INV. 818.99	8" SE INV. 819.33	8" SE INV. 819.67	8" SE INV. 820.01	8" E INV. 820.99	8" E INV. 821.49	8" SE INV. 821.94	8" S INV. 823.22	8" S INV. 828.61	8" SE INV. 815.88	8" S INV. 816.61	8" S INV. 818.10	8" SE INV. 819.29	8" S INV. 818.27
Pipe In:	8" W INV. 813.88	8" NW INV. 815.14	8" NW INV. 815.69	8" NW INV. 816.24	8" NW INV. 817.12	8" NW INV. 818.33	8" NW INV. 819.09	8" NW INV. 819.43	8" NW INV. 819.77	8" W INV. 820.11	2" SUMP 818.01	8" SE INV. 821.09	8" NW INV. 821.59	8" N INV. 822.02	8" N INV. 815.98	8" N INV. 816.71	8" NW INV. 818.20	8" NW INV. 818.20	8" SE INV. 819.29	8" S INV. 818.20
Structure:	S40	S41	S42	S43	S44	44A	S45	S46	S47	S48	S49	S50	S51	S52	S53	53A	S54	S55	S56	S57
Type:	4 FT. MH																			
Rm:	RM 833.30	RM 834.52	RM 836.79	RM 838.72	RM 840.02	RM 840.27	RM 840.57	RM 840.92	RM 841.58	RM 841.92	RM 840.27	RM 841.13	RM 843.06	RM 836.58	RM 836.28	RM 836.63	RM 838.03	RM 836.73	RM 835.67	RM 834.61
Casting:	EJW 1040-AGS																			
Pipe Out:	8" SW INV. 818.62	8" SW INV. 819.04	8" SW INV. 819.63	8" S INV. 820.20	8" S INV. 821.07	8" SE INV. 821.41	8" SE INV. 822.08	8" SE INV. 823.42	8" SE INV. 824.00	8" E INV. 825.47	8" E INV. 826.67	8" NE INV. 828.51	8" NE INV. 830.93	8" SW INV. 822.23	8" SW INV. 822.61	8" S INV. 822.89	8" SE INV. 823.41	8" NW INV. 821.34	8" N INV. 822.05	8" NW INV. 822.76
Pipe In:	8" NE INV. 818.72	8" NE INV. 819.14	8" N INV. 819.63	8" N INV. 820.20	8" NW INV. 821.17	8" NW INV. 821.88	8" NW INV. 822.18	8" NW INV. 823.52	8" W INV. 824.10	8" W INV. 825.57	8" SW INV. 826.97	8" SW INV. 830.01	8" NE INV. 830.93	8" SW INV. 822.33	8" NW INV. 822.71	8" S INV. 822.89	8" SE INV. 823.41	8" NW INV. 821.44	8" SE INV. 822.15	8" NW INV. 822.76
Structure:	S58	S59	S60	S61	S62	S63	S64	S65	65A	S66	S67	S68	S69	S70	S71	S72				
Type:	4 FT. MH																			
Rm:	RM 830.77	RM 832.75	RM 833.00	RM 832.10	RM 832.23	RM 833.16	RM 834.26	RM 832.65	RM 831.54	RM 830.97	RM 827.62	RM 828.80	RM 829.80	RM 829.40	RM 830.00	RM 830.31				
Casting:	EJW 1040-AGS																			
Pipe Out:	8" SE INV. 814.18	8" SE INV. 818.58	8" SW INV. 819.14	8" SW INV. 819.77	8" SW INV. 820.18	8" NE INV. 819.18	8" NE INV. 819.74	8" SW INV. 818.13	8" S INV. 814.18	8" SW INV. 820.53	8" S INV. 817.23	8" SE INV. 817.82	8" SE INV. 818.45	8" SE INV. 818.97	8" N INV. 817.07	8" SE INV. 817.77				
Pipe In:	8" NW INV. 815.68	8" NE INV. 818.68	8" NE INV. 819.24	8" NE INV. 819.87	8" SW INV. 819.28	8" SW INV. 819.28	8" SW INV. 819.28	8" NE INV. 819.63	8" NE INV. 815.68	8" SW INV. 820.53	8" NW INV. 817.33	8" NW INV. 817.92	8" NW INV. 818.55	8" SE INV. 818.97	8" NW INV. 817.51	8" SE INV. 817.77				
Structure:	EXS1	EXSTUB1	EXS-2	EXSTUB2	EXS-3	EXSTUB3	EXS-4	EXSTUB4	EXS-5	EXS-6	EXS7	EXS8	EXS19	EXS20						
Type:	4 FT. MH																			
Rm:	RM 827.49	RM 822.78	RM 828.01	RM 0.00	RM 831.77	RM 827.60	RM 827.96	RM 0.00	RM 828.70	RM 828.86	RM 827.55	RM 827.05	RM 830.59	RM 822.98						
Casting:	EJW 1040-AGS																			
Pipe Out:	10" E INV. 813.98	8" S INV. 811.30	10" E INV. 811.51	8" E INV. 813.88	10" E INV. 812.42	8" S INV. 816.31	10" E INV. 813.38	8" E INV. 816.21	10" E INV. 814.24	10" E INV. 815.18	8" SW INV. 815.51	8" E INV. 816.17	8" E INV. 813.90	8" N INV. 811.16						
Pipe In:	10" W INV. 814.02	8" N INV. 811.30	10" W INV. 811.51	8" NW INV. 813.88	10" W INV. 812.51	8" N INV. 816.31	10" W INV. 813.38	8" W INV. 816.21	10" W INV. 814.28											
Structure:		EXS-2			EXS7															
Type:		4 FT. MH			4 FT. MH															
Rm:		RM 828.01			RM 827.55															
Casting:		EJW 1040-AGS			EJW 1040-AGS															
Pipe Out:		10" E INV. 811.51			8" SW INV. 815.51															
Pipe In:		10" W INV. 811.51			8" W INV. 815.51															

NOTE:
THIS FINAL SITE PLAN ONLY APPLIES TO PHASE 1 (UNITS 1-28) OF THE MEADOWS AT ARBOR RIDGE. FINAL SITE PLAN APPROVAL FOR PHASE 2 SHALL BE OBTAINED SEPARATELY FROM THE TOWNSHIP.

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SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 SANITARY STRUCTURE SCHEDULE

DATE	JULY 21, 2014
REVISIONS/SUBMITTALS	
12/12/14 PER TWP. CONSULTANTS	
04/01/15 PER TWP. CONSULTANTS	
05/20/15 PER TWP. CONSULTANTS	

SCALE	NO SCALE
DRAWN BY:	GMS
CHECKED BY:	GMS
PROJECT MANAGER:	EL
CAD:	30081952-09-R
JOB #:	12001809
FILE CODE:	
SHEET NO.	

SANITARY SEWER LEAD SCHEDULE
The Meadows at Arbor Ridge

Lot #	Lead Invert at Main	Lead Length to Stub (LF) (10' off bldg)	Lead Slope (%)	Lead Dia. (in)	Lot F.G. Elev.	Riser Height (FT)	Stub Invert Elev.	Lead Type
L1	820.82	62	2.00%	6	833.50	0.0	822.06	1
L2	820.57	63	2.00%	6	834.00	1.0	822.83	1
L3	820.34	68	2.00%	6	834.30	1.0	822.70	1
L4	820.11	65	2.00%	6	834.70	2.0	823.41	1
L5	819.86	66	2.00%	6	834.70	2.0	823.18	1
L6	819.53	66	2.00%	6	834.50	2.0	822.85	1
L7	819.99	84	2.00%	6	834.70	1.5	823.17	1
L8	820.29	84	2.00%	6	835.50	2.0	823.97	1
L9	820.42	63	2.00%	6	835.50	2.5	824.18	1
L10	820.41	67	2.00%	6	835.45	2.5	824.25	1
L11	820.38	77	2.00%	6	835.35	2.0	823.92	1
L12	820.24	76	2.00%	6	835.35	2.0	823.76	1
L13	819.08	67	2.00%	6	835.00	3.0	823.42	2
L14	818.57	67	2.00%	6	835.05	3.5	823.41	2
L15	817.95	67	2.00%	6	835.05	4.0	823.29	2
L16	817.43	67	2.00%	6	834.14	4.0	822.77	2
L17	815.14	60	2.00%	6	832.30	4.5	820.84	2
L18	814.70	62	2.00%	6	832.00	4.5	820.44	2
L19	814.46	18	2.00%	6	832.20	5.5	820.32	1
L20	814.71	21	2.00%	6	832.30	5.5	820.63	1
L21	815.06	21	2.00%	6	832.00	5.0	820.48	1
L22	817.10	20	2.00%	6	833.55	4.5	822.00	1
L23	817.56	20	2.00%	6	834.85	5.5	823.46	1
L24	818.32	20	2.00%	6	835.05	5.0	823.72	1
L25	819.88	24	2.00%	6	834.90	3.0	823.36	1
L26	820.26	21	2.00%	6	834.40	2.5	823.18	1
L27	820.53	23	2.00%	6	834.00	1.5	822.49	1
L28	820.84	25	2.00%	6	833.50	1.0	822.34	1

Crossings Table

Crossing Number	Surface Elevation	Pipe 1 Name	Dist. From Pipe 1 UPSTREAM Str.	Pipe 2 Name	Dist. From Pipe 2 UPSTREAM Str.	CROSSING PIPE 1	CROSSING PIPE 2	Clearance
69A	832.00	R329	18.7	S62	22.3	12" ST B/P= 826.73	8" SAN T/P= 820.82	5.92
114	829.54	R318	10	WM8		12" ST T/P= 821.53	8" WM B/P= 823.03	1.50
115	831.01	R307	130.2	S59	310.5	24" ST B/P= 819.90	8" SAN T/P= 816.52	3.38
116	831.26	R338	108.3	WM8		12" ST T/P= 823.59	8" WM B/P= 825.09	1.51
117	833.61	R339	120.8	S59	84.3	12" ST B/P= 827.46	8" SAN T/P= 818.55	8.91
120	832.94	R334	14.8	S63	71.7	15" ST B/P= 822.61	8" SAN T/P= 819.61	3.00
121	833.00	R336	121	WM8		12" ST T/P= 824.96	8" WM B/P= 826.51	1.55
135	834.36	S64	44.9	WM8		8" SAN T/P= 820.29	8" WM B/P= 827.89	7.60
136	833.40	S63	59.1	WM8		8" SAN T/P= 819.66	8" WM B/P= 826.21	7.57
L1	832.15	WM8		L1	33	8" WM B/P= 825.98	6" SAN T/P= 822.15	3.83
L2	832.50	WM8		L2	33	8" WM B/P= 826.33	6" SAN T/P= 822.92	3.42
L3	832.82	WM8		L3	34	8" WM B/P= 826.65	6" SAN T/P= 822.77	3.88
L4	833.19	WM8		L4	34	8" WM B/P= 827.02	6" SAN T/P= 823.48	3.54
L5	833.38	WM8		L5	33	8" WM B/P= 827.21	6" SAN T/P= 823.27	3.94
L6	833.43	WM8		L6	33	8" WM B/P= 827.26	6" SAN T/P= 822.94	4.33
L7	833.02	WM8		L7	52	8" WM B/P= 826.85	6" SAN T/P= 822.88	3.97
L8	833.95	WM8		L8	77	8" WM B/P= 827.78	6" SAN T/P= 823.18	4.60
L12	833.58	S64	58	WM1		8" SAN T/P= 820.23	1" WM B/P= 828.00	7.76
L13	832.41	R332	17.4	L13	53.5	15" ST B/P= 822.24	6" SAN T/P= 820.10	2.15
L13	833.23	WM8		L13	33	8" WM B/P= 826.61	6" SAN T/P= 820.51	6.10
L14	833.51	R331	15.7	L14	53.5	18" ST B/P= 821.73	6" SAN T/P= 819.59	2.15
L14	833.98	WM8		L14	33	8" WM B/P= 827.73	6" SAN T/P= 820.00	7.73
L15	833.62	R331	84.7	L15	53.5	18" ST B/P= 821.39	6" SAN T/P= 818.97	2.42
L15	834.00	WM8		L15	33	8" WM B/P= 827.77	6" SAN T/P= 819.38	8.39
L16	832.27	R331	141.7	L16	53.6	18" ST B/P= 821.11	6" SAN T/P= 818.45	2.65
L16	832.78	WM8		L16	33	8" WM B/P= 826.45	6" SAN T/P= 818.86	7.59
L17	830.07	R306	16.8	L17	46.5	24" ST B/P= 819.59	6" SAN T/P= 816.16	3.43
L17	830.46	WM8		L17	26	8" WM B/P= 823.67	6" SAN T/P= 816.57	7.10
L18	830.36	R305	50.2	L18	47.1	30" ST B/P= 817.21	6" SAN T/P= 815.72	1.49
L18	830.60	WM8		L18	26	8" WM B/P= 823.76	6" SAN T/P= 816.17	7.59
L19	831.47	EXS19	70	WM1		8" SAN T/P= 814.30	1" WM B/P= 825.89	11.59
L19	830.74	R305	113.6	WM1		30" ST T/P= 820.16	1" WM B/P= 825.16	5.00
L20	831.08	EXS19	13.5	WM1		8" SAN T/P= 814.56	1" WM B/P= 825.50	10.94
L20	830.40	R305	57.4	WM1		30" ST T/P= 820.27	1" WM B/P= 824.82	4.54
L21	830.82	S58	15	WM1		8" SAN T/P= 814.99	1" WM B/P= 825.24	10.24
L21	830.00	R306	48.5	WM1		24" ST T/P= 821.91	1" WM B/P= 824.42	2.50
L22	831.74	S59	247.4	WM1		8" SAN T/P= 817.08	1" WM B/P= 826.16	9.07
L22	831.55	R331	168.4	WM1		18" ST T/P= 822.89	1" WM B/P= 825.97	3.08
L23	833.20	S59	196.4	WM1		8" SAN T/P= 817.54	1" WM B/P= 827.62	10.08
L23	832.90	R331	117.4	WM1		18" ST T/P= 823.14	1" WM B/P= 827.32	4.17
L24	834.27	S59	131.4	WM1		8" SAN T/P= 818.13	1" WM B/P= 828.69	10.56
L24	833.86	R331	52.3	WM1		18" ST T/P= 823.47	1" WM B/P= 828.28	4.81
L25	833.15	S60	32.9	WM1		8" SAN T/P= 819.73	1" WM B/P= 827.57	7.84
L26	832.60	S61	97.2	WM1		8" SAN T/P= 820.11	1" WM B/P= 827.02	6.91
L27	832.18	S61	28.1	WM1		8" SAN T/P= 820.38	1" WM B/P= 826.60	6.21
L28	831.48	S62	42.2	WM1		8" SAN T/P= 820.74	1" WM B/P= 825.90	5.16
L28	831.77	R329	10.7	WM1		12" ST B/P= 826.77	1" WM T/P= 825.27	1.50

NOTES:

- ALL SANITARY LEADS SHALL BE 6" DIA. PVC SDR 26.
- SEE DETAIL ON PITTSFIELD TOWNSHIP SANITARY SEWER DETAILS FOR ADDITIONAL INFORMATION ON RISER TYPES.

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SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
SANITARY SEWER LEAD SCHEDULE & CROSSINGS TABLE

DATE	JULY 21, 2014
REVISIONS/SUBMITTALS	
12/12/14 PER TWP. CONSULTANTS	
04/01/15 PER TWP. CONSULTANTS	
05/20/15 PER TWP. CONSULTANTS	

SCALE
NO SCALE

DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819SF2-09-R
JOB #: 12001809
FILE CODE:
SHEET NO.

WATER MAIN STRUCTURE SCHEDULE			
STR	DIA (FT)	FG/RIM	Casting
EX H18	-	832.03	-
H19	-	834.25	-
H27	-	833.13	-
H43	-	830.45	-
TEMP H44	-	830.75	-
EX V30	5	832.08	1040-A w/ Pittsfield Logo
V31	5	833.10	1040-A w/ Pittsfield Logo
V32	5	833.27	1040-A w/ Pittsfield Logo
V33	5	833.33	1040-A w/ Pittsfield Logo
V34	5	829.96	1040-A w/ Pittsfield Logo
V35	5	829.90	1040-A w/ Pittsfield Logo

The Meadows, Phase 1	
UNIT #	WATER LEAD LENGTH IN FT.
1	33
2	33
3	33
4	34
5	33
6	33
7	58
8	78
9	83
10	43
11	46
12	87
13	33
14	33
15	33
16	33
17	27
18	27
19	74
20	76
21	78
22	74
23	74
24	74
25	77
26	75
27	74
28	74

NOTE:

1. ALL WATER SERVICE LEADS SHALL BE 1" TYPE K COPPER PIPE.



SCALE
0
NO SCALE

DRAWN BY: GMS

CHECKED BY: GMS

PROJECT MANAGER: EL

CAD: 300819SF2-09-R

JOB #: 12001809

FILE CODE:

SHEET NO.

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
WATER MAIN STRUCTURE
AND LEAD LENGTH SCHEDULES

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SECTION 13
 TOWN 3 SOUTH, RANGE 6 EAST
 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 DRAINAGE AREA PLAN
 SOUTH

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS:
 12/12/14 PER TWP CONSULTANTS
 04/01/15 PER TWP CONSULTANTS
 05/20/15 PER TWP CONSULTANTS

SCALE
 0 50 100
 1" = 100 FEET

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 300819SF2-11-DA
 JOB #: 12001809
 FILE CODE:
 SHEET NO. 69

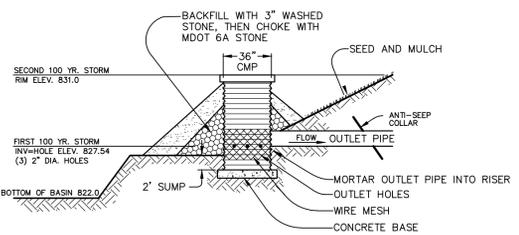
LEGEND

EXIST. CONTOUR PROP. CONTOUR EXIST. SPOT ELEVATION PROP. SPOT ELEVATION EXIST. STORM SEWER PROP. STORM SEWER EXIST. MANHOLE PROP. MANHOLE EXIST. CATCH BASIN/INLET PROP. CATCH BASIN/INLET EXIST. SANITARY SEWER PROP. SANITARY SEWER EXIST. CLEANOUT PROP. CLEANOUT EXIST. WATER MAIN PROP. WATER MAIN EXIST. HYDRANT PROP. HYDRANT EXIST. SHUT-OFF OR CURB BOX PROP. CURB AND GUTTER EXIST. CURB AND GUTTER CENTERLINE OF DITCH OR EDGE OF WATER EXISTING FENCE PROPOSED FENCE PROPERTY LINE CENTERLINE EXIST. SIGN PROP. SIGN SIDEWALK RAMP F.F. F.G. FINISHED BASEMENT WALKOUT BASEMENT BASEMENT FLOOR GARAGE FLOOR SALT FENCE PROP. SHUT-OFF OR CURB BOX EXIST. GATE VALVE IN BOX PROP. GATE VALVE IN BOX EXIST. GATE VALVE IN MANHOLE PROP. GATE VALVE IN MANHOLE EXIST. OVERHEAD ELECTRIC PROP. OVERHEAD ELECTRIC EXIST. UNDERGROUND ELECTRIC PROP. UNDERGROUND ELECTRIC EXIST. LIGHT POLE PROP. LIGHT POLE EXIST. UTILITY POLE PROP. UTILITY POLE EXIST. OVERHEAD TELEPHONE PROP. OVERHEAD TELEPHONE EXIST. UNDERGROUND TELEPHONE PROP. UNDERGROUND TELEPHONE EXIST. GAS PROP. GAS EXIST. GAS RISER EXIST. TELEPHONE RISER CONTROL POINT FOUND IRON PIPE FOUND CONCRETE MONUMENT SET IRON PIPE NAIL SET CONCRETE MONUMENT SET IRON PIPE NAIL SET CONCRETE MONUMENT FOUND LEADED DIESEL HOLE SET LEADED DIESEL HOLE FOUND REBAR APPROX. LOCATION OF SOIL BORING APPROX. LOCATION OF MONITORING WELL APPROX. LOCATION OF PENETROMETER TEST EXIST. DECIDUOUS TREE EXIST. CONIFEROUS TREE EXIST. TREE OR BRUSH LIMIT SECTION CORNER
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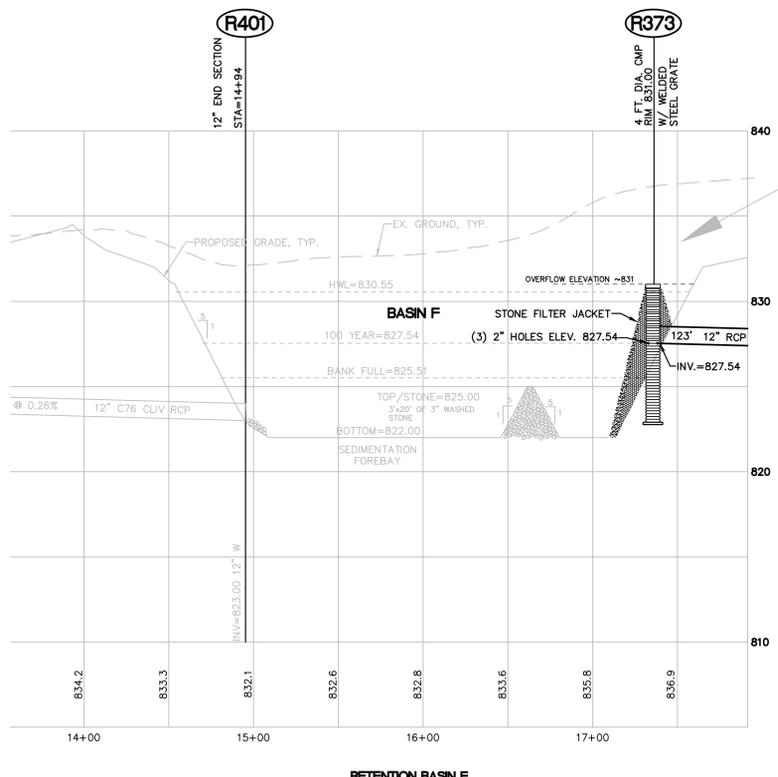


STORMWATER NARRATIVE

THE STORMWATER FROM THE MEADOWS PHASE 1 WILL BE COLLECTED IN AN UNDERGROUND STORM SEWER SYSTEM AND DIRECTED TO THE EXISTING DETENTION BASINS C & D, WHICH WERE BUILT DURING ARBOR RIDGE PHASE 1. PROVISIONS WERE MADE IN THE DESIGN AND CONSTRUCTION FOR THE STORMWATER FROM PHASE 1 OF THE MEADOWS OF ARBOR RIDGE TO BE COLLECTED IN THESE BASINS. IN ORDER TO ALLEVIATE THE PROBLEMS WITH THE EXISTING RETENTION BASIN F, AN OUTLET RUN OF STORM SEWER HAS BEEN ADDED (R373-R372-R336) TO THE INTO THE PREVIOUSLY PROPOSED STORM SEWER SYSTEM. THIS OUTLET HAS BEEN DESIGNED TO HAVE A MAXIMUM OUTFLOW OF 0.50 CFS AND WILL BE CONTAINED WITHIN THE EXCESS CAPACITY IN THE PREVIOUSLY PROPOSED STORM SEWER SYSTEM. A DETAILED DRAINAGE ANALYSIS HAS BEEN PREVIOUSLY PROVIDED TO THE WASHTENAW COUNTY WATER RESOURCES COMMISSIONER.



DETENTION BASIN F RISER DETAIL - R373
NO SCALE



EXISTING RETENTION BASIN F CALCULATIONS

TOTAL DRAINAGE AREA: 12.98 AC.
 PERVIOUS AREA: 8.60 AC. (C=0.36)
 IMPERVIOUS AREA: 3.22 AC. (C=0.95)
 POND AREA: 1.16 AC. (C=1.0)
 COMPOSITE C-FACTOR: 0.56

VOLUME REQUIRED = 33,000(A)(C) = 33,000(12.92)(0.56) = 239,870 CF
 VOLUME PROVIDED = 239,870 CF (EL. 830.70)
 FOREBAY VOL. REQ'D = 5% (V) = 0.05(239,870) = 11,994 CF
 FOREBAY VOL. PROVIDED = 12,445 CF (EL. 822.0 TO 825.0)
 100-YR VOL = 16,500(A)(C) = 16,500(12.98)(0.56) = 119,935 CF @ 827.63
 BANKFULL VOL = 8,170(A)(C) = 8,170(12.98)(0.56) = 59,368 CF @ 825.51

INFILTRATION RATE
 @ 100-YR ELEV = 2.02 CFS @ 827.63
 @ BOTTOM ELEV = 0.86 CFS @ 822.00
 @ AVG ELEV = 1.63 CFS @ 825.75

RETENTION TIME = 40.2 HR

EXISTING BASIN F PREVIOUSLY CONSTRUCTED. MODIFICATION OF BASIN F TO OCCUR DURING THE MEADOWS AT ARBOR RIDGE PHASE 1 CONSTRUCTION CONSISTS OF INSTALLATION OF RISER OUTLET STRUCTURE AND STORM SEWER RUN R373-R336.

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DIVERSE REAL ESTATE LLC
 ARBOR RIDGE CROSSING, PHASES 1 & 2
 FINAL SITE PLAN
 DETENTION BASIN F
 PLAN, PROFILE AND
 CALCULATIONS

DATE: JUNE 6, 2014

REVISIONS/SUBMITTALS
 2014-08-05 WRC COMMENTS
 2014-09-08 PER TWP.
 2014-09-22 PER TWP.
 2014-09-29 PER TWP.
 2014-10-28 PER TWP.
 2014-12-12 PER TWP.
 2015-01-13 PER TWP.

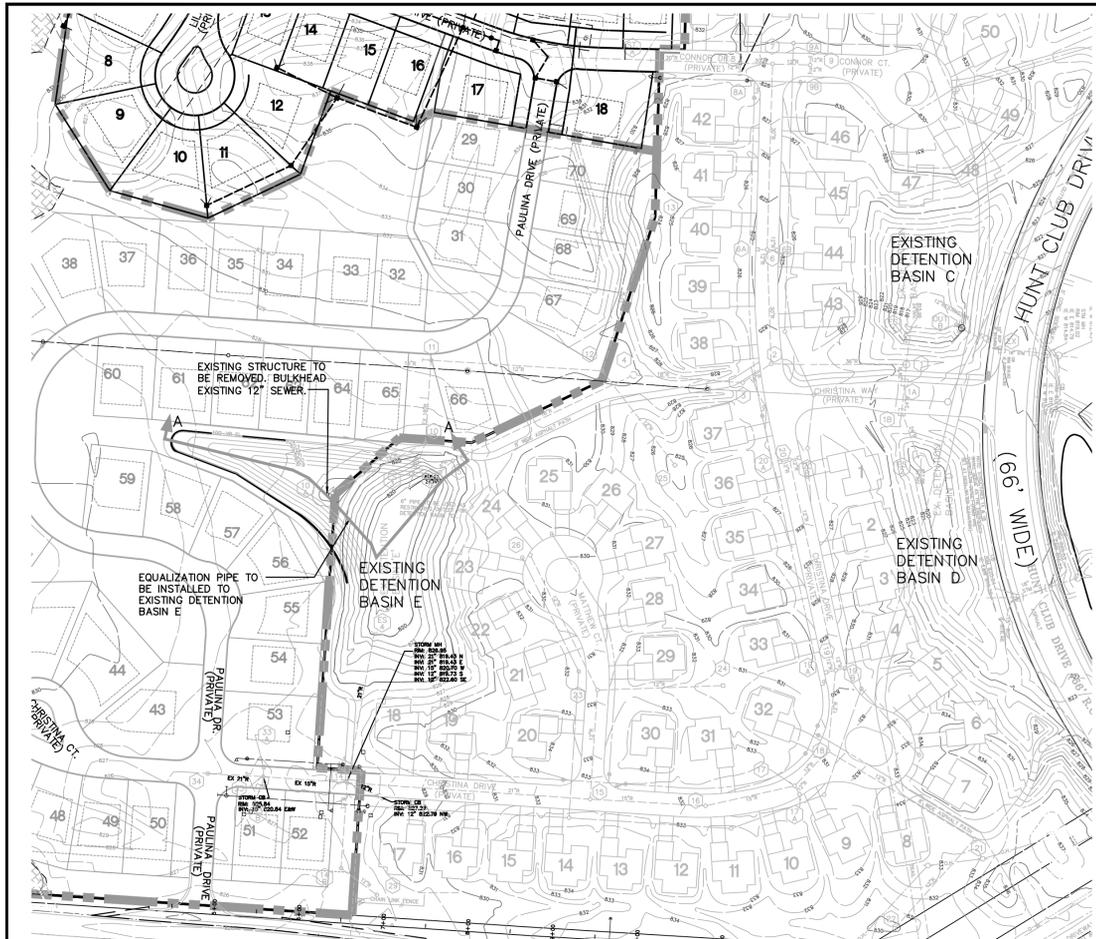
SCALE
 0 150 300
 1" = 300 FEET

DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 3008195F2-12-DETENTION
 JOB #: 12001809
 FILE CODE:
 SHEET NO. 71



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

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ANALYSIS OF EXISTING BASINS C,D AND E

Basin	C-factor	Tri-Area (ac) from Arbor Ridge Phase 1	Volume Required (cf)	Volume (as-built)	HWE (as-built)	Remaining Volume for The Meadows			
C	0.35	4.88	18,669	67,277	823.67	57,608			
D	0.35	1.23	4,705	42,184	823.67	37,479			
E	0.35	10.12	38,715	82,079	824.14	43,364			
						138,451			
E (PROPOSED ADDITION)						71,942	824.34	210,393	TOTAL (REVISED)

DETENTION BASINS C AND D CONTRIBUTING VOLUME FROM THE MEADOWS

I. Total Volume of Detention Area: 100 Year storm - Basins C&D Proposed Conditions

Surface	area (ac)	c factor	c/A
building/driveways	1.08	0.95	1.77
pavement	1.08	0.95	1.50
water	0.00	1.00	0.00
grass	5.41	0.36	1.96
	8.56	0.51	

Developed Runoff Coefficient: C = 0.59

Allowable Release Rate, $Q_a = 0.15 \text{ cfs} \times A = 1.34 \text{ cfs}$

Max Outflow Per Acre Imp, $Q_o = Q_a / (A/C) = 0.25 \text{ cfs} / \text{ac-imp}$

Storage Time, $T = -25 + (10312.5/Q_a)(1/2) = 177.0 \text{ min}$

Storage per Acre Imp, $V_s = (16500 \times T)(1 + 25) - 40 \times Q_a \times T = 12696.1 \text{ cf} / \text{ac-imp}$

Total Storage Required, $V_t = V_s \times A \times C = 62725 \text{ cf}$

DETENTION BASIN C AS-BUILT VOLUME

Elevation	Surface Area (SF)	Volume (CF)	Total Volume (CF)
818	1,853	358	358
817	1,807	3,096	3,454
816	4,999	3,267	6,721
815	7,371	8,061	15,432
814	10,000	15,359	25,791
813	12,858	26,788	39,649
812	16,000	44,217	55,657
811	19,630	62,132	71,792
810	22,368	80,547	82,915

Storage Volume Provided = 76,277

Overflow = 823.67

DETENTION BASIN D AS-BUILT VOLUME

Elevation	Surface Area (SF)	Volume (CF)	Total Volume (CF)
819	305	153	153
818	1,300	710	863
817	7,420	5,872	7,732
816	15,000	12,000	27,000
815	19,338	15,068	34,406
814	22,712	18,170	42,576

Storage Volume Provided = 42,184

Overflow = 823.67

TOTAL VOLUME REQUIRED FOR BASINS C,D AND E
 $V = 67,275 + 95,737 = 163,012 \text{ CF}$

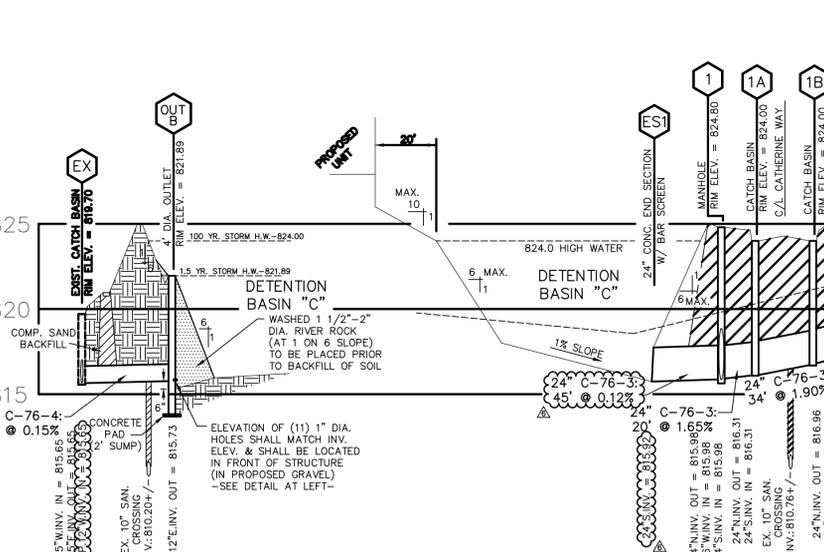
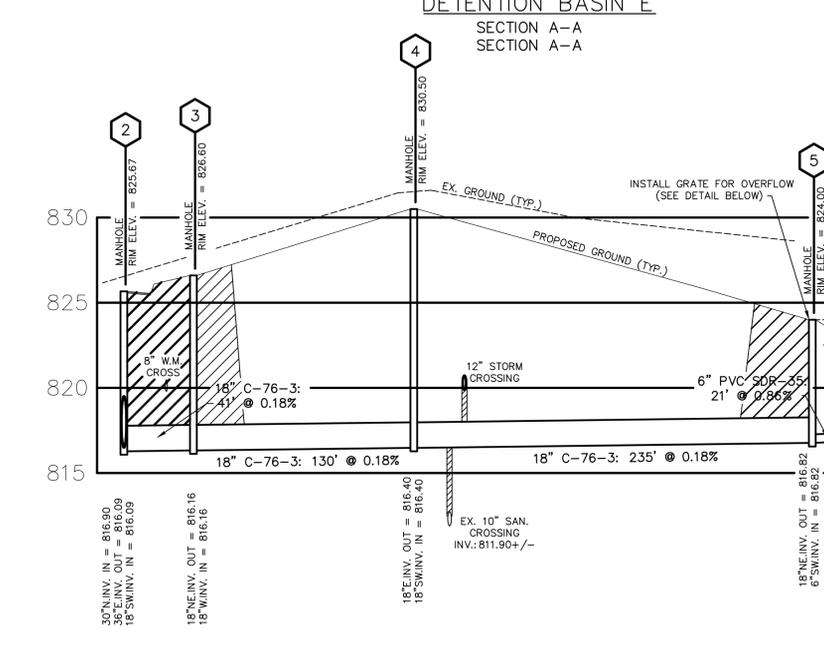
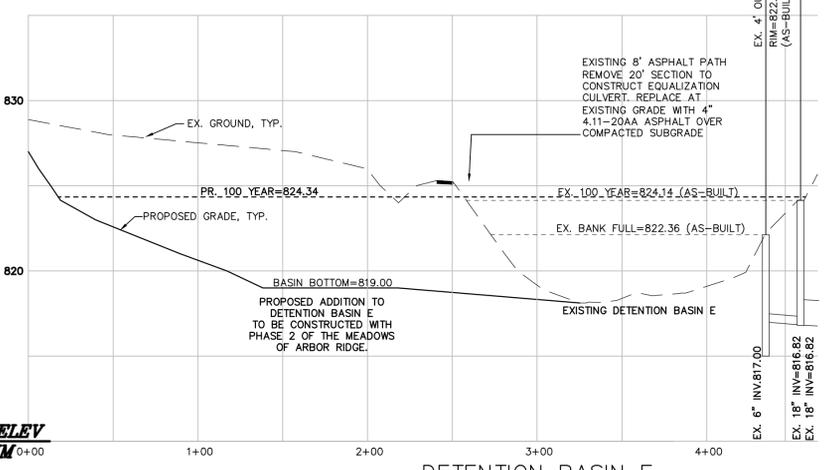
TOTAL VOLUME AVAILABLE FOR BASINS C,D AND E
 $V = 169,553 \text{ CF (SEE TABLE)}$

NOTE:
 EXISTING BASINS C,D AND E WERE DESIGNED TO WORK IN UNISON. THEREFORE, THE OVERALL AVAILABLE VOLUME FOR ALL THREE (3) BASINS WERE ANALYZED WITH THE OVERALL REQUIRED VOLUME.

TOTAL CAPACITY OF BASIN E

AS-BUILT VOLUME = 89,359 CF
 ADDITIONAL VOLUME = 71,942 CF

TOTAL VOLUME = 161,301 CF AT EL. 824.34



ORIGINAL DETENTION CALCULATIONS FOR BASINS C,D AND E PER SEIBER, KEAST AND ASSOC. PLANS DATED JULY 1995

STORM DETENTION CALCULATIONS FOR BASINS "C" & "D"

DETERMINE DETENTION REQUIRED (100-YEAR STORM)
 $Q_{11} = 4.11 \text{ cfs} \times (0.20 \text{ cfs/ac})$
 $AC = 20.56 \text{ (AREA TRIBUTARY TO THE DETENTION BASIN)}$
 $C = 0.35$
 $Q_0 = Q_{11} / (C \times AC \times C) = 0.57$
 $T = -25 + \text{SORT}(10312.5/Q_0) = 109.34 \text{ min}$
 $V_s = (16500 \times T)(1 + 25) - 40 \times Q_0 \times T = 10930.23 \text{ C.F./ac-imp}$
 $V_t = V_s \times AC \times C = 133665 \text{ C.F.}$

DETECTION PROVIDED (BASIN "C")

CONTOUR (CH.W.)	AREA (S.F.)	VOLUME (C.F.)
824.00	23211	21083
823.00	18954	16971
822.00	14988	13522
821.00	12056	10636
820.00	9215	8156
819.00	7096	6381
818.00	5065	4599
817.00	1652	1491
816.00	85	13
815.73	10	10

DETECTION PROVIDED (BASIN "D")

CONTOUR (CH.W.)	AREA (S.F.)	VOLUME (C.F.)
824.00	20455	18174
823.00	15892	14197
822.00	12802	11419
821.00	8560	10531
820.00	4768	6664
819.00	1173	2971
818.00	10	592

DETECTION PROVIDED (BASIN "E")

CONTOUR (CH.W.)	AREA (S.F.)	VOLUME (C.F.)
824.00	20608	24402
823.00	15993	19923
822.00	14318	16157
821.00	11021	12670
820.00	6728	8875
819.00	2094	4411
818.00	10	1052

DETERMINE ULTIMATE OUTLET SIZE (STRUCTURE "OUT-A")

DETERMINE DRAIN SIZE (STRUCTURE #1)

TOTAL $Q_{11} = 0.32 \text{ cfs}$ $Q_{11} = 6.99 + 1.73 = 8.72 \text{ cfs}$
 $h = 8.15 \text{ feet}$
 $Area = 0.15 \text{ S.F.}$ $Q_{11} = 5.06 - 3.33 = 1.73 \text{ cfs}$
 $Dia. = 3.19 \text{ in.}$
 USE 6 in. Dia. Outlet

STORM SEWER PROFILES
 SCALE: HOR. 1" = 50'
 VERT. 1" = 5'

NOTE:
 THE PROFILES OF THE EXISTING BASINS AND STORM SEWER ARE FROM SEIBER, KEAST & ASSOCIATES, INC. DRAWINGS DATED JANUARY 1995 (JOB NO. 92-039)



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DIVERSE REAL ESTATE LLC
 ARBOR RIDGE CROSSING, PHASES 1 & 2
 FINAL SITE PLAN
 DETENTION BASIN C, D AND E PLAN,
 PROFILE AND CALCULATIONS

DATE: JUNE 6, 2014
 REVISIONS/SUBMITTALS
 2014-08-05: WRC COMMENTS
 2014-09-08: PER TWP
 2014-09-22: PER TWP
 2014-09-29: PER TWP
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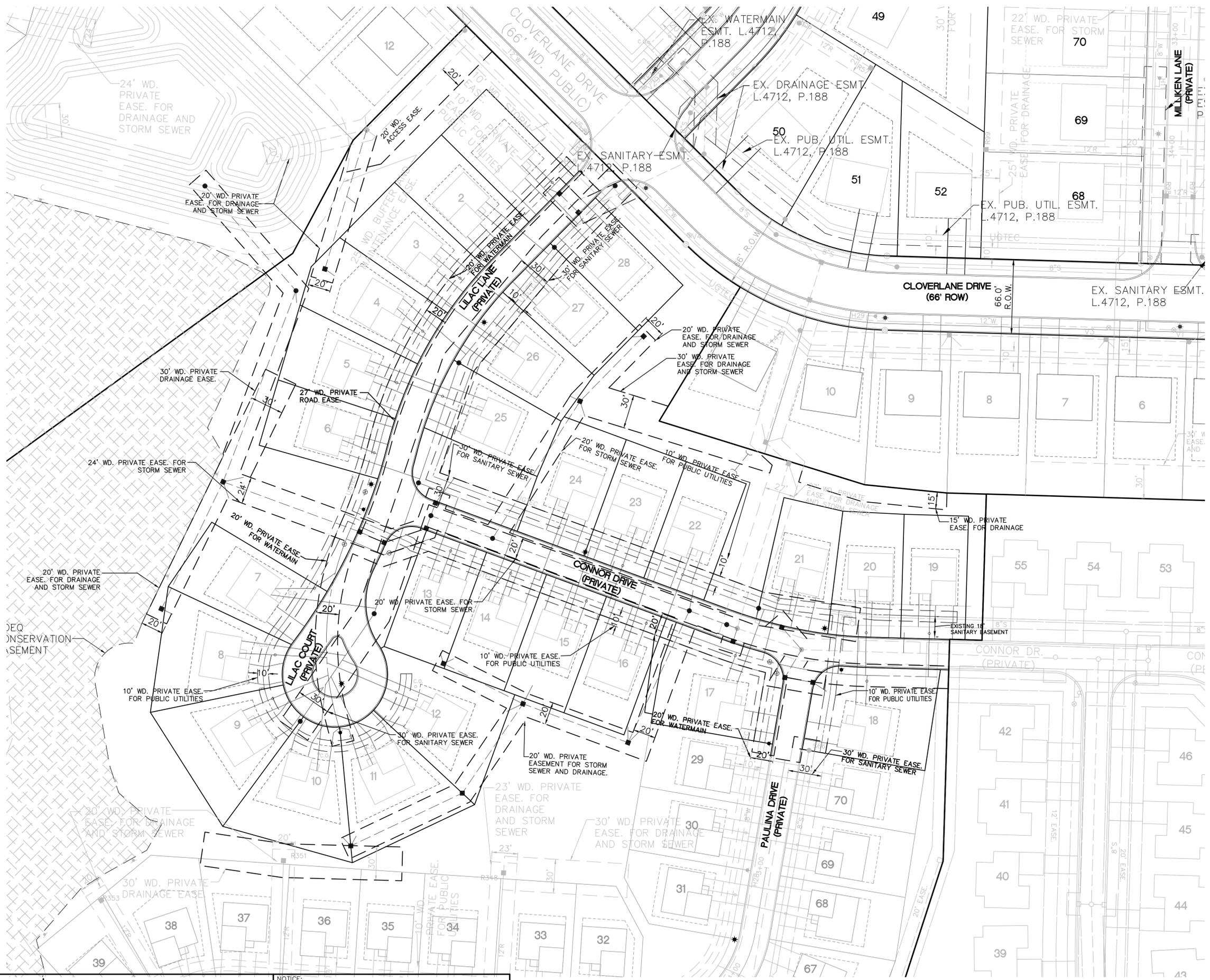
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 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 3008195F2-12-DETENTION
 JOB #: 12001809
 FILE CODE:
 SHEET NO. 72

PAGE NO. 26

STORM SEWER CALCULATIONS

From STR	To STR	HYDROLOGY									HYDRAULICS								ELEVATIONS					
		Trib. Area Label	Drainage Area A. Ac.	Runoff Coeff. C	Equiv. Area (Ax.C)	Add'l Laterals (Ax.C)	Sum of (Ax.C)	Time Conc. (min.)	Intensity I (in./hr)	Flow Q (cfs)	Min HG for Q (%)	Pipe Length (ft.)	Pipe Dam. (in.)	Pipe Slope (%)	Pipe Area (s.f.)	Pipe Cap. (cfs)	HG Slope (%)	Vel. @ Full (ft/sec)	Time of flow (min)	HGL Upper STR	HGL Low er STR	Invert Upper STR	Invert Low er STR	Upper Ground/ Rm
R237	R231	237	0.27	0.43	0.116	0.000	0.116	20.00	3.89	0.45	0.016	129	12	2.00	0.79	5.04	0.02	6.4	0.34	826.25	826.23	828.01	825.43	832.58
R236	R235	236	1.23	0.57	0.701	0.000	0.701	20.00	3.89	2.73	0.178	168	15	0.33	1.23	3.71	0.18	3.0	0.93	827.45	827.16	826.71	826.16	830.95
R235	R234	-	0.00	0.57	0.000	0.701	0.701	20.93	3.81	2.67	0.171	41	15	0.33	1.23	3.71	0.17	3.0	0.23	826.99	826.92	826.06	825.92	832.03
R234	R233	234	0.81	0.57	0.462	0.701	1.163	21.15	3.79	4.41	0.176	35	18	0.28	1.77	5.56	0.18	3.1	0.19	826.89	826.83	825.73	825.63	831.00
R233	R232	233	0.84	0.57	0.479	1.163	1.642	21.34	3.78	6.20	0.348	32	18	0.26	1.77	5.36	0.35	3.0	0.18	826.77	826.65	825.53	825.43	831.00
R232	R231	-	0.00	0.45	0.000	1.642	1.642	21.51	3.76	6.18	0.346	124	18	0.26	1.77	5.36	0.35	3.0	0.68	826.65	826.23	825.35	825.03	832.15
R231	R230	231	0.94	0.45	0.423	1.758	2.181	22.20	3.71	8.09	0.128	70	24	0.18	3.14	9.60	0.13	3.1	0.38	826.19	826.10	824.63	824.50	830.50
R230								22.58					24										0.00	
R373	R372	373	1.00	0.11	0.110	0.000	0.110	20.00	3.89	0.43	0.014	123	12	0.44	0.79	2.36	0.01	3.0	0.68	826.01	825.99	825.73	825.19	831.00
R372	R336	-	0.00	0.00	0.000	0.110	0.110	20.68	3.83	0.42	0.014	182	12	0.44	0.79	2.36	0.01	3.0	1.01	825.22	825.20	825.20	824.40	833.90
		*** From Hydratlow model, Q10 = 0.43cfs from Basin F.																						
R377	R339	377	0.16	0.43	0.069	0.000	0.069	20.00	3.89	0.27	0.006	81	12	0.44	0.79	2.36	0.01	3.0	0.45	827.37	827.37	827.52	827.16	831.80
R339	R331	339	0.22	0.43	0.095	0.069	0.163	20.45	3.85	0.63	0.031	145	12	0.44	0.79	2.36	0.03	3.0	0.80	827.37	827.32	827.16	826.52	832.00
R340	R332	340	0.22	0.43	0.095	0.000	0.095	20.00	3.89	0.37	0.011	12	12	0.44	0.79	2.36	0.01	3.0	0.07	827.82	827.82	827.07	827.02	831.78
R376	R375		0.18	0.43	0.077	0.000	0.077	20.00	3.89	0.30	0.007	110	12	0.44	0.79	2.36	0.44	3.0	0.61	825.84	825.36	825.04	824.56	829.50
R375	R338A		0.10	0.43	0.043	0.077	0.120	20.61	3.84	0.46	0.017	96	12	0.44	0.79	2.36	0.44	3.0	0.53	825.36	824.94	824.56	824.14	832.80
R374	R338A		0.01	0.43	0.004	0.000	0.004	20.00	3.89	0.02	0.000	79	12	2.00	0.79	5.04	0.00	6.4	0.21	827.84	827.84	828.62	827.04	833.50
R338A	R338	R338A	0.43	0.43	0.185	0.125	0.310	20.21	3.87	1.20	0.113	100	12	0.44	0.79	2.36	0.11	3.0	0.55	824.47	824.36	824.00	823.56	831.28
R338	R330	338	0.34	0.43	0.146	0.310	0.456	20.76	3.82	1.74	0.239	129	12	0.44	0.79	2.36	0.24	3.0	0.71	823.44	823.13	822.90	822.33	829.33
R337	R336	337	0.36	0.59	0.212	0.000	0.212	20.00	3.89	0.83	0.054	126	12	0.50	0.79	2.52	0.05	3.2	0.65	826.16	826.10	825.93	825.30	829.95
R336	R335	336	0.50	0.59	0.295	0.322	0.617	20.65	3.83	2.37	0.441	129	12	0.50	0.79	2.52	0.44	3.2	0.67	825.12	824.55	824.40	823.75	829.40
R335	R334	335	0.40	0.59	0.236	0.617	0.853	21.32	3.78	3.22	0.819	25	12	0.70	0.79	2.98	0.82	3.8	0.11	824.08	823.88	823.25	823.08	832.33
R334	R333	334	0.43	0.59	0.254	0.853	1.107	21.43	3.77	4.17	0.417	39	15	0.50	1.23	4.57	0.42	3.7	0.17	823.84	823.68	822.88	822.68	832.33
R333	R332	333	0.13	0.59	0.077	1.107	1.184	21.61	3.75	4.44	0.473	12	15	0.50	1.23	4.57	0.47	3.7	0.05	823.61	823.55	822.58	822.52	831.78
R332	R331	-	0.00	0.59	0.000	1.278	1.278	21.66	3.75	4.79	0.551	59	15	0.50	1.23	4.57	0.55	3.7	0.26	823.55	823.22	822.52	822.22	832.06
R331	R330	-	0.00	0.45	0.000	1.442	1.442	21.93	3.73	5.38	0.262	187	18	0.50	1.77	7.43	0.26	4.2	0.74	822.78	822.29	822.02	821.09	833.23
R330	R316	-	0.00	0.45	0.000	1.898	1.898	22.67	3.67	6.97	0.440	36	18	1.00	1.77	10.50	0.44	5.9	0.10	821.99	821.83	820.99	820.63	831.13
R316	R306	-	0.00	0.59	0.000	1.898	1.898	22.67	3.67	6.97	0.440	10	18	1.00	1.77	10.50	0.44	5.9	0.03	821.77	821.73	820.63	820.53	830.37
R328	R329	328	0.33	0.63	0.208	0.000	0.208	20.00	3.89	0.81	0.051	25	12	0.44	0.79	2.36	0.05	3.0	0.14	827.80	827.79	827.10	826.99	831.20
R329	R313	329	0.33	0.43	0.142	0.208	0.350	20.14	3.88	1.36	0.145	123	12	0.48	0.79	2.47	0.14	3.1	0.65	827.38	827.20	826.99	826.40	831.20
R326	R323	326	0.00	0.43	0.000	0.000	0.000	20.00	3.89	0.00	0.000	66	12	0.44	0.79	2.36	0.00	3.0	0.37	826.60	826.60	826.09	825.80	830.13
R325	R324	325	0.09	0.59	0.053	0.000	0.053	20.00	3.89	0.21	0.003	35	12	0.50	0.79	2.52	0.00	3.2	0.18	826.87	826.87	826.25	826.07	830.61
R324	R323	324	0.27	0.59	0.159	0.053	0.212	20.18	3.87	0.82	0.053	44	12	0.50	0.79	2.52	0.05	3.2	0.23	826.58	826.55	825.97	825.75	830.61
R323	R322	-	0.00	0.59	0.000	0.212	0.212	20.41	3.85	0.82	0.053	74	12	0.50	0.79	2.52	0.05	3.2	0.38	825.27	825.23	824.80	824.43	832.14
R322	R321	322	0.06	0.59	0.035	0.212	0.248	20.79	3.82	0.95	0.071	140	12	0.50	0.79	2.52	0.07	3.2	0.73	824.53	824.43	824.33	823.63	833.33
R321	R309	321	0.06	0.59	0.035	0.248	0.283	21.52	3.76	1.07	0.089	133	12	1.00	0.79	3.56	0.09	4.5	0.49	823.22	823.10	823.53	822.20	833.34
R320A	R306	R320A	0.19	0.43	0.082	0.000	0.082	20.00	3.89	0.32	0.008	13	12	0.44	0.79	2.36	0.01	3.0	0.07	826.23	826.23	825.48	825.43	829.95
R320	R305	320	0.46	0.43	0.198	0.000	0.198	20.00	3.89	0.77	0.047	27	12	0.44	0.79	2.36	0.05	3.0	0.15	826.31	826.30	825.62	825.50	829.71
R319	R318	319	0.29	0.63	0.183	0.000	0.183	20.00	3.89	0.71	0.040	26	12	0.44	0.79	2.36	0.04	3.0	0.14	825.14	825.13	824.44	824.33	829.17
R318	R305	318	0.30	0.43	0.129	0.183	0.312	20.14	3.88	1.21	0.115	29	12	0.44	0.79	2.36	0.12	3.0	0.16	821.11	821.08	820.41	820.28	829.17
R317	R315	317	0.03	0.59	0.018	0.000	0.018	20.00	3.89	0.07	0.000	54	12	3.70	0.79	6.85	0.00	8.7	0.10	827.90	827.90	829.10	827.10	832.60
R315	R314	315	0.40	0.59	0.236	0.018	0.254	20.10	3.88	0.98	0.076	29	12	0.48	0.79	2.47	0.08	3.1	0.15	827.68	827.66	827.00	826.86	831.12
R314	R313	314	0.60	0.59	0.354	0.254	0.608	20.26	3.87	2.35	0.435	60	12	0.44	0.79	2.36	0.44	3.0	0.33	827.16	826.90	826.36	826.10	831.12
R313	R312	-	0.00	0.59	0.000	0.958	0.958	20.59	3.84	3.68	0.324	93	15	0.33	1.23	3.71	0.32	3.0	0.51	826.89	826.59	825.90	825.59	833.03
R312	R311	-	0.00	0.59	0.000	0.958	0.958	21.10	3.80	3.63	0.317	50	15	0.33	1.23	3.71	0.32	3.0	0.28	823.58	823.43	822.59	822.43	831.22
R311	R310	311	0.54	0.45	0.243	0.958	1.201	21.38	3.77	4.53	0.186	35	18	0.35	1.77	6.21	0.19	3.5	0.17	823.37	823.30	822.23	822.10	829.91
R310	R309	310	0.65	0.59	0.384	1.201	1.584	21.54	3.76	5.96	0.321	29	18	0.35	1.77									



DATE	JULY 21, 2014
REVISIONS/SUBMITTALS	
12/12/14 PER TWP CONSULTANTS	
04/01/15 PER TWP CONSULTANTS	
05/20/15 PER TWP CONSULTANTS	

SCALE	0 20 40 1" = 40 FEET
DRAWN BY:	GMS
CHECKED BY:	GMS
PROJECT MANAGER:	EL
CAD:	30081952-14-L-EM
JOB #:	12001809
FILE CODE:	
SHEET NO.	



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND UTILITIES.

NOTICE:
 CONSTRUCTION SITE SAFETY IS THE SOLE RESPONSIBILITY OF THE CONTRACTOR. NEITHER THE OWNER NOR THE ENGINEER SHALL BE EXPECTED TO ASSUME ANY RESPONSIBILITY FOR SAFETY OF THE WORK, OF PERSONS ENGAGED IN THE WORK, OF ANY NEARBY STRUCTURES, OR OF ANY OTHER PERSONS.

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LEGEND



LILAC LANE
D3-1

200' STREET TREE LOCATION
STOP APPROACH. SEE DETAIL
THIS SHEET.

NOTES:
1. SIGHT DISTANCE DESIGN SPEED WITHIN SITE IS 25 MPH. MORGAN ROAD DESIGN SPEED IS 55 MPH. CARPENTER ROAD DESIGN SPEED IS 45 MPH. SITE DISTANCE TRIANGLE IN ACCORDANCE WITH THE WASHTENAW COUNTY ROAD COMMISSION STANDARD DETAIL GUIDE FOR CORNER SIGHT DISTANCE. SEE DETAIL THIS SHEET.

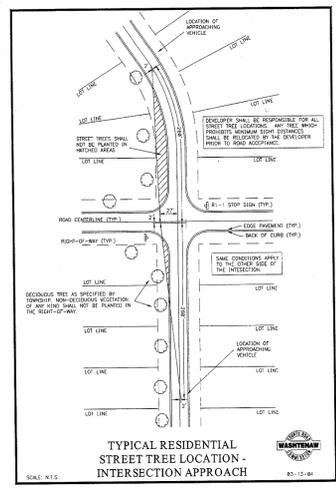


Figure 33: Typical Residential Street Tree Location, Intersection Sight Distance

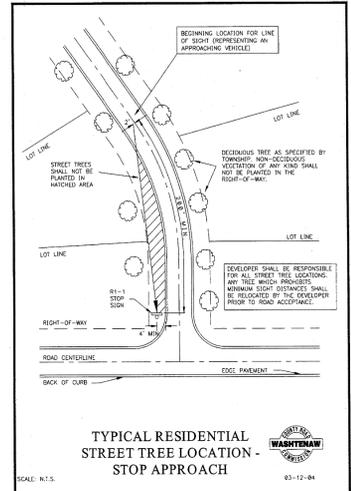


Figure 32: Typical Residential Street Tree Location, Stop Approach



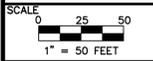
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SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
TRAFFIC CONTROL AND SIGNING PLAN

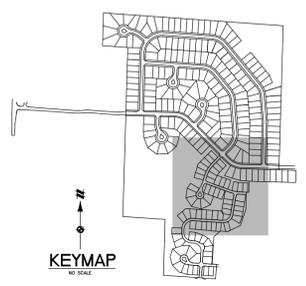
DATE: JULY 21, 2014
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05/20/15 PER TWP CONSULTANTS



DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819SF2-15-TC
JOB #: 12001809
FILE CODE:
SHEET NO.



NOTE:
 1. ALL TREES SHALL BE LOCATED OUTSIDE OF SIGHT TRIANGLES TO ACHIEVE 260 FEET OF INTERSECTION SIGHT DISTANCE AND 200 FEET OF STOP SIGN SIGHT DISTANCE.
 2. TREES, ROCKS, LANDSCAPING, BERMS, HEADWALLS, PRIVATE SIGNS, SPRINKLERS, OR PRIVATELY OWNED UTILITIES SHALL NOT BE ALLOWED IN THE RIGHT-OF-WAY.
 3. SEE SOIL EROSION CONTROL PLAN SHEETS FOR ADDITIONAL INFORMATION.



THE LOCATIONS OF EXISTING UNDERGROUND UTILITIES ARE SHOWN IN AN APPROXIMATE WAY ONLY AND HAVE NOT BEEN INDEPENDENTLY VERIFIED BY THE OWNER OR ITS REPRESENTATIVE. THE CONTRACTOR SHALL DETERMINE THE EXACT LOCATION OF ALL EXISTING UTILITIES BEFORE COMMENCING WORK, AND AGREES TO BE FULLY RESPONSIBLE FOR ANY AND ALL DAMAGES WHICH MIGHT BE OCCASIONED BY THE CONTRACTOR'S FAILURE TO EXACTLY LOCATE AND PRESERVE ANY AND ALL UNDERGROUND

NOTICE:
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SECTION 13
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 PITTSFIELD TOWNSHIP
 WASHTENAW COUNTY, MICHIGAN

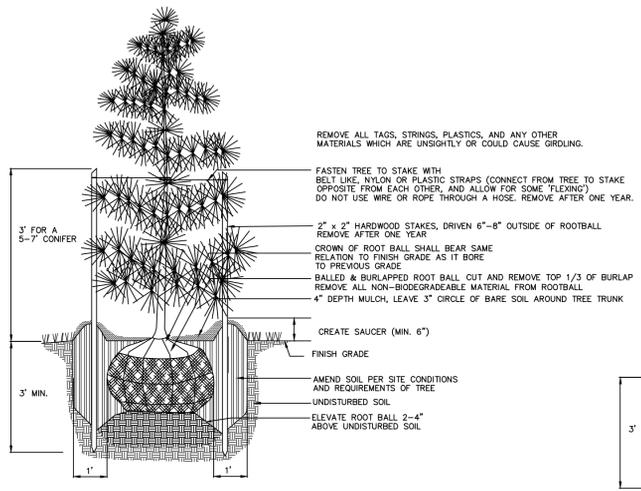
DIVERSE REAL ESTATE LLC
 THE MEADOWS OF ARBOR RIDGE
 FINAL SITE PLAN - PHASE 1
 LANDSCAPE PLAN

DATE: JULY 21, 2014
 REVISIONS/SUBMITTALS
 12/12/14 PER TWP CONSULTANTS
 04/01/15 PER TWP CONSULTANTS
 05/20/15 PER TWP CONSULTANTS

SCALE
 0 25 50
 1" = 50 FEET

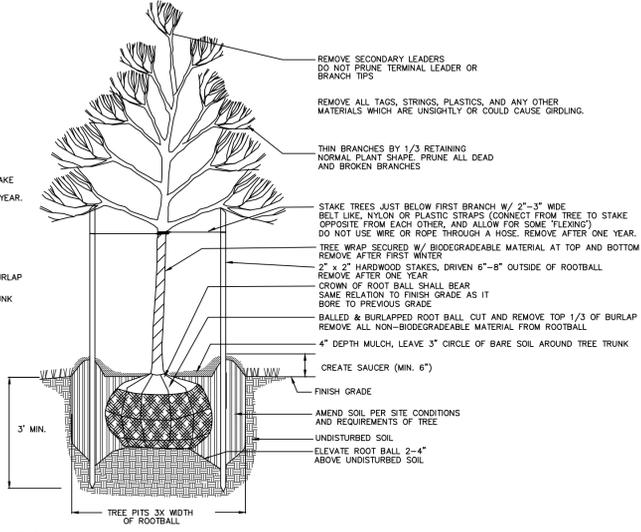
DRAWN BY: GMS
 CHECKED BY: GMS
 PROJECT MANAGER: EL
 CAD: 300819S2-16A-LS
 JOB #: 12001809
 FILE CODE:
 SHEET NO.

PAGE NO. **31**
 SHEET NO. **80**



- NOTES:
- DO NOT ALLOW AIR POCKETS TO FORM WHEN BACKFILLING
 - DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKE
 - REMOVE TREE RINGS AND STAKES TWO YEARS AFTER INSTALLATION
 - WATER TREE THOROUGHLY SUBSEQUENT TO INSTALLATION

CONIFEROUS TREE PLANTING DETAIL
BALLED AND BURLAPPED
NO SCALE



- NOTES:
- DO NOT ALLOW AIR POCKETS TO FORM WHEN BACKFILLING
 - DO NOT DAMAGE MAIN ROOTS OR DESTROY ROOT BALL WHEN INSTALLING TREE STAKE
 - REMOVE TREE RINGS AND STAKES TWO YEARS AFTER INSTALLATION
 - WATER TREE THOROUGHLY SUBSEQUENT TO INSTALLATION

DECIDUOUS TREE PLANTING DETAIL
BALLED AND BURLAPPED
NO SCALE

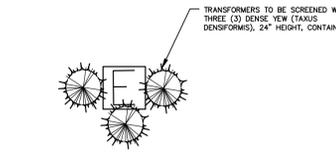
LANDSCAPE MAINTENANCE

The owner of the property shall be responsible for all maintenance of site landscaping, as follows:

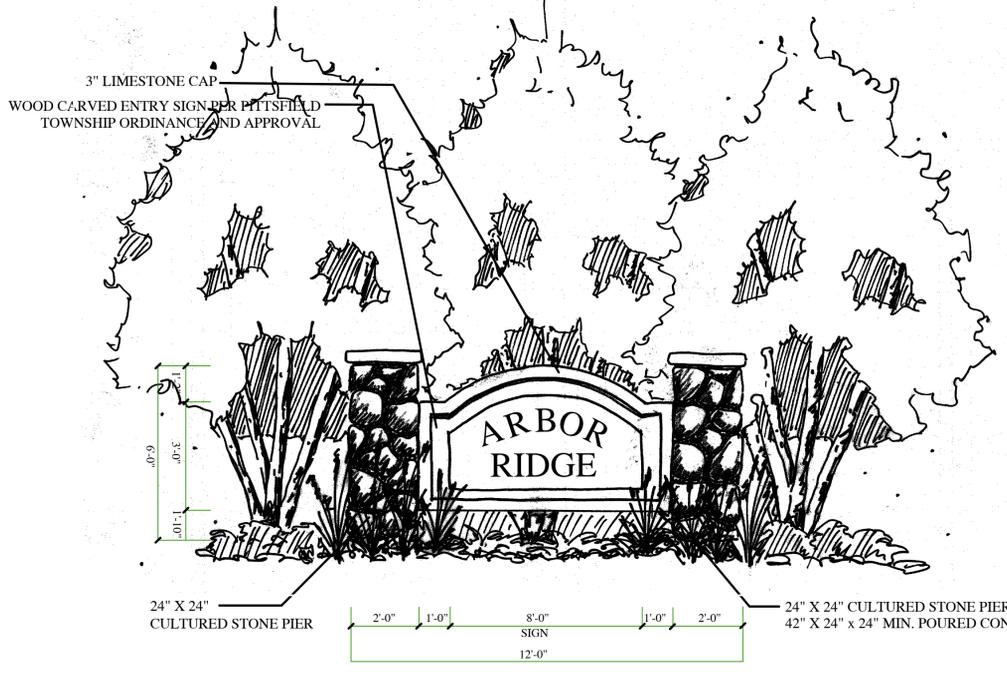
Continuing Care
Landscaping shall be kept in a neat, orderly, and healthy growing condition, free from debris and refuse. All landscape materials shall be maintained in accordance with moving, watering, weeding, feeding, and pruning. Pruning shall be minimal at the time of installation, only to remove dead or diseased branches. Subsequent pruning shall assure proper maturation of plants to achieve their approved purpose.

Replenishment
All dead or diseased plant material shall be removed and replaced within six (6) months after it dies or in the next planting season, whichever occurs first. For purposes of this, planting season for deciduous plants shall be between March 1 and June 1, and from October 1 until the prepared soil becomes frozen. The planting season for evergreen plants shall be between March 1 and June 1. Plant material installed to replace dead or diseased material shall be as close as practical to the size of the material it is intended to replace.

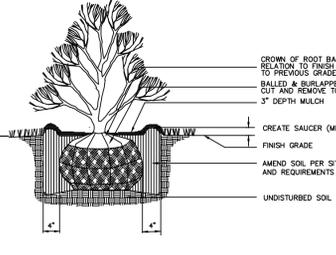
Watering
The developer, at the time of submission of the final site plan, shall demonstrate that adequate provisions have been made to supply water to all landscape areas.



TRANSFORMER SCREENING DETAIL
NO SCALE

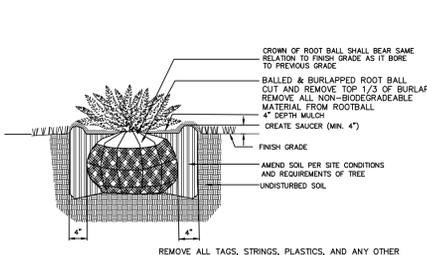


Entry Sign Detail
Not to Scale



- NOTES:
- DO NOT ALLOW AIR POCKETS TO FORM WHEN BACKFILLING
 - WATER SHRUBS IMMEDIATELY AFTER INSTALLATION

DECIDUOUS SHRUB PLANTING DETAIL
BALLED & BURLAPPED
NO SCALE



- NOTES:
- DO NOT ALLOW AIR POCKETS TO FORM WHEN BACKFILLING
 - WATER SHRUB THOROUGHLY SUBSEQUENT TO INSTALLATION

CONIFEROUS SHRUB PLANTING DETAIL
BALLED AND BURLAPPED
NO SCALE

REPLACEMENT TREE PLANTING SCHEDULE

KEY	QTY.	SPECIES	SIZE	SPEC.
Canopy Trees				
AR	52	Acer rubrum 'October Glory'	2 1/2" cal.	B&B
AF	49	October Glory Red Maple	2 1/2" cal.	B&B
AL	59	Acer rubrum 'Franksred'	2 1/2" cal.	B&B
AS	51	Red Sunset Red Maple	2 1/2" cal.	B&B
AC	60	Acer saccharum 'Legacy'	2 1/2" cal.	B&B
CO	94	Acer saccharum 'Green Mountain'	2 1/2" cal.	B&B
PT	61	Green Mountain Sugar Maple	2 1/2" cal.	B&B
QP	59	Acer saccharum 'Commemoration'	2 1/2" cal.	B&B
QR	88	Commemoration Sugar Maple	2 1/2" cal.	B&B
QB	32	Celtis occidentalis	2 1/2" cal.	B&B
TA	44	Common Hackberry	2 1/2" cal.	B&B
NS	57	Platanus x acerifolia 'Columbia'	2 1/2" cal.	B&B
Evergreen Trees				
PA	47	Picea abies	6' ht.	B&B
PG	60	Norway Spruce	6' ht.	B&B
PP	122	Picea glauca	6' ht.	B&B
PS	128	White Spruce	6' ht.	B&B
Ornamental Trees				
AM	20	Picea pungens	6'-8' ht.	B&B Multi-stem
BN	26	Amelancier canadensis	6'-8' ht.	B&B Multi-stem
CC	24	Shadbowl Serviceberry	6'-8' ht.	B&B Multi-stem
CF	17	Betula nigra	6'-8' ht.	B&B Multi-stem
		River Birch	6'-8' ht.	B&B Multi-stem
		Crataegus crusgalli	6'-8' ht.	B&B Multi-stem
		Cockspur Hawthorn	6'-8' ht.	B&B Multi-stem
		Cornus florida	6'-8' ht.	B&B Multi-stem
		White Flowering Dogwood	6'-8' ht.	B&B Multi-stem

STREET TREE PLANTING SCHEDULE

KEY	QTY.	SPECIES	SIZE	SPEC.
Canopy Trees				
AR	32	Acer rubrum 'October Glory'	2 1/2" cal.	B&B
AF	50	October Glory Red Maple	2 1/2" cal.	B&B
AL	6	Acer rubrum 'Franksred'	2 1/2" cal.	B&B
AS	53	Red Sunset Red Maple	2 1/2" cal.	B&B
AC	12	Acer saccharum 'Legacy'	2 1/2" cal.	B&B
GB	19	Acer saccharum 'Green Mountain'	2 1/2" cal.	B&B
PT	14	Green Mountain Sugar Maple	2 1/2" cal.	B&B
QP	56	Acer saccharum 'Commemoration'	2 1/2" cal.	B&B
TC	56	Commemoration Sugar Maple	2 1/2" cal.	B&B
ZS	58	Ginkgo biloba	2 1/2" cal.	B&B
		Maidenhair Tree	2 1/2" cal.	B&B
		Platanus x acerifolia 'Columbia'	2 1/2" cal.	B&B
		Columbia London Plane Tree	2 1/2" cal.	B&B
		Quercus palustris	2 1/2" cal.	B&B
		Pin Oak	2 1/2" cal.	B&B
		Tilia cordata 'Greenspire'	2 1/2" cal.	B&B
		Greenspire Littleleaf Linden	2 1/2" cal.	B&B
		Zelkova serrata	2 1/2" cal.	B&B
		Japanese Zelkova	2 1/2" cal.	B&B

LANDSCAPE DATA

Street Trees (1/50ft.)	Required	Provided
Trees (17,700 #/50)	354	356

TREE REPLACEMENT CALC'S.

DBH of Woodland Tree Removal:	2,011"
Required Replacement - 1,011 x 100%	2,011"
DBH of Heritage Tree Removal:	1,719"
Required Replacement - 1,719" x 150%	2,579"
Total Replacement Caliper Inches Req'D:	4,590"
Total Replacement Caliper Inches Provided:	4,590"

NOTE: TREES IN VERY POOR, POOR, NEAR DEAD, OR DISEASED CONDITION ARE NOT INCLUDED IN TREE REPLACEMENT CALCULATIONS.

NOTE: THE FOLLOWING CALCULATIONS WERE USED IN DETERMINING REPLACEMENTS.

1 Canopy Tree (2 1/2" cal.) = 2.5" Cal. Inches of Replacement
1 Ornamental Tree (6'-8' ht.) = 2.5" Cal. Inches of Replacement
1 Evergreen Tree (6' ht.) = 2.5" Cal. Inches of Replacement

REPLACEMENTS PROVIDED

706 Canopy Trees @ 2.5" Cal. Inches = 1,765 cal. inches of replacement
87 Ornamental Trees @ 2.5" Cal. Inches = 217.5 cal. inches of replacement
313 Evergreen Trees (6' ht.) @ 2.5" Cal. Inches = 782.5 cal. inches of replacement
380 Wetland Mitigation Trees @ 2.5 Cal. Inches = 950 cal. inches of replacement
Two 2.5" caliper to be planted on each lot in phases 3 & 4 within the first 60 days of owner occupancy as specified in the condominium association restriction/covenants. (140 lots x 2 trees x 2.5 Cal. Inches = 700 cal. inches of replacement)
One 2.5" caliper to be planted on each lot in phase 5 within the first 60 days of owner occupancy as specified in the condominium association restriction/covenants. (70 lots x 1 tree x 2.5 Cal. Inches = 175 cal. inches of replacement)

Tree replacements are shown on the plan sheets per the symbols found in the Landscape Legend. Tree replacements will be a mix of the trees listed per their category and plan symbol. Canopy trees to be 2 1/2" caliper, ornamental trees to be 6'-8' ht. multi-trunk trees, and evergreen trees to be 6' ht. All replacement trees shall meet Township Standards.

LANDSCAPE LEGEND

- PROPOSED**
- CANOPY TREE
 - RETENTION BASIN SEED MIX
 - REPLACEMENT TREE (EVERGREEN)
 - REPLACEMENT TREE (CANOPY)
(See Wetland Mitigation Planting Plan)
 - REPLACEMENT TREE (ORNAMENTAL)

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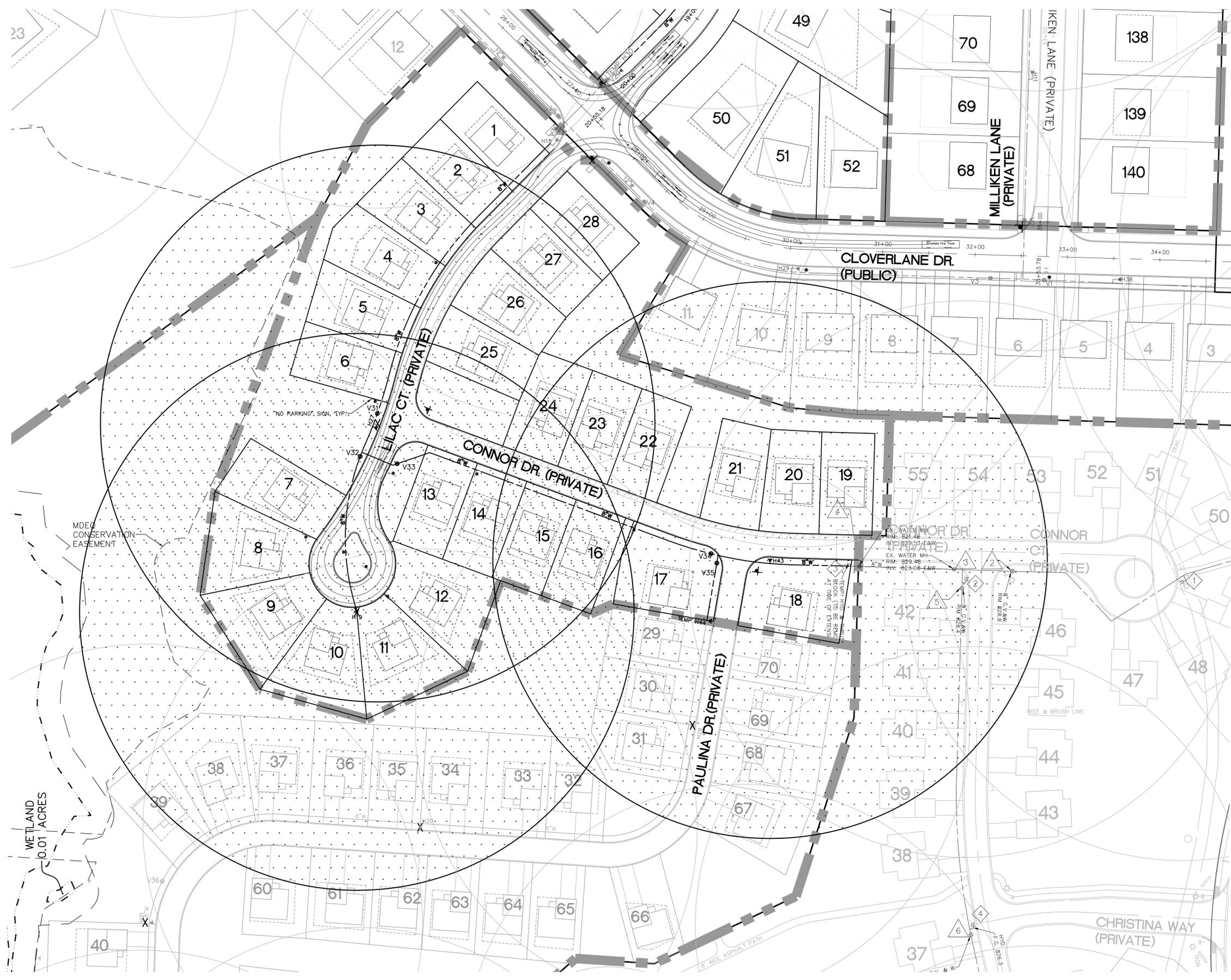
SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
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WASHTENAW COUNTY, MICHIGAN

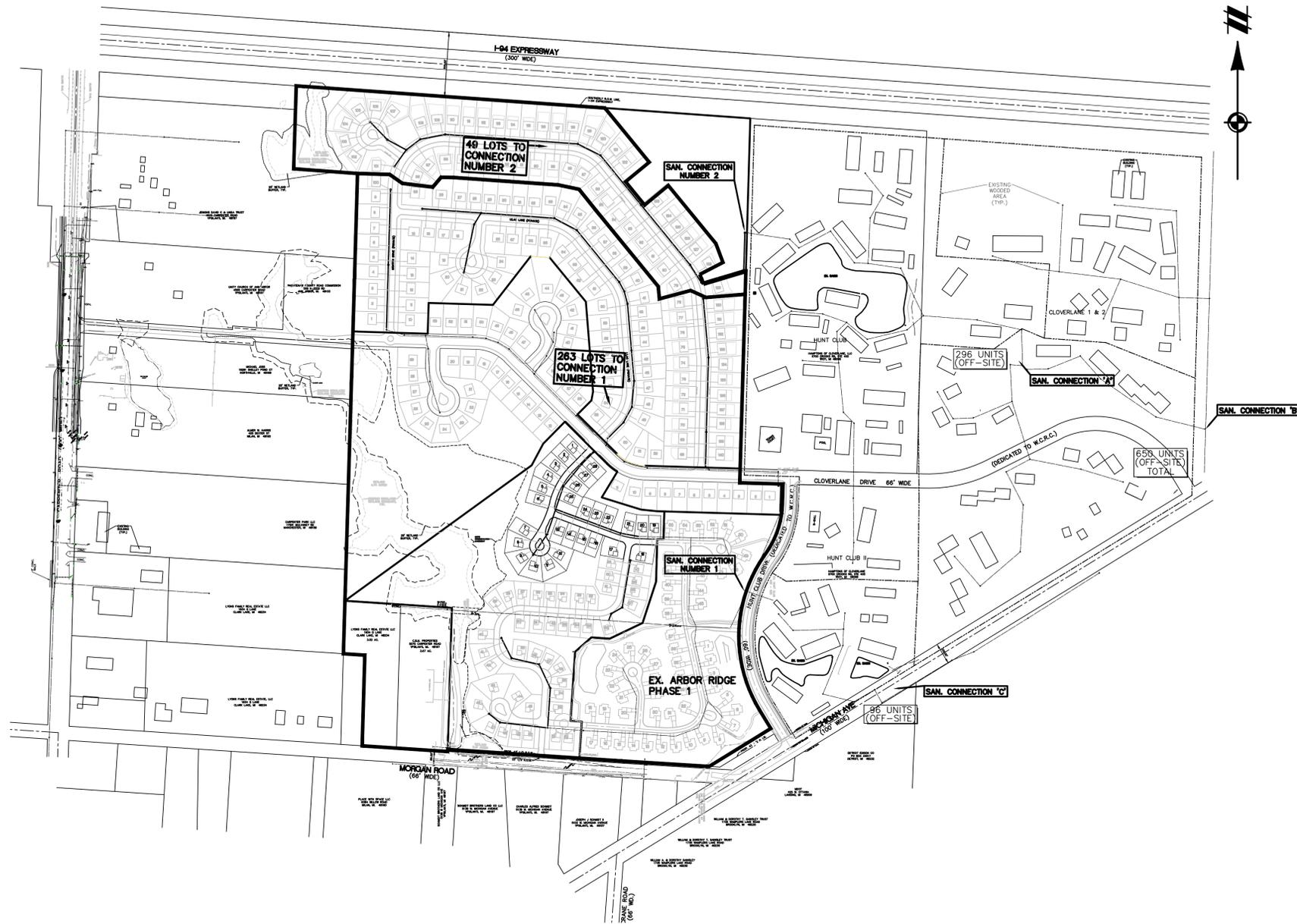
DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
LANDSCAPE NOTES AND DETAILS

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

SCALE
NO SCALE

DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819SF2-16A-LSDT
JOB #: 12001809
FILE CODE:
SHEET NO.





Sanitary Sewer Basis of Design for Connection #1

Number of Single Family Lots:	263
No. of Users per Lot:	3.5
Total Expected Population Served:	921
Average Daily Flow (per capita)	100 G.P.D.
Peaking Factor: $\frac{18+\sqrt{POP/1000}}{4+\sqrt{POP/1000}}$	3.82
Average Flow: POP * 100 =	92100 G.P.D.
	= 63,96 G.P.M.
	= 0.143 C.F.S.
Peak Flow: 0.143 * 3.82 =	0.545 C.F.S.
Pipe Capacity: 8 in. diameter	A= 0.349 sf
0.40% slope	R= 0.167 ft
0.013 Manning's 'n'	
Manning's Capacity =	0.766 C.F.S. (> 0.545)
Velocity Flowing Full =	2.20 F.P.S.

Sanitary Sewer Basis of Design for Connection #2

Number of Single Family Lots:	49
No. of Users per Lot:	3.5
Total Expected Population Served:	172
Average Daily Flow (per capita)	100 G.P.D.
Peaking Factor: $\frac{18+\sqrt{POP/1000}}{4+\sqrt{POP/1000}}$	4.17
Average Flow: POP * 100 =	17200 G.P.D.
	= 11,94 G.P.M.
	= 0.027 C.F.S.
Peak Flow: 0.027 * 4.17 =	0.111 C.F.S.
Pipe Capacity: 8 in. diameter	A= 0.349 sf
0.40% slope	R= 0.167 ft
0.013 Manning's 'n'	
Manning's Capacity =	0.766 C.F.S. (> 0.111)
Velocity Flowing Full =	2.20 F.P.S.

Sanitary Sewer Basis of Design for Connection to Pipe 'C'

Number of Single Family Lots:	263
No. of Users per Lot:	3.5
Ex. CBM (acres):	8.03
No. of Users per Acre:	12
Ex Off-Site Units:	96
No. of Users per Unit:	2.1
Total Expected Population Served:	1219
Average Daily Flow (per capita)	100 G.P.D.
Peaking Factor: $\frac{18+\sqrt{POP/1000}}{4+\sqrt{POP/1000}}$	3.74
Average Flow: POP * 100 =	121900 G.P.D.
Add'l Offsite Flow (below) =	4683 G.P.D.
	= 87.90 G.P.M.
	= 0.196 C.F.S.
Peak Flow: 0.196 * 3.74 =	0.733 C.F.S.
Pipe Capacity: 10 in. diameter	A= 0.545 sf
0.50% slope	R= 0.208 ft
0.013 Manning's 'n'	
Manning's Capacity =	1.553 C.F.S. (> 0.733)
Velocity Flowing Full =	2.85 F.P.S.

Sanitary Sewer Basis of Design for Connection to Pipe 'B'

Number of Single Family Lots:	49
No. of Users per Lot:	3.5
Ex Off-Site Units:	650
No. of Users per Unit:	2.1
Total Expected Population Served:	1537
Average Daily Flow (per capita)	100 G.P.D.
Peaking Factor: $\frac{18+\sqrt{POP/1000}}{4+\sqrt{POP/1000}}$	3.67
Average Flow: POP * 100 =	153700 G.P.D.
	= 106.74 G.P.M.
	= 0.238 C.F.S.
Peak Flow: 0.238 * 3.67 =	0.873 C.F.S.
Pipe Capacity: 10 in. diameter	A= 0.545 sf
0.53% slope	R= 0.208 ft
0.013 Manning's 'n'	
Manning's Capacity =	1.599 C.F.S. (> 0.873)
Velocity Flowing Full =	2.93 F.P.S.

	Flow	Total Flow
	GPD/AC	GPD
** Additional Flow from Commercial Properties (Rolland B. Lyons & C.B.M. Inc.)	6.69	700
		4683

SANITARY SEWER BASIS OF DESIGN PER SIEBER, KEAST AND ASSOCIATES PLANS DATED 8-4-94

SANITARY SEWER BASIS OF DESIGN (CONNECTION NO. 1)

POPULATION (HOUSES) 263.0 UNITS x 3.5 PEOPLE/UNIT =	921.0 PEOPLE
(-EX. CBM) 8.03 ACRES x 12.0 PEOPLE/ACRE =	96.4 PEOPLE
TOTAL POP. =	1017.4 PEOPLE
AVERAGE FLOW: 1017.4 PEOPLE x 100 GAL/CAP/DAY =	0.1389 CFS
PEAKING FACTOR: IF POPULATION IS LESS THAN 500 PEOPLE, USE A PEAKING FACTOR OF 4. SINCE POPULATION IS GREATER THAN 500 PEOPLE, THEREFORE, PEAKING FACTOR = $(18 + (\sqrt{SRT}) P/1000) / (4 + (\sqrt{SRT}) P/3.82)$	
PEAK FLOW: PEAK FLDV = AVERAGE FLDV x PEAKING FACTOR	
PEAK FLDV = 0.5319 CFS	
PIPE CAPACITY: 10" diameter pipe at 0.28% has a capacity of 1.15 CFS. THEREFORE, PIPE CAPACITY IS SUFFICIENT	

SANITARY SEWER BASIS OF DESIGN (CONNECTION NO. 2)

POPULATION: 97.0 UNITS x 3.5 PEOPLE/UNIT =	339.5 PEOPLE
AVERAGE FLOW: 339.5 PEOPLE x 100 GAL/CAP/DAY =	0.0525 CFS
PEAKING FACTOR: SINCE POPULATION IS LESS THAN 500 PEOPLE, USE A PEAKING FACTOR OF 4.	
PEAK FLOW: PEAK FLDV = AVERAGE FLDV x PEAKING FACTOR	
PEAK FLDV = 0.2101 CFS	
PIPE CAPACITY: 10" diameter pipe at 0.28% has a capacity of 1.15 CFS. THEREFORE, PIPE CAPACITY IS SUFFICIENT	

SANITARY SEWER BASIS OF DESIGN (FOR PIPE "A", 10" @ 0.28% SLOPE)

POPULATION: (EX. OFF-SITE) 296.0 UNITS x 2.1 PEOPLE/UNIT =	621.6 PEOPLE
(TOTAL POPULATION FOR PROPOSED CONNECTION #2) =	339.5 PEOPLE
TOTAL POP. =	961.1 PEOPLE
AVERAGE FLOW: 961.1 PEOPLE x 100 GAL/CAP/DAY =	0.1487 CFS
PEAKING FACTOR: IF POPULATION IS LESS THAN 500 PEOPLE, USE A PEAKING FACTOR OF 4. SINCE POPULATION IS GREATER THAN 500 PEOPLE, THEREFORE, PEAKING FACTOR = $(18 + (\sqrt{SRT}) P/1000) / (4 + (\sqrt{SRT}) P/3.81)$	
PEAK FLOW: PEAK FLDV = AVERAGE FLDV x PEAKING FACTOR	
PEAK FLDV = 0.5666 CFS	
PIPE CAPACITY: 10" diameter pipe at 0.28% has a capacity of 1.15 CFS. THEREFORE, PIPE CAPACITY IS SUFFICIENT	

SANITARY SEWER BASIS OF DESIGN (FOR PIPE "B", 10" @ 0.53% SLOPE)

POPULATION: (EX. OFF-SITE) 650.0 UNITS x 2.1 PEOPLE/UNIT =	1365.0 PEOPLE
(TOTAL POPULATION FOR PROPOSED CONNECTION #2) =	339.5 PEOPLE
TOTAL POP. =	1704.5 PEOPLE
AVERAGE FLOW: 1704.5 PEOPLE x 100 GAL/CAP/DAY =	0.2637 CFS
PEAKING FACTOR: IF POPULATION IS LESS THAN 500 PEOPLE, USE A PEAKING FACTOR OF 4. SINCE POPULATION IS GREATER THAN 500 PEOPLE, THEREFORE, PEAKING FACTOR = $(18 + (\sqrt{SRT}) P/1000) / (4 + (\sqrt{SRT}) P/3.64)$	
PEAK FLOW: PEAK FLDV = AVERAGE FLDV x PEAKING FACTOR	
PEAK FLDV = 0.9594 CFS	
PIPE CAPACITY: 10" diameter pipe at 0.53% has a capacity of 1.60 CFS. THEREFORE, PIPE CAPACITY IS SUFFICIENT	

SANITARY SEWER BASIS OF DESIGN (FOR PIPE "C", 10" @ 0.50% SLOPE)

POPULATION: (EX. OFF-SITE) 96.0 UNITS x 2.1 PEOPLE/UNIT =	201.6 PEOPLE
(TOTAL POPULATION FOR PROPOSED CONNECTION #1) =	897.9 PEOPLE
TOTAL POP. =	1099.5 PEOPLE
AVERAGE FLOW: 1100 PEOPLE x 100 GAL/CAP/DAY =	0.1701 CFS
PEAKING FACTOR: IF POPULATION IS LESS THAN 500 PEOPLE, USE A PEAKING FACTOR OF 4. SINCE POPULATION IS GREATER THAN 500 PEOPLE, THEREFORE, PEAKING FACTOR = $(18 + (\sqrt{SRT}) P/1000) / (4 + (\sqrt{SRT}) P/3.77)$	
PEAK FLOW: PEAK FLDV = AVERAGE FLDV x PEAKING FACTOR	
PEAK FLDV = 0.6417 CFS	
PIPE CAPACITY: 10" diameter pipe at 0.50% has a capacity of 1.55 CFS. THEREFORE, PIPE CAPACITY IS SUFFICIENT	

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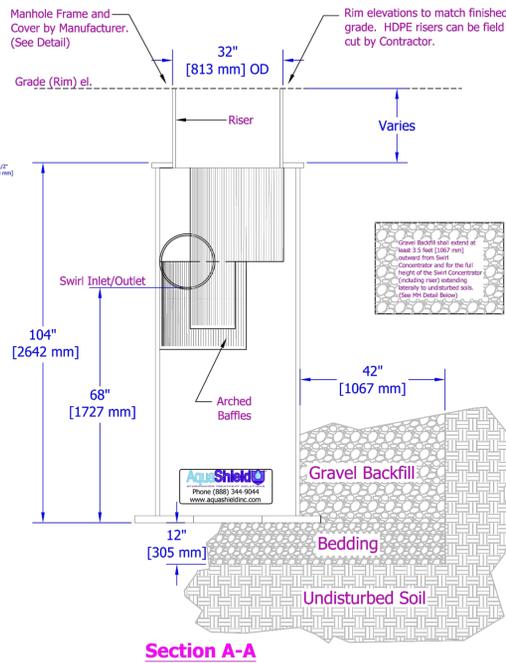
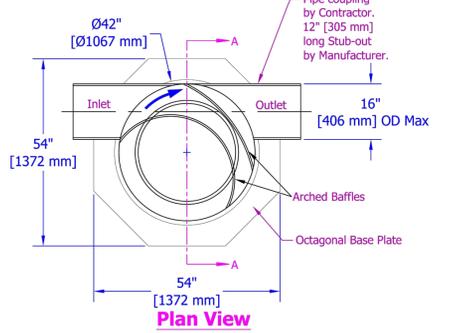
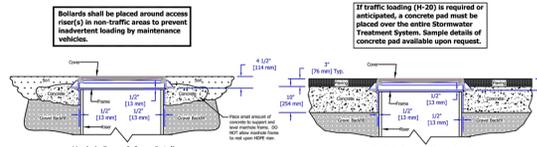
SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
FINAL SITE PLAN - PHASE 1
SANITARY SEWER DISTRICT MAP

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

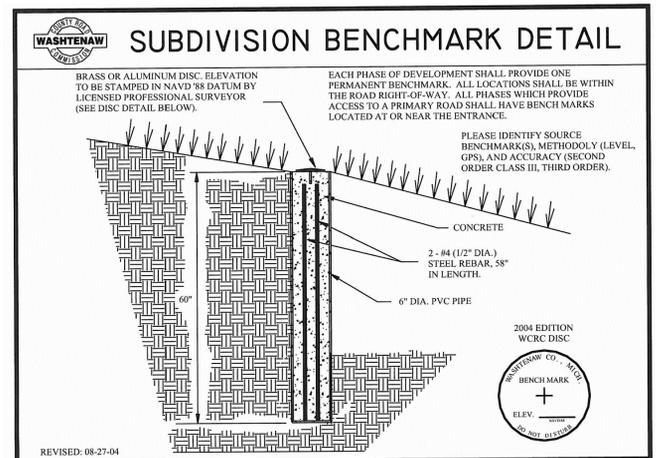
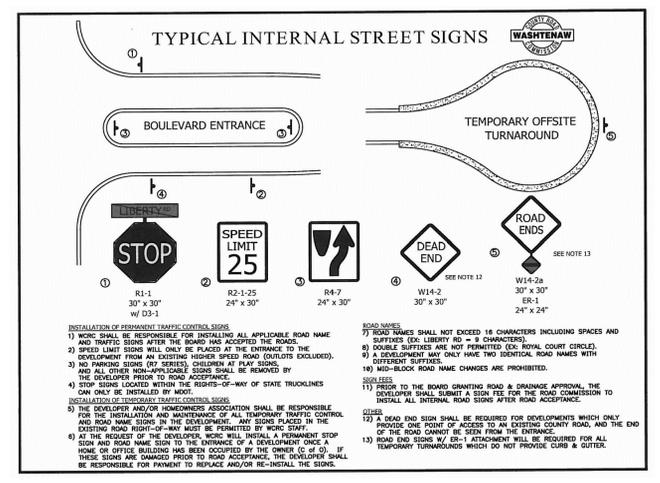
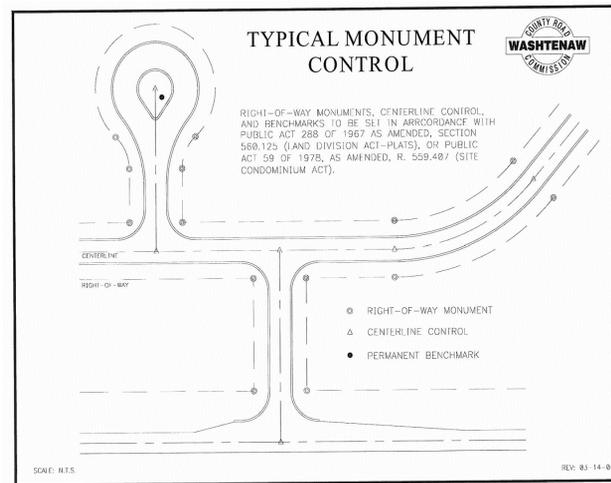
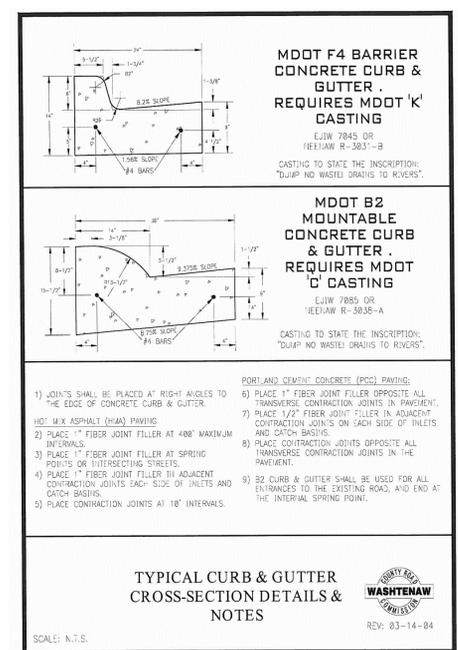
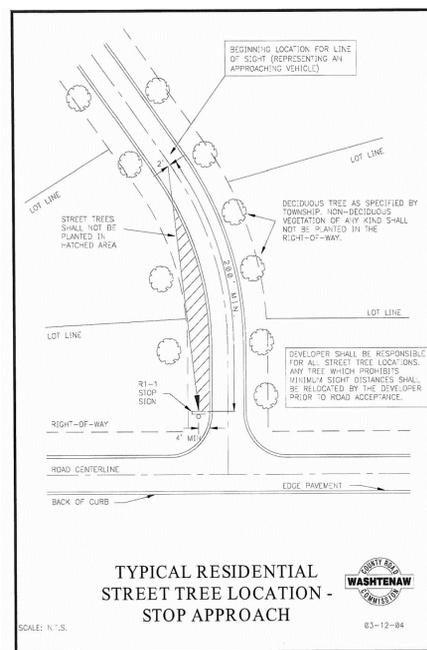
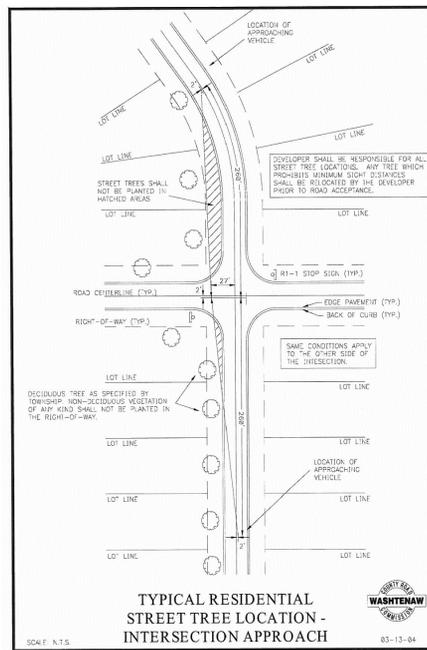
SCALE: 1" = 300 FEET
DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 300819S2-19-SDST
JOB #: 12001809
FILE CODE:
SHEET NO. 90

* Please see accompanied Aqua-Swirl specification notes.
* See Site Plan for actual system orientation.



AquaShield
2700 Kanasta Drive, Chattanooga, TN 37344
Phone (888) 344-9044 Fax (423) 256-2112
www.aquashieldinc.com
U.S. Patent No. 6,524,473 and other Patent Pending

Aqua-Swirl Concentrator Model AS-3 CFD Standard Detail



Aqua-Swirl™ Sizing Chart

Aqua-Swirl™ Model	Swirl Chamber Diameter (ft.)	Maximum Stub-Out Pipe Outer Diameter (ft.)	Water Quality Treatment Flow* (cfs)	Oil/Debris Storage Capacity (gal)	Sediment Storage Capacity (ft³)
AS-2	2.50	8	1.1	37	10
AS-3	3.25	10	1.8	110	20
AS-4	4.25	12	3.2	190	32
AS-5	5.00	12	4.4	270	45
AS-6	6.00	14	6.3	390	65
AS-7	7.00	16	8.6	540	90
AS-8	8.00	18	11.2	710	115
AS-9	9.00	20	>48 *	910	145
AS-10	10.0	22	>48 *	1130	180
AS-11	11.0	24	>48 *	1422	222
AS-12	12.0	26	>48 *	1698	270
AS-13	13.0	28	>48 *	1986	310
AS-XX	Custom	--	>26 **	--	--

* See Representative for larger pipe diameters available. ** Higher water quality treatment flow rates can be designed with multiple swirls.

- The Aqua-Swirl™ Internal Bypass (BYIP) provides full treatment of the "first flush," while the peak design storm is diverted and channeled through the main conveyance pipe. Please refer to your local representative for more information.
- Many regulatory agencies are establishing "water quality treatment flow rates" for their areas based on the initial movement of pollutants into the storm drainage system. The treatment flow rate of the Aqua-Swirl™ system is engineered to meet or exceed the local water quality treatment criteria. This "water quality treatment flow rate" typically represents approximately 90% to 95% of the total annual runoff volume.

The design and orientation of the Aqua-Filter™ generally entails some degree of customization. For assistance in design and specific sizing using historical rainfall data, please refer to an AquaShield™ representative or visit our website at www.AquaShieldInc.com. CAD details and specifications are available upon request.

- Manufacturer shall be responsible for complete assembly of Swirl Concentrator.
- Polymer Coated Steel (PCS) Swirl Concentrator shall be fabricated from polymer pre-coated steel sheet for corrugated steel pipe, and shall comply with ASTM A 760 and ASTM A 742.
- Stub outs and internal components shall be supplied by manufacturer and MIG welded using accepted welding practices.
- Manufacturer shall supply direct access to Swirl Concentrator via 30-inch ID riser(s). Riser should not be field cut by Contractor. Riser should maintain its finish cut length as supplied by manufacturer to match final grade per approved site elevations (as indicated on approved shop drawing). If necessary to extend riser, Contractor should use adjusting rings to bring top of structure to grade.
- Contractor shall supply pipe couplings to and from Swirl Concentrator, which shall be Mar-Mac, Fernco, or Mission style flexible boot with stainless steel tension bands and shear guard. Mar-Mac couplings should be used for connections to corrugated plastic pipe and are recommended for use with larger diameter pipe (e.g. 24" ID and larger). A concrete grade is recommended beneath Mar Mac's to prevent joint movement.
- Contractor shall prepare excavation and off-load Swirl Concentrator. Contractor is responsible for bedding and backfill around Swirl Concentrator as detailed on site plan. (see notes 11 and 12)
- Manufacturer shall supply standard manhole frame(s) and cover(s). (Traffic rated H20)
- Where traffic loading (H-20) is required or anticipated, a 4-foot diameter, 14-inch thick reinforced concrete pad must be placed over the Swirl Concentrator to support and level the manhole frame. The top of riser pipe must be wrapped with compressible expansion joint material to a minimum 1-inch thickness to allow transfer of wheel loads from manhole cover to concrete slab. Manhole cover shall bear on concrete slab and not on riser pipe. The concrete slab shall have a minimum strength of 3,000 psi and be reinforced with #4 reinforcing steel (per drawing). Minimum cover over reinforcing steel shall be 1-inch. Top of manhole cover and concrete slab shall be level with finish grade.
- Unless other traffic barriers are present, bollards shall be placed around access risers in non-traffic areas to prevent inadvertent loading by maintenance vehicles. Sample of typical bollard installation detail and recommended locations of bollards around the Swirl Concentrator can be provided upon request.
- Where high groundwater elevations are present or anticipated, Contractor shall supply concrete anti-floatation pad underneath and poured over the octagonal base plate of the swirl (see Anti-Floatation Base Detail) to prevent buoyancy and base plate deflection (details, if necessary, available upon request).
- Excavation and Bedding** - The trench and trench bottom shall be constructed in accordance with ASTM A 798 Section 5, Trench Excavation, Section 6, Foundation, and Section 7, Bedding. The PCS Swirl Concentrator shall be installed on a stable base consisting of at least 6-inches of fine, readily compacted soil or granular fill material, and compacted to 95% proctor density. Bedding shall not contain stones retained on a 3-inch ring, frozen lumps, highly plastic clay, organic material, corrosive material, or other deleterious foreign materials. All required safety precautions for Swirl Concentrator installation are the responsibility of the Contractor and shall be per OSHA approved methods.
- Backfill Requirements** - Backfill materials shall be fine, readily compacted soil or granular fill material, and compacted to 90% proctor density. Processed granular materials with excellent structural characteristics are preferred. Coarse grained soils of USCS Groups GW, GP, GM, GC, SW, and SP as described in ASTM D 2487 are generally acceptable materials when compacted to 90% proctor density. Backfill shall not contain stones retained on a 3-inch ring, frozen lumps, highly plastic clay, organic material, corrosive material, or other deleterious foreign materials. Backfilling shall conform to ASTM A 798, Section 10, Structural Backfill Placement. Backfill shall be placed in 6 to 12 inch layers or "lifts" and compacted before adding the next lift. Backfill shall extend at least 18 inches outward from Swirl Concentrator and for the full height of the Swirl Concentrator (including riser(s)) extending laterally to undisturbed soils.

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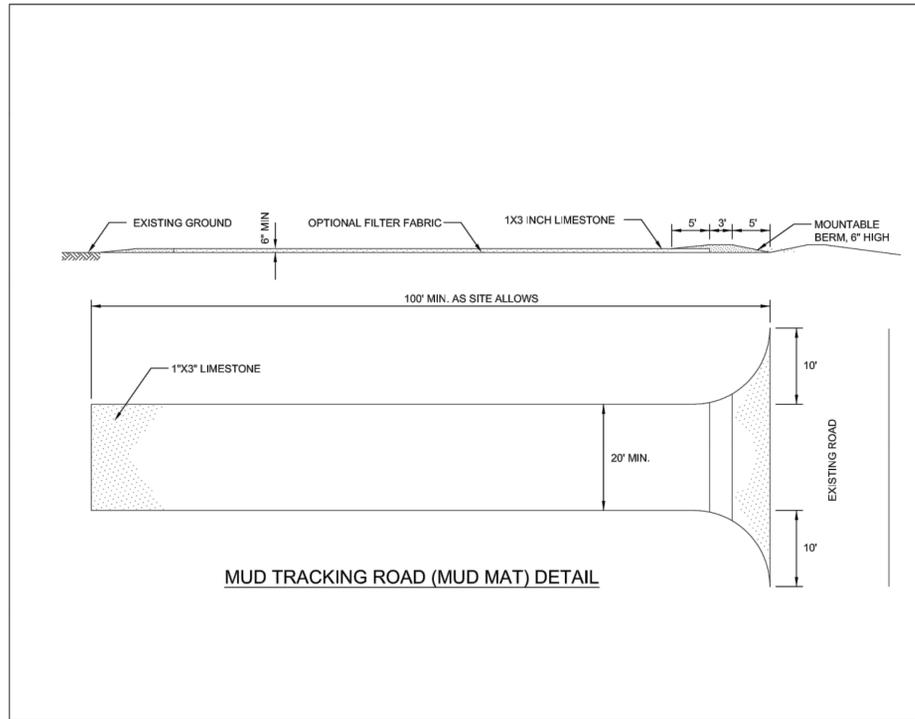
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SECTION 13
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

DIVERSE REAL ESTATE LLC
THE MEADOWS OF ARBOR RIDGE
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DETAILS

DATE: JULY 21, 2014
REVISIONS/SUBMITTALS
12/12/14 PER TWP CONSULTANTS
04/01/15 PER TWP CONSULTANTS
05/20/15 PER TWP CONSULTANTS

SCALE: NO SCALE
DRAWN BY: GMS
CHECKED BY: GMS
PROJECT MANAGER: EL
CAD: 30081952-24-WCSP
JOB #: 12001809
FILE CODE:
SHEET NO. 106



MUD TRACKING ROAD (MUD MAT) DETAIL

**PITTSFIELD CHARTER TOWNSHIP
SOIL EROSION AND SEDIMENTATION CONTROL NOTES
GENERAL**

- The contractor shall implement and maintain the soil erosion control measures as shown on the plans at all times during construction on this project. Any modifications or additions to the soil erosion control measures due to construction or changed conditions, shall be compiled with as required or directed by the owner, project engineer or Pittsfield Township.
- All soil erosion and sedimentation control work shall conform to the permit requirements of Pittsfield Township and the laws of the State of Michigan.
- A NPDES construction activity permit is required for all sites greater than 5 acres.
- Daily inspections shall be made by the contractor. Periodic inspections may be made by the owner/project engineer/Township to determine the effectiveness of erosion and sedimentation control measures. Any necessary corrections shall be made without delay.
- Erosion and sedimentation from work on the site shall be contained on the site and not be allowed to collect on any off-site areas or in waterways.
- All mud/dirt tracked onto roads from the site due to construction, shall be promptly removed by the contractor.
- Restoration of all disturbed areas, including placement of topsoil, seed, fertilizer and mulch and/or sod shall be done within 5 days of the completion of final grade.
- Construction operations shall be scheduled and performed so that preventative soil erosion control measures are in place prior to excavation in critical areas and temporary stabilization measures are in place immediately following backfilling operations.
- Special precautions will be taken in the use of construction equipment to prevent situations that promote erosion.
- Proper dust control shall be maintained during construction by use of water trucks and/or chloride as required.
- The contractor shall be responsible for maintaining all temporary soil erosion control measures and removal of some upon authorized completion of project. Completion of project will not be authorized until all site work, home building, road work and utility construction is complete and all soils are stabilized.
- The contractor shall not grade in existing wetland or conservation areas to be protected. Silt fence shall be installed and maintained adjacent to existing wetland and conservation areas to prevent grading, erosion and sedimentation into them.
- Tree protection fencing must remain intact until restoration of the site is complete.

SEQUENCE OF CONSTRUCTION

- Install sediment fence and tree protection fencing prior to any grading operation.
- Install mud-tracking pad.
- Construct temporary sediment/detention basin.
- Place topsoil, fertilizer, seed and mulch over the entire detention basin area.
- Rough grade site, stockpile topsoil and begin building construction.
- Install storm drainage system including riprap and parking lot inlet filters and detention basin standpipe.
- Maintain erosion and sedimentation control measures, as required.
- Install sanitary sewer and water systems.
- Bring pavement areas to sub-base grade, place sub-base and bituminous pavement.
- Install franchised utilities.
- Finish grade, redistribute topsoil, seed and mulch all disturbed areas.
- Remove any accumulated sediment within the detention basin and replace clean washed stone around standpipe.
- Complete construction of site.
- Insure all soil is stabilized. Remove all temporary soil erosion control measures.

SEEDING/SOD

- Seed or sod in accordance with project specifications.
- All areas of disturbed earth that are not to be paved or sodded shall have 4 inches of topsoil, seed, fertilizer and mulch.
- Immediately after seeding, mulch all seeded areas with unweathered small grain straw (preferably wheat) or hay spread. Spread uniformly at the rate of 1 1/2 to 2 tons or 100 pounds (2 to 3 bales) per 1,000 square foot. This mulch should be anchored with a disc-type mulch-anchoring tool.
- Any disturbed area not paved, seeded or mulched, sodded or built upon by November 15, is to be mulched in the manner as specified above, in order to provide soil erosion protection during the winter and early spring.
- All erosion and sedimentation control prevention procedures and structures are to comply with the Standards and Specifications for soil erosion and sediment control of the Washtenaw County Soil Conservation District.
- Drainage ditches and slopes steeper than 1:4 (25%) shall be stabilized with erosion control blankets.
- Steep slopes that do not take upon initial seeding must be re-seeded and stabilized with erosion control blankets.
- Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.

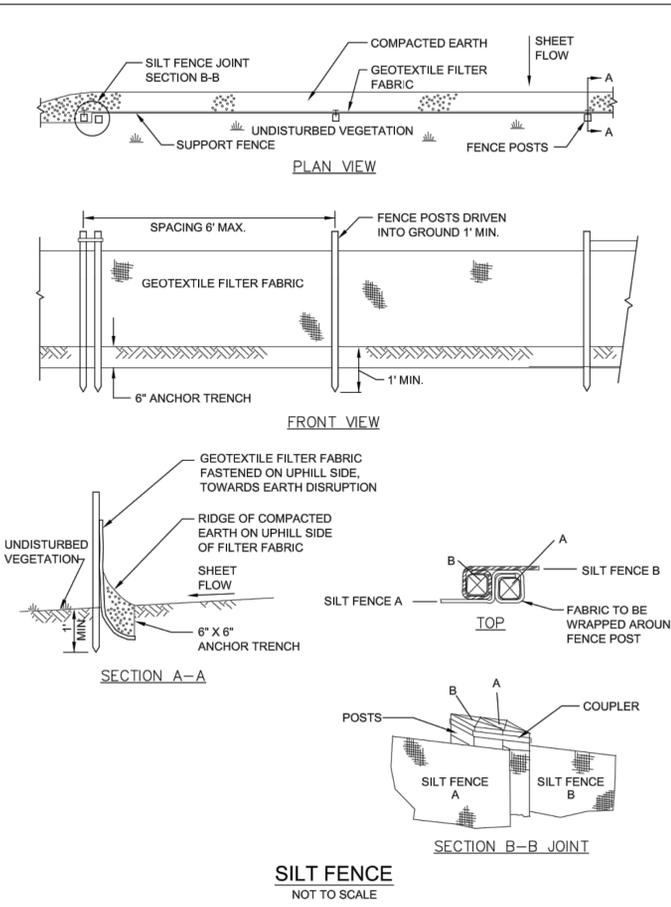
CATCH BASIN/MANHOLE PROTECTION

- Protect storm sewer catch basins with Siltsack, or approved equivalent as follows:

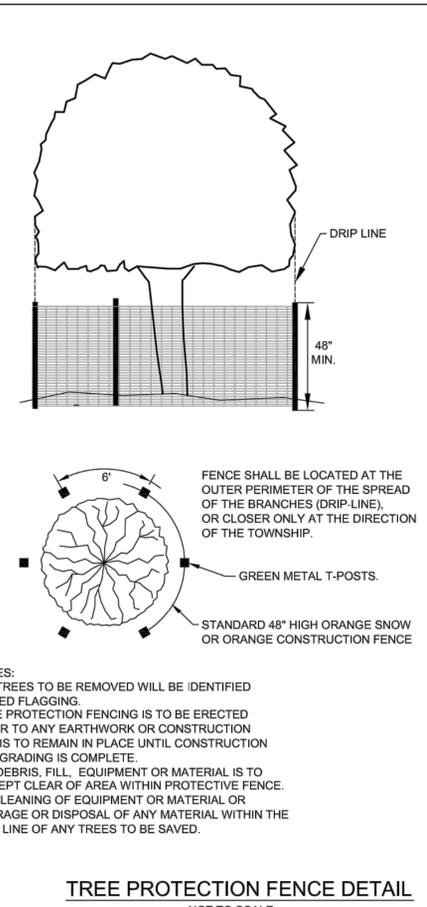
ROADS

- During construction, all roads shall be protected from unvegetated areas washing onto road surfaces by placement of silt fence behind curb or a 10 foot wide straw mulch bank behind the curb or other approved method and/or as shown on the plans.
- During construction of any portion of the project, roads shall be maintained free of dirt, silt and construction debris.

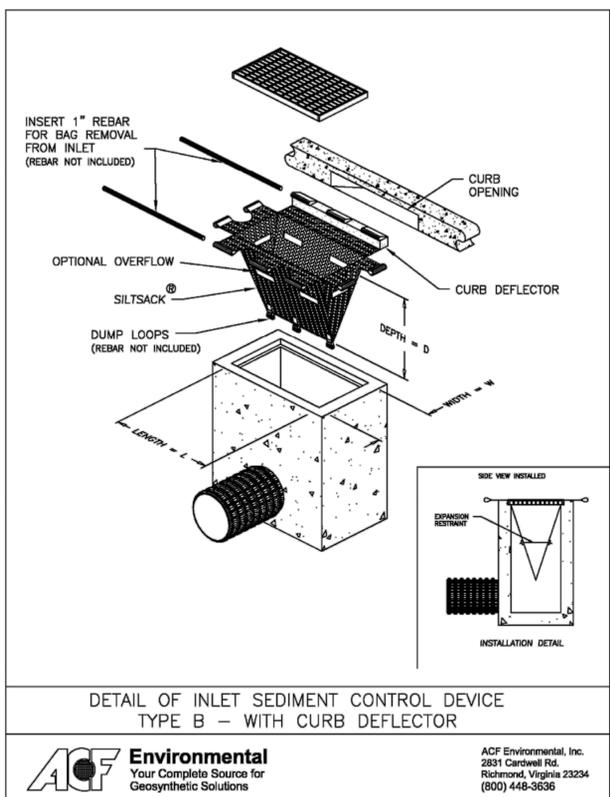
Pittsfield SEC 9/22/2009



SILT FENCE
NOT TO SCALE



TREE PROTECTION FENCE DETAIL
NOT TO SCALE



DETAIL OF INLET SEDIMENT CONTROL DEVICE
TYPE B - WITH CURB DEFLECTOR

ACF Environmental
Your Complete Source for Geosynthetic Solutions
ACF Environmental, Inc.
2831 Cardwell Rd.
Richmond, Virginia 23234
(800) 448-3636

SILTSACK®
SPECIFICATIONS

NOTE: THE SILTSACK® WILL BE MANUFACTURED FROM A WOVEN POLYPROPYLENE FABRIC THAT MEETS OR EXCEEDS THE FOLLOWING SPECIFICATIONS.

PROPERTIES	TEST METHOD	UNITS	
GRAB TENSILE STRENGTH	ASTM D-4632		300 LBS
GRAB TENSILE ELONGATION	ASTM D-4632		20 %
PUNCTURE	ASTM D-4853		120 LBS
MULLEN BURST	ASTM D-3786		800 PSI
TRAPEZOID TEAR	ASTM D-4533		120 LBS
UV RESISTANCE	ASTM D-4205		80 %
APPARENT OPENING SIZE	ASTM D-4751		40 US SIEVE
FLOW RATE	ASTM D-4491		40 GAL/MIN/50 FT
PERMITTIVITY	ASTM D-4491		0.55 SEC -1

PROPERTIES	TEST METHOD	UNITS	
GRAB TENSILE STRENGTH	ASTM D-4632		255 LBS
GRAB TENSILE ELONGATION	ASTM D-4632		20 %
PUNCTURE	ASTM D-4853		135 LBS
MULLEN BURST	ASTM D-3786		420 PSI
TRAPEZOID TEAR	ASTM D-4533		45 LBS
UV RESISTANCE	ASTM D-4205		90 %
APPARENT OPENING SIZE	ASTM D-4751		50 US SIEVE
FLOW RATE	ASTM D-4491		200 GAL/MIN/50 FT
PERMITTIVITY	ASTM D-4491		1.5 SEC -1

OIL-ABSORBANT SILTSACK®
FOR AREAS WHERE THERE IS A CONCERN FOR OIL RUN-OFF OR SPILLS

DEPENDENT ON YOUR PARTICULAR APPLICATION, THE SILTSACK CAN BE MADE FROM EITHER ONE OF THE ABOVE FABRICS WITH AN OIL-ABSORBANT PILLW INSERT OR, MADE COMPLETELY FROM AN OIL-ABSORBANT SILTSACK WITH A WOVEN PILLW INSERT.

SILTSACK DISTRIBUTORS:
PRICE & COMPANY
(www.priceandcompany.com)
METRO GRAND RAPIDS, MI
425 36TH STREET SW
WYOMING, MI 49548-2108
1-800-248-6230
METRO DETROIT, MI
29105 WALL STREET
WIXOM, MI 48393-3525
1-866-960-4300

(* HI-FLOW SILTSACK SHALL BE USED FOR ALL APPLICATIONS WITHIN PITTSFIELD TOWNSHIP)



Pittsfield Charter Township
6201 W. Michigan Ave.
Ann Arbor, MI 48108-9721
48108-9721
Tel. 734.822.3101
www.pittsfield-mi.gov

Revision	By	Appd.	YY.MM.DD
SILTSACK	BWA	DRW	12.01.03
TWP REV	BWA	DRW	11.04.27
UPDATES	TTN	DRW	10.01.20
Issued		By	Appd.
			YY.MM.DD

File Name: SE-01	TTN	DRW	DRW	07.10.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Client/Project
PITTSFIELD TOWNSHIP
Pittsfield Township, Michigan
Title
SOIL EROSION DETAILS AND NOTES

Project No.	Scale
2075001300	NOT TO SCALE

Revision

STORM SEWER AND DRAINAGE STRUCTURES

1.00 GENERAL

1.01 DESCRIPTION

A. Furnish all labor, tools, equipment and materials to construct all storm sewers, and drainage structures as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

1.02 TESTING

A. General

1. The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed or just prior to placing the line in service providing the sewer pipe has been installed for not less than 30 days.

B. Test for Alignment

1. All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

C. Material Tests

1. The CONTRACTOR shall have tests of pipe strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the Specifications.

D. Submittals

1. The CONTRACTOR shall submit shop drawings, or data sheets for all castings, steps and manholes.

2. The CONTRACTOR shall submit certification letters for all pipes. All letters must contain the following: Contractors name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company.

2.00 PRODUCTS

2.01 PIPE

A. Reinforced concrete pipe and manhole tees shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Proposal.

B. Concrete pipe shall have tongue and groove gasketed premium joints.

C. Corrugated steel pipe shall meet the requirements of AASHO M-190 for coated pipe latest revision. Minimum gage thickness shall be as shown on the Plans.

2.02 REINFORCED CONCRETE MANHOLES

A. Manholes shall conform to the current ASTM Specifications for precast reinforced concrete Manhole Sections, serial designation C478. Manhole section joints shall conform to ASTM Designation C990. All cones shall be eccentric with an offset step configuration. Concrete adjustment rings or riser rings shall not be used for adjusting the height of the structure.

B. All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4 inches high.

2.03 MORTAR FOR MANHOLES

A. Mortar for plastering manholes and drainage structures shall be made of one part Portland cement and two parts fine aggregate.

2.04 BRICK AND BLOCK

A. Brick for brick and mortar structures shall conform to the current ASTM Specification C32. Block for block and mortar structures shall conform to the current ASTM Specification C135.

B. The concrete block masonry used to construct manhole and catch basin walls shall be solid curved blocks with the inside and outside surfaces curved to the required radii. The blocks shall have tongue and groove or other approved type of joint at the ends so that the units interlock to form a strong, rigid structure. Curved blocks shall have the inside and outside surfaces parallel.

C. The block shall not exceed 18 inches in length or 8 inches in depth (height). No block shall be less than 6 inches in width (thickness). All blocks in one structure shall be of the same height dimension. The blocks shall be designed for length so that only full-length or half-length blocks are required to lay the circular wall of any one course.

D. Blocks intended for use in the cones or tops of manholes and catch basins shall have such shape as may be required to form the structure as shown on the Plans with inside and outside joint not to exceed 1/4-inch in thickness.

2.05 STRUCTURE FRAMES AND COVERS

A. Structures frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each solid manhole cover shall be marked Storm Sewer with letters integrally cast into the cover.

B. Frames and Covers shall be as follows:

- For use on manholes: East Jordan 1040Z, with Type B cover lettered "STORM SEWER", or equal. Structures 24-inches in diameter shall have the 1045 Z frame.
- For use on drainage structures in paved areas: East Jordan 1040Z, with Type M1 cover, with "DUMP NO WASTE" lettering and trout logo.
- For use on drainage structures in curbed areas: East Jordan 7045 or 7065, with "DUMP NO WASTE" lettering and trout logo.
- For use on drainage structures in landscaped areas: East Jordan 1040Z, with 1040 N 7", with "DUMP NO WASTE" lettering and trout logo.

C. All frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER.

D. All covers for drainage structures shall have storm drain markers affixed to the nearest available flat surface. The storm drain markers shall be manufactured by Das Manufacturing and shall be #SDR "No Dumping, Drains to River." The storm drain markers shall be installed per the manufacturer's recommendations.

2.06 MANHOLE STEPS

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF for precast manholes, PS1-B for block manholes, or equal.

2.07 DRAINAGE STRUCTURES

A. All manholes and catch basins shall be precast unless otherwise specified.

B. Manhole and catch basin bottoms shall be concrete and top of slab shall have a troweled finish.

C. Upon approval by the ENGINEER, the manhole and catch basin walls may be constructed of concrete block masonry or concrete manhole pipe conforming to the requirements of the specifications previously listed. Construction shall be in accordance with the details for Catch Basin and Storm Sewer Manhole shown on the Plans.

D. A plaster coat of mortar 1/2-inch in thickness shall be applied to the inside and outside surface of all manholes and catch basins constructed with concrete block masonry or sewer brick. The inside coat of mortar shall be applied in a smooth, neat workmanlike manner.

E. Final adjustment of the top of manholes and catch basins, so that the manhole or catch basin cover is at finished elevations as shown on the Plans or meets the finished surface, may be accomplished with sewer brick conforming to the previously listed Specifications. The total height of brick for this purpose shall not exceed 9 inches. The total chimney height shall not exceed 18 inches.

F. All block and brick masonry units shall be laid in a full bed of mortar. The inside joints of the block masonry construction shall be tooled in a neat and workmanlike manner.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill 12 inches above the crown of pipe shall conform to Section 2.04, Earthwork of these specifications.

B. The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within four pipe lengths behind pipe laying.

3.02 BEDDING

A. Concrete pipe shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 4 inches. Where indicated on the Plans or required by the ENGINEER, concrete encasement or cradle shall be used.

B. For all pipes, compacted aggregate material shall be placed at the sides of the pipe in 12-inch lifts and cover not less than 12 inches above the crown of the pipe.

C. "Granular Material" shall be MDOT class II, placed in not more than 6-inch layers and compacted to not less than 90% standard density.

3.03 PIPE INSTALLATION

A. All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress, shall be kept dry, and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with holes at each joint to receive bells. All pipe shall be laid with bells uphill.

B. The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.

C. The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities or structures. Any change in location or alignment of piping, which may be found more feasible or practicable as the work progresses, shall be made by the CONTRACTOR, as the ENGINEER may direct.

D. All pipe shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the concrete pipe will be considered cause for rejection.

E. All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing cutter or similar tool may be used to cut concrete pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

F. Breaks in pipe or joints shall be repaired to the satisfaction of the ENGINEER and at the expense of the CONTRACTOR.

3.04 CONNECTIONS TO EXISTING MANHOLES

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cored into the manhole.

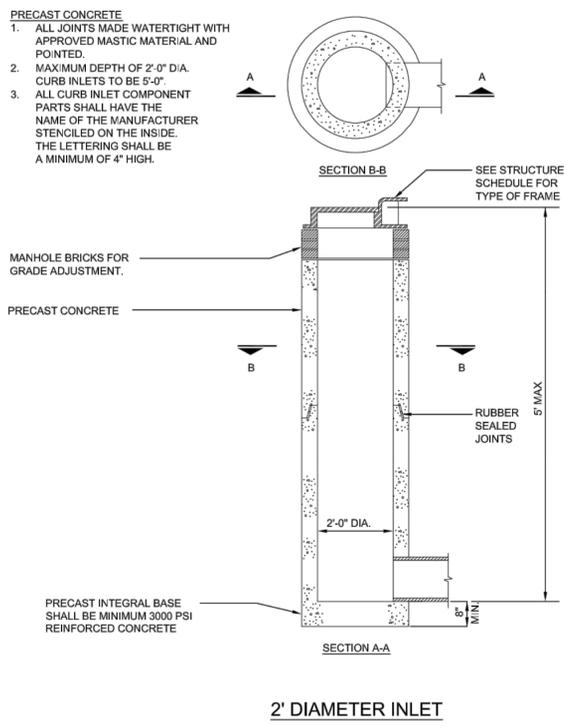
B. If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.

C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut out shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration. The formed area shall then be filled with concrete.

D. Closure of the manhole wall shall be made watertight using concrete.

3.05 ANIMAL GRATES

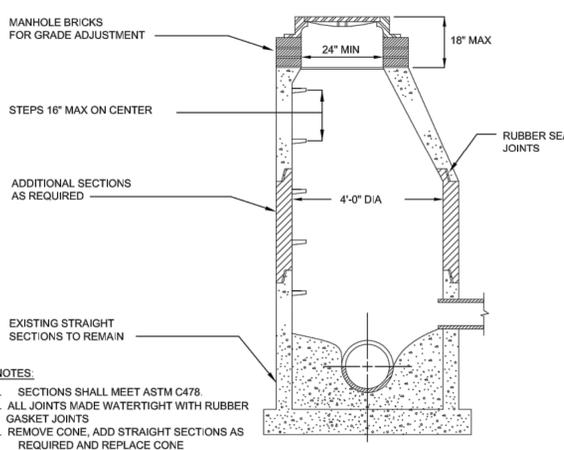
A. Animal grates shall be required on all endsections greater than 12-inch diameter.



2' DIAMETER INLET



STORM DRAIN MARKER



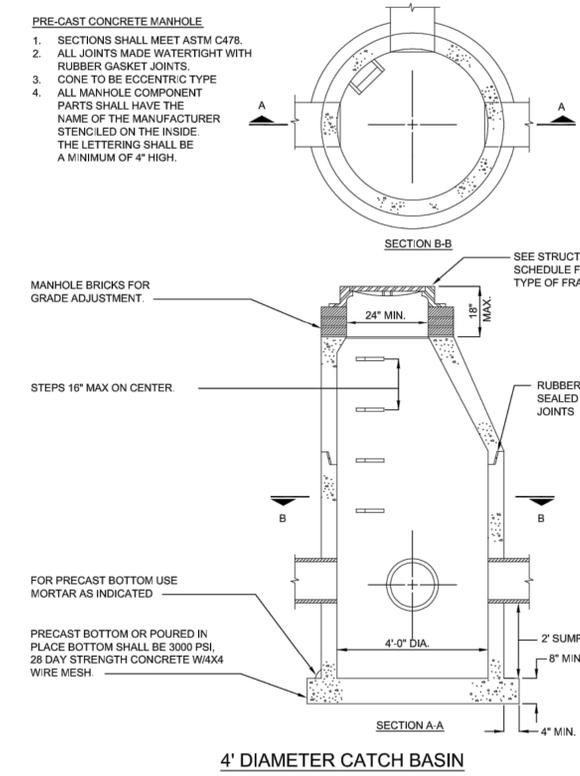
MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL

NOTES:

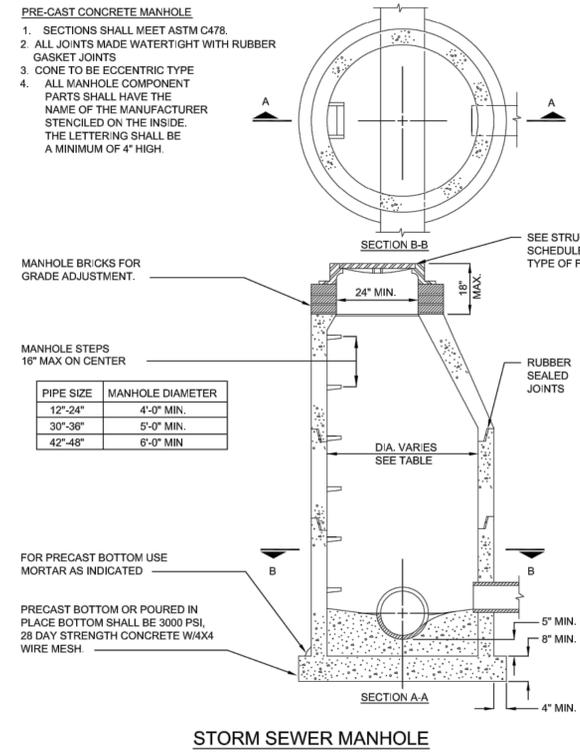
- SECTIONS SHALL MEET ASTM C478.
- ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS.
- REMOVE CONE. ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE.
- ADD MANHOLE STEPS AS NECESSARY.
- ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT.

DIA	A	B	C	D	E	F	G
12"	5"	13"	45.5"	72"	24"	2"	2"
15"	7"	16"	43.5"	72"	30"	2.25"	2.25"
18"	11"	19"	41.5"	72"	36"	2.5"	2.5"
24"	12"	25"	29"	72"	48"	3"	2"
30"	14"	31"	19"	72"	60"	3.5"	3.5"
36"	17"	37"	34.5"	96"	72"	4"	4"
42"	22"	43"	32.5"	96"	78"	4.5"	4.5"
48"	24"	49"	23.5"	96"	84"	5"	5"

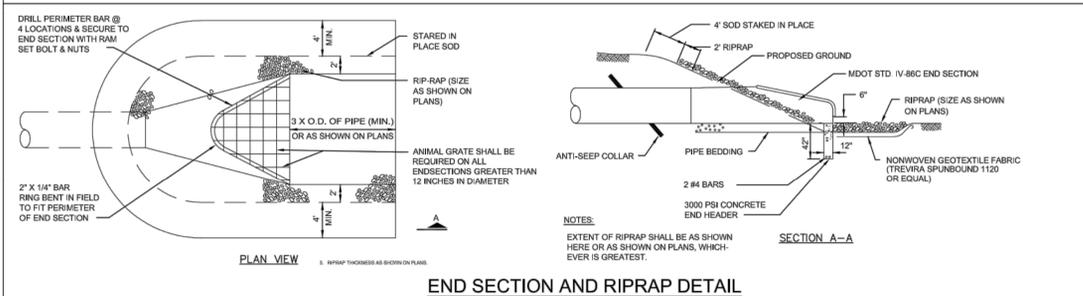
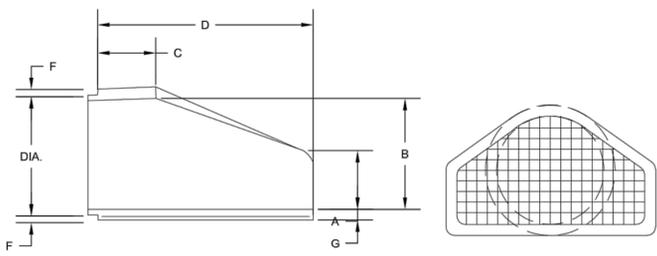
STANDARD END SECTIONS FOR PRECAST CONCRETE



4' DIAMETER CATCH BASIN



STORM SEWER MANHOLE



END SECTION AND RIPRAP DETAIL



Pittsfield Charter Township
6201 W. Michigan Ave.
Ann Arbor, MI 48108-9721
48108-9721
Tel. 734.822.3101
www.pittsfield-mi.gov

Revision	By	Appd.	YY.MM.DD
UPDATES	MRH	DRW	14.01.24
TWP REV	BWA	DRW	12.08.09
TWP REV	BWA	DRW	11.04.27
UPDATES	BWA	DRW	10.10.25
UPDATES	TTN	DRW	10.01.20
Issued		By	Appd.
File Name: ST-01	TTN	DRW	DRW
	Dwn.	Chkd.	Dsgn.
Permit-Seal			

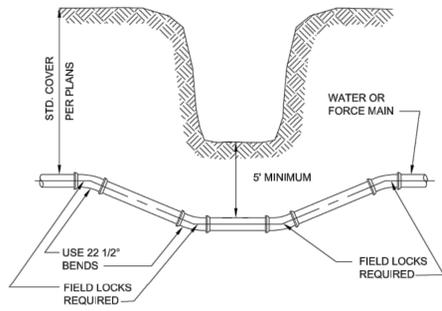
Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

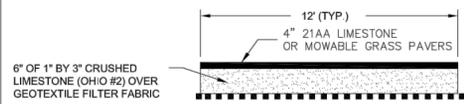
Title
STORM SEWER DETAILS AND SPECIFICATIONS

Project No. 2075001300 Scale **NOT TO SCALE**

Revision

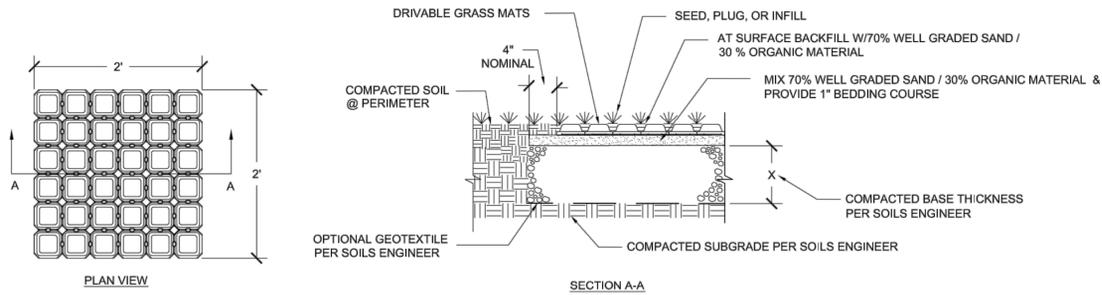


DITCH & STREAM CROSSING

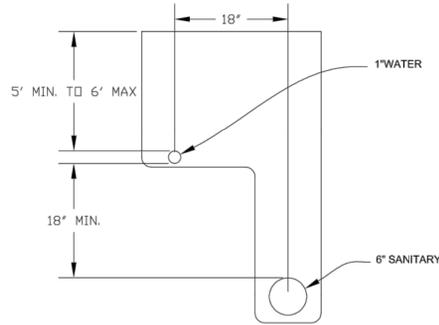


SANITARY SEWER ACCESS PATH

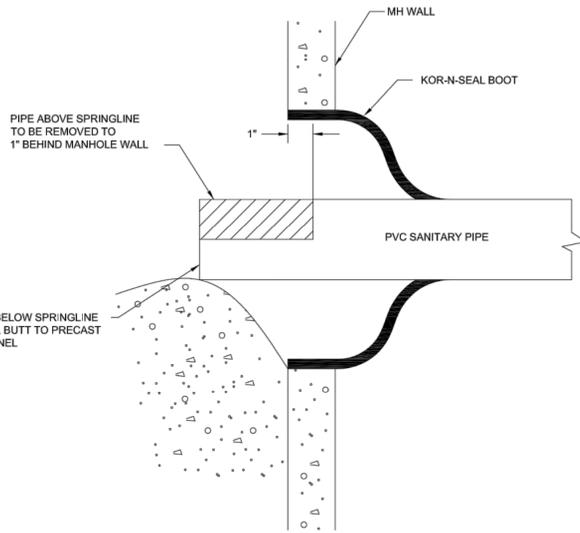
NOTE:
FOR STORMWATER MANAGEMENT APPLICATIONS INCLUDING STORAGE AND INFILTRATION, ALTERNATE INFILLS, BASE MATERIAL, AND DRAINAGE MAY BE REQUIRED



TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



TYPICAL L TRENCH DETAIL
HOUSE LEADS



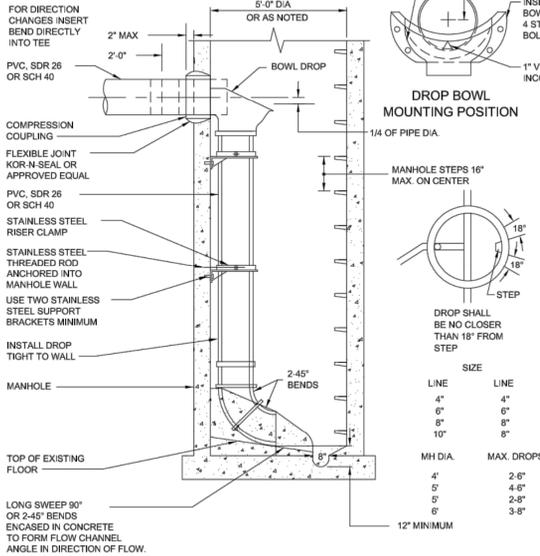
SANITARY PIPE PENETRATION

PIPE ABOVE SPRINGLINE TO BE REMOVED TO 1\"/>

PIPE BELOW SPRINGLINE SHALL BUTT TO PRECAST CHANNEL

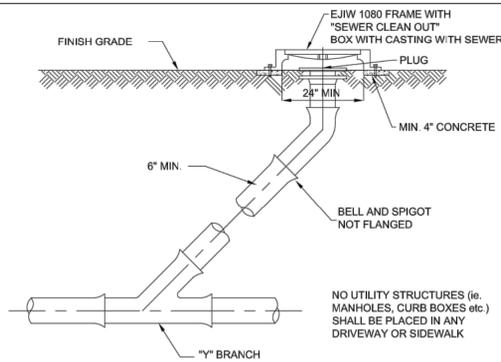
NOTES

1. SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN, INC STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS OR EQUAL.
2. ATTACH THE DROP BOWL & EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH 3/8\"/>

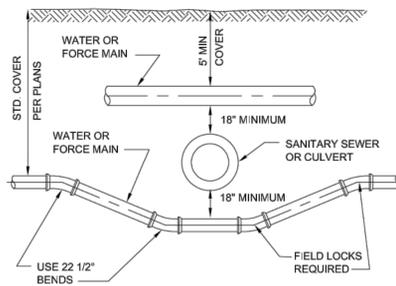


NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

INTERIOR DROP
SANITARY MANHOLE



SANITARY SEWER CLEANOUT



SEWER OR CULVERT CROSSING

PRE-CAST CONCRETE MANHOLE

1. SECTIONS SHALL MEET ASTM C478
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE THE LETTERING SHALL BE A MINIMUM OF 4\"/>

E.J.I.W. #1040 W/TYPE \"AGS\" COVER W/PITTSFIELD TWP. SANITARY\" IN RAISED LETTERS

FRAME SET IN MASTIC AND BOLTED TO PRECAST

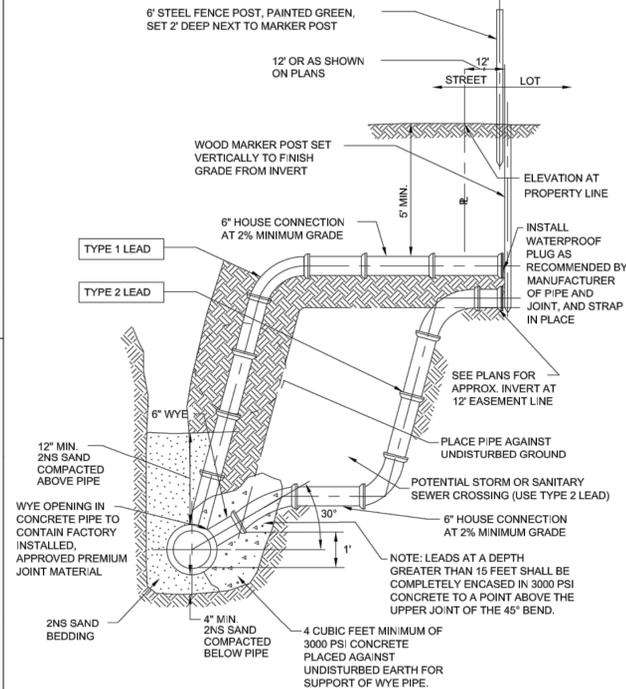
HDPE ADJUSTMENT RINGS FOR GRADE ADJUSTMENT MANUFACTURER'S RECOMMENDED SEALANT BETWEEN RINGS. STEPS 16\"/>

WHERE PRECAST CHANNELS ARE NOT POSSIBLE, CHANNEL TO BE 3000 PSI CONCRETE POURED AS SHOWN AND TROWELED

ALL CHANNELS TO BE FULL DEPTH. PRECAST BOTTOM SHALL BE 3000 PSI CONCRETE WITH 4X4 WIRE MESH.

NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

SANITARY MANHOLE



SANITARY SEWER SERVICE & RISER CONNECTION DETAIL



Pittsfield Charter Township
6201 W. Michigan Ave.
Ann Arbor, MI 48108-9721
48108-9721
Tel. 734.822.3101
www.pittsfield-mi.gov

COVER DETAIL UPDATE	MRH	DRW	14.01.24
TWP REV	BWA	DRW	11.04.27
MANHOLE UPDATES	BWA	DRW	10.10.25
UPDATES	TTN	DRW	10.01.20
Revision	By	Appd.	YY.MM.DD

Issued	By	Appd.	YY.MM.DD
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File Name: SS-01	BWA	DRW	DRW	07.10.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SANITARY SEWER DETAILS

Project No
2075001300

Scale
NOT TO SCALE

Revision

Earthwork

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall perform all excavation and backfilling necessary to complete the work. This shall include the excavation of earth and rock, the removal and disposal of unsuitable material, dewatering, placement of suitable fill and backfill material, pipe boring and jacking, all quality assurance testing, and the restoration and final grading for all earth surfaces.

1.02 WORK WITHIN RIGHTS-OF-WAY

A. Where the governmental bodies having jurisdiction of the streets or rights-of-way have specific specifications relating to the requirements for work within their jurisdiction, such requirements must be met as a minimum requirement, and if these Specifications impose further limitation on the work, they shall also be met as the required work standard.

B. During all operations of the CONTRACTOR in the streets and roadways, the CONTRACTOR shall maintain barricades, lights, and warning signs as required by the agency having jurisdiction.

1.03 WORK WITHIN EASEMENTS

A. During construction within any easements, the CONTRACTOR shall confine himself to the limits shown on the Plans. He shall notify property owners in advance of moving equipment on easements and use of the access routes which will be designated by the OWNER. The OWNER will cooperate in working out the details of access. The topsoil over the trench shall be removed and carefully replaced upon completion of the work. The backfill of the trench in the easement may be left slightly high to provide for any slight residual settlement. Any trees, shrubs, or bushes removed shall be replaced to the satisfaction of the property owner.

1.04 SOIL BORINGS

A. Soil boring results, if taken on a site, are appended to these Specifications with locations noted. Boring logs are shown to be generally representative of the site and to assist in the design and construction of the work.

2.00 PRODUCTS

2.01 BACKFILL MATERIAL

A. For areas not requiring "granular backfill" material, backfill shall be of the excavated material, with the exception that materials such as soft clay, topsoil, muck, cinders, vegetable matter, refuse, boulders and other objectionable and non-packing earth shall be excluded from the backfill and removed from the site. Stone larger than 3 inches in any dimension shall be excluded from the backfill and removed from the site by the CONTRACTOR.

B. Where "granular material" backfill is required as specified herein, backfill material shall be defined as a material meeting granular material Class II as defined in 2003 MDOT 902.08.

C. All utilities within road right-of-way corridor (existing or proposed) shall be backfilled with MDOT CL II granular material compacted to 95% maximum unit weight.

D. All utilities shall be installed with 2 NS sand bedding or better.

2.02 ENCASING PIPE

A. Steel encasing pipe for boring and jacking shall conform to the requirements of either, ASTM A53, Type E or S, Grade B or ASTM A139, Grade B.

B. Steel encasing pipe used under channels and highways shall meet the requirements of the governmental agency having jurisdiction and the following minimum requirements:

Nominal Diameter (Inches)	Maximum Wall Thickness
Under 13	0.188 inches
13-24	0.250 inches
25-36	0.312 inches
42	0.438 inches
48	0.500 inches
54	0.563 inches

C. Steel encasing pipe used under railroads shall meet the requirements of the railroad and the following minimum requirements:

Nominal Diameter (Inches)	Minimum Wall Thickness (Inches)	
	Coated or Cathodically Protected	Uncoated & Unprotected
Under 14	0.190	0.251
14-16	0.219	0.282
18	0.250	0.313
20	0.281	0.344
22	0.312	0.375
24	0.344	0.407
26	0.375	0.438
28-30	0.406	0.469
32	0.438	0.501
34-36	0.469	0.532
38-42	0.500	0.563
48	0.563	0.626

D. Casing pipe joints shall be welded to form a leak-proof continuous casing.

E. The inside diameter of casing pipe shall be at least 2 inches greater than the largest outside diameter of the carrier pipe joints or couplings for carrier pipe less than 6 inches in diameter, and at least 4 inches greater than the largest outside diameter of the carrier pipe joints for carrier pipe 6 inches and over in diameter, unless otherwise shown on the Plans.

F. The steel casing pipe shall be of smooth interior and shall be placed accurately to line and grade, allowing for the encased pipe thickness and supports under each length of encased pipe.

3.00 EXECUTION

3.01 GENERAL EXCAVATION

A. Excavation shall be performed by any practicable method consistent with the integrity and protection of the work and neighboring structures, workmen, and the public. Topsoil shall be separately removed and stockpiled for reuse.

B. All excavation, except where necessary to tunnel, bore or jack under roads, railroads, tree roots and other obstructions within the limits indicated on the Plans, may be open cut from the surface. Tunneling or boring under trees shall be considered as incidental to construction and will not be considered as cause for request for additional payment.

C. Foreign material or unsuitable foundation material encountered such as wood, boulders, etc., which obstruct the excavation, shall be removed. Such materials found at the bottom of the excavation shall be removed and the foundation restored with approved materials.

D. If excess excavation is made or the material becomes disturbed so as to require removal beyond the prescribed limits, the resulting space shall be filled with selected material solidly tamped into place, in not more than 6-inch layers to the satisfaction of the ENGINEER, before the construction work proceeds. At the direction of the ENGINEER, the excess excavation may be filled with 2000 psi concrete at the CONTRACTOR'S expense.

E. The excavation shall be kept dry during the work. Where water is encountered in the excavation, it shall be removed by pumping or well points. All necessary precautions shall be taken to prevent damage to existing wells and to completed or partially completed structures. The CONTRACTOR shall be responsible for all damages caused by him due to inadequate or improper protection.

F. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction areas, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.

G. Any excavation not backfilled at the end of each day must be clearly marked and surrounded by appropriate safety fencing as directed by the ENGINEER. If directed by the ENGINEER, the CONTRACTOR shall cover the open excavation with a steel plate and light the excavated area.

3.02 EXCAVATION FOR SEWERS AND WATER MAINS

A. Trenches shall be excavated to the depth required with allowance for bedding the pipe. The trench shall be cut wider and deeper at each pipe joint location to provide for properly completing the pipe joint and to relieve the joint of all loadings.

B. The width of the trench at the top of a rigid pipe shall be sufficient to allow the pipe to be laid and jointed properly and shall provide for a minimum net clearance of 6 inches and a maximum net clearance of 12 inches on each side of the barrel of the pipe and to allow the backfill to be placed and properly compacted.

C. The width of trench at the top of a flexible pipe backfill when using concrete bedding shall be sufficient to allow the pipe to be laid and jointed with a minimum net clearance of 12 inches and a maximum net clearance of 18 inches on each side of the barrel of the pipe.

D. Where the conditions of the ground require or where the work is in close proximity of existing structures, the sides of excavation shall be securely held by bracing and/or sheeting which may be removed in units when the level of the backfill has reached a point where it is safe to pull the sheeting without disturbing the protected feature. No sheeting, bracing, or other timber shall be left in the excavation upon the completion of the main or other structures, except with the specific review and direction of the ENGINEER.

E. Other underground mains, sewers or structures encountered in the excavation shall be adequately supported during the CONTRACTOR'S operations, and before backfilling, shall be given permanent support as directed by the ENGINEER to meet the standards or requirements of the owning utility or agency.

F. Water, sewer, gas and other utility services disturbed by the CONTRACTOR in his operations shall be repaired or replaced in a manner equal to the original condition by the CONTRACTOR at his own expense. Where these services are encountered and are undamaged, they shall be supported and/or protected by the CONTRACTOR at his expense against later settlement and/or damage after backfill. The CONTRACTOR shall consult the agency or the utility firm having jurisdiction over any duct line, gas main, etc., which may cross the excavation to determine method of supporting such duct or pipe.

G. All excavated material shall be piled in a manner that will not endanger the work and that will avoid obstructing sidewalks and driveways. Hydrants under pressure, valve manhole covers, valve boxes, curb stop boxes, fire and police call boxes, or other utility controls shall be left unobstructed and accessible until the work is completed. Gutters shall be kept clean, or other satisfactory provisions made for street drainage. An natural water courses shall not be obstructed except as otherwise provided for herein on a temporary basis.

3.03 EXCAVATION FOR STRUCTURES

A. Excavation for structures shall be extended sufficiently beyond the limits of the structure to provide ample room for form construction and for practicable construction methods to be followed.

B. Requirements for excavation of sewers and water mains shall also apply to this Section.

3.04 EXCAVATION FOR PAVED SURFACES

A. In excavating around manholes and catch basins or inlets, care shall be exercised to avoid removing the casings and pushing dirt into the structures. Dirt pushed into manholes, catch basins or inlets by the CONTRACTOR'S operations shall be immediately removed so that the dirt will not be carried into the sewer by the flow of sewage or storm water.

B. The CONTRACTOR shall take ample precautions to protect all trees and ornamental shrubbery not within the limits of the construction area, or within the construction areas shown on the Plans to be retained from injury by workmen, equipment, or any other agencies connected with the work, including subcontractors. Such protection shall be provided during the progress of the excavation, grading, or other phases of the work as necessary. Such trees or shrubbery shall be surrounded by protective posts or fencing before construction begins, when in the judgment of the ENGINEER, such precautionary measures are necessary. If, as a result of any phase of the work, trees are damaged or it is necessary to remove limbs in the way of construction, the repair of the damage and such limb removal shall be done by the CONTRACTOR as directed by the ENGINEER. All costs for the protective work shall be borne by the CONTRACTOR as incidental to the Contract work.

3.05 ROCK EXCAVATION

A. Rock excavation shall consist of excavating igneous, metamorphic and sedimentary rock which cannot be excavated without continuous drilling and blasting or drilling and spitting to fracture the rock. Blasting shall be permitted only after it has been shown that other methods of excavation are impractical. All rock excavation shall be carried to a minimum depth of 8 inches below the pipe or manhole bottom and to the bottom of all footings. The width of the rock excavation shall not exceed the diameter of the pipe plus 12 inches on either side or the edge of the foundation footing.

B. When the use of explosives is necessary for the progression of the work, the CONTRACTOR shall comply with all laws, ordinances and applicable safety code requirements and regulations relative to the handling, storage and use of explosives and protection of life and property. A person competent and experienced in the use of explosives shall be employed to supervise the work. The CONTRACTOR shall schedule all blasting for a definite hour of the day and shall so notify all residents and businesses in the area as to the scheduled day and hour for such blasting operations. Explosive materials shall not be stockpiled and stored in residential areas. Explosives and initiating devices shall not be carried in the same vehicle.

C. Suitable weighted plank coverings or timber mats shall be provided to confine all materials lifted by blasting within the limits of the excavation of trench. Excessive blasting or overshooting shall not be permitted. Any material outside of the authorized excavation cross section which may be shattered or loosened shall be removed at the CONTRACTOR'S expense. The CONTRACTOR shall be responsible for all damage resulting from the use of explosives.

3.06 PIPE BORING AND JACKING

A. The CONTRACTOR shall obtain all necessary permits for jacking the encasing pipe under channels, highways and/or railroads and shall notify the governmental agency and/or company having jurisdiction 48 hrs before work at any crossing is started. The CONTRACTOR shall pay all costs for an inspector and/or flagmen required by a railroad or governmental agency.

B. A suitable approach trench shall be opened, adjacent to the toe of the slope of the embankment. The approach trench shall be long enough to accommodate the length of pipe units to be placed, and wide enough to provide sufficient working room. Guide timbers or rails for keeping the pipe on-line and grade shall be installed in the bottom of the trench and heavy timber backstop supports installed at the rear of the trench to take the thrust of the jacks. A timber bearing a "pushing frame" shall be built and furnished to fit or match the end of the pipe to be jacked, so that the pressure of the jacks will be evenly distributed over the end of the pipe. Two (2) hydraulic jacks of sufficient power shall be used to apply pushing or jacking pressure. For firm ground, excavation shall be carried on from inside the pipe, not to exceed twelve (12) inches ahead of the lead pipe. For unstable ground, the lead pipe shall proceed the auger. Excavation at the top and sides shall be accurately cut to line and grade. Adjoining sections of steel pipe shall be welded. Pipe shall be jacked on successive shifts until completed to guard against the "freezing of the line" due to settlement and compaction of surrounding soil.

C. The sheeting of pits along any road will be required if the leading edge of all work pits will be closer to the pavement edge than the shoulder point or ten (10) ft, whichever ever distance is greater, or on curb and gutter sections, at least five (5) ft from back of curb.

D. Upon completion of the installation of the steel pipe encasement, the contractor shall furnish and install a bolted style casing spacer as described below on the carrier pipe. Casing spacers shall be placed a maximum of seven (7) feet apart along the length of the carrier pipe with one casing spacer within 2-1/2 feet of each side of a pipe joint and the rest evenly spaced. Wood skids are not an acceptable method of supporting the carrier pipe.

1. Casing spacers for carrier pipes from 4" - 24" shall be made of a molded, segmented high density polyethylene plastic with 304 stainless steel connecting nuts and bolts. Minimum spacer width shall be 5.2" for carrier pipes from 4" - 12" and 7.0" for carrier pipes 14" - 24". Each casing spacer shall have at least six (6) integrally molded skids extending 1" beyond the ball or mechanical joint of the carrier pipe. The casing spacers shall be equal to the PSI Ranger as manufactured by Pipeline Seal and Insulator, Inc., Houston, TX.

2. Casing spacers for carrier pipes larger than 24" shall be a PVC fusion bonded coated (10-16 mils) steel shell (minimum 14 gauge steel) with a 90 mil PVC inner liner and 2" wide 30% glass reinforced polypropylene runners (minimum compressive strength = 18,000 psi) (polyethylene is not an acceptable runner material) attached by 3/8" coated steel studs welded to the steel shell. All bolts and nuts used to fasten the shell to the carrier pipe shall be cadmium plated steel. Where riser are required under the runners they shall be a minimum 10 gauge steel welded to the shell and coated as specified for the shell (epoxy is not an acceptable coating for the shell riser). The casing spacers shall be equal to the PSI Model C as manufactured by Pipeline Seal and Insulator, Inc., Houston, Texas.

E. Boring shall be performed by accepted and recognized methods which will provide adequate safety and protection at all times to workmen employed in the work and to inspectors and others involved in the construction.

F. If voids should develop around the outside of the encasing pipe, grouting or other methods approved by the ENGINEER shall be employed to fill such voids.

G. After the pipes are tested satisfactorily, the remaining space between the carrier pipe and the encasing pipe shall be pressure grouted or otherwise filled with concrete. The carrier pipe shall be adequately braced to prevent floating or movement of the pipe.

3.07 SHORING, SHEETING AND BRACING

A. Where sheet piling, shoring, sheeting, bracing, or other supports are necessary, they shall be furnished, placed, maintained, and except as shown or specified otherwise, removed by the CONTRACTOR.

B. All sheet piling, shoring, sheeting and bracing shall be designed by a professional engineer engaged by the CONTRACTOR with demonstrated competence and experience in such work. The sheeting system shall be designed to prevent bottom failure and hydrostatic uplift within the excavation. Provision shall also be made in the design for lateral pressures due to side slope and construction equipment or other surcharge loads, as applicable.

C. The CONTRACTOR shall provide to the ENGINEER for his review, design calculation and arrangement drawings of the sheeting system prior to ordering any materials for bracing, sheeting, etc., and prior to the commencement of the excavation.

D. All materials, except as otherwise specified, used for sheeting and sheet piling, lagging, braces, shores, and stringers, or waling strips shall be of approved quality and dimensions throughout.

E. Materials for sheeting systems shall be furnished and driven or set in place by the CONTRACTOR, where necessary or wherever ordered by the ENGINEER, whether the same is or is not considered necessary by the CONTRACTOR. If, in the opinion of the ENGINEER, the materials furnished by the CONTRACTOR are not of proper quality or sufficient size or not properly placed to ensure the safety of the work or of adjacent structures and property, the CONTRACTOR shall, upon notice from the ENGINEER to that effect, forthwith procure, furnish and set in place or drive other and satisfactory materials, or place the material in a satisfactory manner; and if he shall fail or neglect to do so, the ENGINEER may order all or any part of the work to be stopped until such materials so used are furnished and placed; and the CONTRACTOR shall not be entitled to claim, demand, or receive any compensation for larger size or better quality or different disposal of materials ordered by the ENGINEER, nor any compensation for allowance of any kind whatsoever for or on account of any damage or delay resulting from such stoppage of work.

F. Steel sheet piling may be either new or used. It shall be of adequate strength, straight and properly braced. Steel sheet piling shall be of the interlocking type. Friction in the interlocks shall not be assumed to contribute to the strength of the sheet piling.

G. The design, planning, installation and removal, if required, of all sheet piling, shoring, sheeting, and bracing shall be accomplished in such a manner as to maintain the required excavation or trench section and to maintain the undisturbed state of the soils below and adjacent to the excavation.

H. Steel sheet piling for the excavation shall be driven straight and in-line. The piling shall be supported above ground, before driving, by a guide frame at least 20 ft high which will keep the piling accurately in the required position and vertical. Each piece of piling shall be driven only a few feet at a time and driving shall proceed continuously around the perimeter so that the piles shall reach their full penetration together.

I. Waters and bracing shall be supplied and installed as required to complete the sheeting system. Waters and braces shall be of adequate strength for the load imposed. Splices in waters shall develop the full strength of the member in bending, shear, and axial compression.

J. If bracing members are to be removed during construction, the timing and procedure for removal shall not induce excessive stresses in the permanent structures or in steel sheet piling and bracing members.

K. If the construction sequence of structures requires the transfer of bracing to the completed portions of any structure, the CONTRACTOR shall secure written acceptance of the ENGINEER prior to the installation of such bracing.

L. In trenching operations the use of horizontal strutting below the barrel of pipe or the use of the pipe as support for trench racking will not be permitted. The use of a traveling shield for sewer construction shall require that the device be approved for use by a professional engineer. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe.

M. The neglect, failure, or refusal of the ENGINEER to order the use of sheeting, or sheet piling or steel, or to order the same to be left in place, or the giving or failure to give of any order or directions as to the manner or methods of driving or placing sheeting, sheet piling, bracing, shores, etc., shall not in any way relieve the CONTRACTOR of any or all obligations under this Contract. Sheeting left in place shall be cut off one (1) ft below existing grade.

N. The rules of the OSHA and the State Department of Labor with respect to excavation and construction shall at all times be strictly observed.

3.08 GENERAL BACKFILLING

A. For all areas, unless otherwise noted, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum density.

B. Under pavements, curb, paved driveways, and sidewalks, and where pipe is within a one on one influence of pavement, compaction testing shall be performed by an independent testing laboratory. Testing shall be performed at intervals of one test per lift per 50 feet of trench or as determined necessary by the ENGINEER.

C. In residential developments, all backfill within the road corridor shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be as such to obtain 95% of the maximum unit density as determined at the optimum moisture content. For purposes of this section, the road corridor is defined as front of house to front of house, including right-of-way and adjacent easements and setbacks.

3.09 BACKFILLING FOR SEWERS AND WATER MAINS

A. Backfilling shall consist of placement of the prescribed materials from a level 12 inches above the crown of the pipe. Placement shall be as follows:

1. Under gravel driveways, gravel roads and shoulders, the backfill shall be granular material which shall be solidly compacted by mechanical tanks in layers of not more than 12 inches loose thickness with backfilling carried up to within 12 inches of finished grade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.

2. Under pavements, curb, paved driveways, and sidewalks, the backfill shall be granular material compacted in layers not to exceed 12 inches loose thickness with backfilling carried up to subgrade. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content with the work meeting the requirements of the Michigan Department of Transportation satisfactory to the ENGINEER, to provide for any slight settlement, the CONTRACTOR shall return neatly any broken edges of pavement and replace the top surface of the backfill within the pavement area with pavement surface equal to that surface which was removed. The pavement shall be replaced in accordance with the standard specifications of the agency having jurisdiction.

3. Backfill around lift stations, or buried underground structures shall be granular material compacted in 12-inch lifts. Compaction of backfill shall be such as to obtain 95% of the maximum unit density as determined at the optimum moisture content.

4. For all other areas, backfilling shall consist of placing excavated material as defined in Paragraph 2.01.A. of this Section, in 12-inch lifts to finish grade. Compaction of backfill shall be such as to obtain 90% of the maximum unit density as determined at the optimum moisture content.

3.10 FILLING AND BACKFILLING FOR STRUCTURES

A. Embankments underlying structural footings, streets and drives, sidewalks and around structures shall be granular material meeting the requirements of the Michigan Department of Transportation for granular material compacted to 95% density.

B. In all other areas, material required for embankments and backfilling shall be soil or soil-rock mixture free of organic and other deleterious matter and shall contain no more than 15% rocks or lumps larger than 2-1/2 inches in the greatest dimension, compacted to 90% density.

C. Under all interior and exterior floor slabs, an 8-inch thick granular cushion shall be placed. This material shall be clean mineral aggregate meeting the following gradation requirements:

Passing the No. 4 Sieve	100%
Passing the No. 200 Sieve	0-3%

D. Where embankment material is placed to achieve a new surface elevation, the top 4 inches shall be approved topsoil either salvaged from the site or hauled in by the CONTRACTOR.

3.11 FILLING AND BACKFILLING FOR PAVED SURFACES

A. Embankments, including sand cushions and granular fills, shall be placed in successive layers not more than 6 inches in depth the full width of the cross section, each layer to be thoroughly compacted by means of vibratory compactors or by an approved pneumatic-tired roller or combination thereof, as required by the ENGINEER. Each layer shall be compacted to not less than 95% of the maximum unit density as determined at the optimum moisture content. All parts of the embankment shall be uniformly compacted and the CONTRACTOR shall so direct all earthmoving equipment used in the work so that the same shall be attained. Embankment or fill outside the limits of the subgrade where sand or gravel is not required shall be made with suitable material which is free from perishable organic matter, rubbish, stones, broken concrete, roots, or other foreign materials, at no additional compensation. Before any embankments are begun, the base shall be made firm and cleared of topsoil, soil or other perishable material. The sides of the embankment shall be neatly and evenly dressed to the slope shown on the Plans, or such other slope as the ENGINEER may direct.

B. Upon completion of the placing of the curbs, and after the concrete has cured sufficiently, forms shall be removed and the excavated space behind the curb shall be backfilled with a good quality of surface soil, free of rubbish, stone, broken concrete, roots or other foreign material. Where adequate acceptable material for backfill behind the curb is not available, granular fill conforming to 2003 MDOT 8.02.06, Class II, shall be used. Where the area behind the curb is in cut, it shall be trimmed from the top of the curb on the slope shown on the Plans. If the area is in embankment or fill, an earth berm shall be placed immediately adjacent to the top of the curb and then the embankment of fill shall be finished to the slope shown on the Plans. All trimming and finishing shall be done in a neat, workmanlike manner. All excess concrete and debris shall be removed from the excavation behind the curb line before backfilling begins.

C. In construction of non-rigid pavements, backfilling back of curb and gutter shall be completed before placement and compaction of the base course of the roadway.

3.12 PREPARATION OF SUBGRADE FOR ROADWAY SURFACES

A. The bottom of the excavation for the pavement or top of the fill shall be known as the pavement subgrade and shall be smoothed, trimmed and compacted to the required line, grade and cross section to receive the road metal. It shall be thoroughly compacted by rolling with a roller of approved type weighing not less than 8 tons. The subgrade shall be compacted to at least 95% of the maximum density as designated by the test method AASHTO T-180. Inaccessible areas, where rolling is not practical, shall be thoroughly compacted by mechanical tampers capable of striking a blow equivalent to at least 250 foot-pounds per square foot. The subgrade thus formed shall be covered with a smooth and properly compacted surface. The pavement has been placed. No base course, surfacing, curb, or curb and gutter, shall be placed until the subgrade has been reviewed by the ENGINEER. The subgrade shall be finished in an acceptable condition at least one day in advance of the pavement construction at all times. Six inches of compacted depth of granular material shall be used where uncompacted soil is encountered. The granular fill shall conform to the 2003 MDOT 9.02.08, Class II, compacted to 95% of its density.

B. Immediately prior to placing the pavement, the subgrade shall be tested for conformity with the cross section shown on the Plans by means of an approved template riding on the curb and gutter sections or on side forms. If necessary, materials shall be removed or added, as required, to bring all portions of the subgrade to the correct elevation. Corrected portions shall then be thoroughly compacted and again tested with the template. Pavement material shall not be placed at any portion of the subgrade which has not been tested for correct elevation.

C. The finished subgrade shall be maintained in a smooth and compacted condition until the pavement is placed. No storage piles of fine or coarse aggregate shall be placed directly upon the finished subgrade. Should the subgrade become rutted or disturbed in any manner, it shall be reshaped and recompacted.

3.13 GRADING

A. The CONTRACTOR shall grade the site to achieve the elevations as shown on the Plans. All disturbed areas beyond the grading limits shall be restored to prior condition.

B. Surplus excavated material not needed for embankment shall be disposed of by the CONTRACTOR. Headwalls, culverts, drains, sewers and appurtenances filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, repaired, or replaced at his expense.

C. All temporary earth changes shall be in conformance with the Soil and Erosion Control Act.

3.14 RESTORATION

A. Headwalls, culverts, and drainage systems filled or damaged by the CONTRACTOR during the course of his operations shall be cleaned, relaid or rebuilt with new materials to a condition equal to the original state, and of thickness equal to the original structure and to the original line and grade at the CONTRACTOR'S expense.

B. Where the excavation is located beside a ditch and/or where an existing ditch is filled or disturbed in the CONTRACTOR'S operations, the CONTRACTOR shall clean, repair, or replace the ditch with properly pitched bottom and side slopes and of section and capacity not less than the original section.

C. Where excavation has been through lawn areas, the CONTRACTOR shall restore the disturbed area by placing topsoil and seeding or sodding over the final backfill material.

D. The CONTRACTOR shall remove excess dirt and other construction material from the site of the work and leave the site in a condition equal to its original state.

E. The final condition of the streets and roadways shall be subject to the approval of the governmental body having jurisdiction thereof, as well as review by the ENGINEER.



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File Name: SE-02	TTN	DRW	DRW	07.10.01
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Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
EARTHWORK SPECIFICATIONS

Project No. 2075001300 Scale **NOT TO SCALE**

Revision
41 1

SANITARY SEWER AND MANHOLES

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, tools, equipment and materials to construct all sanitary sewers, manholes and necessary appurtenant work as herein specified. No sewers shall be accepted until the sewer system has passed the system acceptance tests.

1.02 TESTING

A. General

- The CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed and has been installed for not less than 30 days.
- The CONTRACTOR may desire to make an air test prior to backfill for his own purposes but the line acceptance tests shall be conducted after backfilling or extensions.
- All sewer lines shall be televised while running enough water through the line to be visible at the next downstream manhole.
- All sewer lines shall be checked for alignment.
- All manholes shall be tested for leakage. All PVC lines shall be tested for deflection.
- Sewer pipe 30 inches and smaller shall be air tested. Sewer pipe larger than 30 inches shall be tested by either infiltration or exfiltration and shall be tested in lengths of 1600 feet or less.
- Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair rejected section and retest until it is within specified allowance.

B. Test for Leakage - Air Test

- Section 33-95 (pg 30-6) 2004-Ten State Standards.
- After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs inflated to 35 psig internal pressure. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing.
- There shall be three (3) hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.
- There shall be a 0-30 psig gauge for reading the internal pressure of the line being tested. Calibrations from the 1-10 psig range shall be in tenths of lbs (no ounces) and this 0-10 portion shall cover 90% of the complete dial range.
- Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the third hose shall be disconnected.
- The portion of line being tested shall be accepted if the portion under test meets the following conditions.
 - DI, and RCP Pipes
 - The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

Pipe Size	Min. Holding Time Seconds/100 ft. Pipe
4-inch	18
6-inch	42
8-inch	72
10-inch	90
12-inch	108
15-inch	126
18-inch	144
21-inch	180
24-inch	216
27-inch	252
30-inch	288

- In areas where ground water is known to exist, the CONTRACTOR shall install a 1/2-inch diameter capped pipe nipple, approximately 10 inches long, through the manhole wall on top of one of the sewer lines entering the manhole. This shall be done at the time the sewer line is installed. Immediately prior to the performance of the line acceptance test, the ground water level shall be determined by removing the pipe cap, blowing air through the pipe nipple into the ground so as to clear it, and then connecting a clear plastic tube to the pipe nipple. The hose shall be held vertically and a measurement of the height in feet of water shall be taken after the water stops rising in this plastic tube. The height in feet shall be divided by 2.3 to establish the lbs of pressure that will be added to all readings. For example, if the height of water is 11-1/2 ft, then the added pressure will be 5 psig. This makes the 3.5 psig to be 8.5 psig, and the 2.5 psig to be 7.5 psig. The 1 lb allowable drop and the timing remains the same.

a. PVC Pipe

- The time requirement for the pressure to decrease from 3.5 to 3.0 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than that shown in the following table:

Pipe Size (inches)	Holding Time (seconds)	Minimum Holding Time (seconds)
4-inch	0.190xL	113
6-inch	0.427xL	170
8-inch	0.760xL	227
10-inch	1.187xL	283
12-inch	1.709xL	340
15-inch	2.671xL	425
18-inch	3.846xL	512

- If any section of the sewer fails to meet this requirement, the CONTRACTOR shall perform a television inspection of the faulty section and repair or replace at his own expense all defective materials and/or workmanship to the satisfaction of the ENGINEER. The test procedure shall be repeated until the results are acceptable.

C. Test for Infiltration

- Sewer pipe over 18 inches shall be tested to measure the infiltration of ground water. If the measured leakage exceeds 100 gallons per inch diameter per mile of pipe per 24 hr period, the CONTRACTOR shall locate the points of excessive leakage and make the necessary repairs at his own expense.
- In the event the line does not pass the infiltration test as stated above, the test shall be repeated after suitable repairs have been completed.

D. Test for Exfiltration

- Where the ground water provides less than a 2 ft head on the sewer, an exfiltration test shall be conducted by filling the sewer with water to a 4 ft head or 4 ft above the ground water level, whichever is greater. The allowable water loss shall be 100 gal/in./mi/day as calculated above for infiltration.
- After the sewer has been filled with water, 4 hrs time shall be allowed for water absorption by the pipe before exfiltration tests are initiated.
- For the purpose of establishing the 4 ft test head, the head shall be measured from the center of the sewer pipe at the midpoint of the test section length. This procedure shall be used for both infiltration and exfiltration tests.

E. Test for Manhole Leakage

- All manholes shall be tested for leakage by using plugs on inlet-outleting sewers, and filling the manholes with water to the top of the manhole. Four hours shall be allowed for water absorption by the manhole before testing is initiated. Allowable exfiltration for 48-inch diameter manholes shall be 2 gallons per foot of depth per day.

F. Test for Alignment

- All sewers shall be laid accurately to the line and grade designed by the ENGINEER. The sewers will be tested for alignment by shining a light through the pipe at a manhole and viewing the light from an adjacent manhole. Any section of sewer in which a light cannot be seen from one manhole to the next shall be corrected to the satisfaction of the ENGINEER to pass this test.

G. Test for Deflection of PVC Pipe

- PVC pipe sewers shall be installed in such a manner that the initial deflection of the conduit shall conform to the latest revision of ASTM D-3034.
- Deflection of PVC pipe shall be tested by pulling a rigid pig or equivalent through the pipe. The pig shall be constructed in accordance with the following table of maximum outside diameters and shall be submitted to the ENGINEER for review before testing is initiated.

Pipe I.D.	Pig O.D.
6 inches	5.33 inches
8 inches	7.11 inches
10 inches	8.87 inches
12 inches	10.55 inches
15 inches	12.90 inches
18 inches	15.74 inches

- The pig shall be drawn by hand through the pipe from manhole to manhole. Any portion of pipe through which the pig passes freely shall be deemed to have passed the deflection test. Sections of pipe through which the pig does not pass shall be located, un-covered and the pipe zone bedding improved and backfilled by the CONTRACTOR at his own expense. The pipe shall then be retested before acceptance is granted.

H. Material Tests

- The CONTRACTOR shall have tests of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of sewer pipe per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the Specifications.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, and valves. The Contractor shall submit certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, township name, current date, certification of pipe provided and letterhead of the certifying company.

2.00 PRODUCTS

2.01 SEWER PIPE

- Pipe for sewer 24-inch diameter and smaller shall be polyvinyl chloride (PVC). Pipe for 30-inch diameter and larger shall be PVC truss pipe. Ductile iron pipe and reinforced concrete pipe shall be used as specified by the ENGINEER.
- Pipe for service leads 4 through 8 inches in diameter shall be polyvinyl chloride (PVC).
- Reinforced concrete pipe shall be no less than the latest revision of ASTM C76, with the class designation as shown on the Plans or in the Pro-posa.
- PVC pipe 4 inches through 15 inches in diameter shall meet or exceed all of the requirements of the current ASTM D-3034 SDR-26 polyvinyl chloride sewer pipe and fittings. 18-inch diameter PVC pipe shall meet or exceed all the requirements of the current ASTM F-794 SDR 26 polyvinyl chloride sewer pipe and fittings. Samples of pipe and physical and chemical data sheets shall be submitted to the ENGINEER for review. Approval shall be obtained before pipe is purchased.
- If the sewer pipe is greater than 15 feet deep PVC pipe shall be SDR 21.
- Truss pipe shall meet or exceed all of the requirements of the current ASTM D2680.
- Ductile iron pipe shall meet or exceed all the requirements of ANSI A21.50 with a cement lining.

2.02 SEWER PIPE FITTINGS

- Fittings shall be of the same material as the pipe, and in no case shall the walls be thinner than that of the pipe furnished.
- Wye and tee fittings for PVC pipe shall be reviewed by the ENGINEER before purchasing.
- The dry fit of all fittings must be snug. If the fit is such that it is loose, the pipe or fitting will be rejected as faulty and of improper size.

2.03 SEWER PIPE JOINTS

- Concrete pipe joints shall be made of a resilient material conforming to the latest revision of ASTM Designation C443. Proper lubricant shall be furnished by the joint manufacturer.
- Concrete pipe for use with rubber joints shall be smooth and precisely formed to provide a uniform annular space for joint materials.
- PVC pipe shall be jointed with ring gusseted bell ends. (ASTM-D3212) Joining materials shall be applied to the bell end of the pipe at the point of manufacture in such a manner that a tight uniform joint will be achieved and such that when the joint is made up in the field, the joint material will not roll or tear from the pipe. A proper joint lubricant shall be furnished by the pipe manufacturer.

2.04 REINFORCED CONCRETE MANHOLES

- Manholes shall conform to the current ASTM specifications for precast reinforced concrete manhole sections, serial designation C478. Manhole section joints shall conform to ASTM C990-96. Cone sections shall be straight side type, with an offset step configuration.
- All manhole component parts shall have the name of the manufacturer stenciled on the inside. The lettering or logo shall be a minimum of 4-inches high.
- Manholes constructed over an existing sewer line shall have a doghouse mudded to an 8-inch thick cookie. The bottom of the existing pipe shall be the channel. All other manholes shall have precast integral base sections with pre-formed concrete channels.
- All channels shall be constructed to the full flow depth of the pipe.

2.05 MORTAR FOR MANHOLES

A. Mortar for plastering manholes shall be made of one part Portland cement and two parts fine aggregate.

2.06 MANHOLE FRAMES AND COVERS

- Manhole frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitably notched for convenient removal of the cover. Each cover shall be marked with the Pittsfield Township logo and the letters, PITTSFIELD TWP SANITARY SEWER integrally cast into the cover.
- Covers shall be of the "self-sealing" design having a continuous gasket glued in a machined groove and a concealed pickhole. Frames and covers shall be East Jordan 1040Z, with Type AGS cover.
- All manhole frames and covers shall be coated by the manufacturer with coal tar pitch varnish or other asphaltum coating reviewed by the ENGINEER.

2.07 MANHOLE STEPS

A. Steps shall be plastic coated steel. They shall be M.A. Industries PS1-PF or PS1-B, or approved equal.

2.08 MANHOLE CONNECTIONS

- Sewer pipe (6-inch to 24-inch) to manhole connections shall be through: 1) a flexible rubber boot which shall be securely clamped into a core-drilled pipe port. Pipe ports shall be core-drilled at the point of manhole manufacturer and shall be accurately located within 1/2-inch of proposed sewer centerline (Kor-N-Seal), or 2) a self-adjusting mechanical pipe to manhole seal which provides a resilient flexible and infiltration-proof joint (Res-seal), or 3) a flexible rubber wedge firmly rammed into a rubber gasket which is cast into the manhole (Press Wedge II), or equal. All flexible pipe to manhole connections shall be installed per the manufacturers specifications.
- Neoprene rubber for the manhole boot shall meet ASTM Specification C443 and shall have a minimum thickness of 3/8-inch. Pipe clamp bands shall be of corrosion-resistant steel.
- Sewer pipe over 24 inches to manhole connections shall be in accordance with details shown on the Plan.

2.09 SANITARY MANHOLE ADJUSTMENTS

- All final grade adjustment of manhole covers and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by LADTECH, INC. or approved equal. The adjustment rings shall be manufactured from polyethylene glass as identified in ASTM Designation D 1248.
- All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.
- Each adjustment ring shall be sealed with a 3/16 to 1/4 inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet ASTM specification C-990.
- All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead concrete anchors or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.
- Manhole drop connections shall be interior drops using the drop bowl as produced by Reiner-Duran Inc. or approved equal.
- Drop bowl model A-4" shall be used for all lines up through full 6-inch inlets. Drop bowl model A-6" shall be used for all 8-inch inlets. Drop bowl model B-8" shall be used for all 10-inch inlets. Lines larger than 10 inches shall be as directed by the ENGINEER.
- The force line hood shall be attached on model's A-4" and A-6" when the incoming line is from a force main or the slope is 3 percent or greater.
- The drop pipe shall be secured to the manhole wall with Reiner-Duran, inc. stainless steel adjustable clamping brackets or approved equal.
- The drop bowl and each clamping bracket shall be attached to the manhole wall with 3/8-inch x 3 3/4-inch bolts.
- The incoming pipe shall be trimmed such that it protrudes 2 inches into the manhole.
- A 1-inch V shaped notch shall be cut into the bottom edge of the incoming pipe.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill above a line 12 inches above the crown of the pipe shall conform to Section 2.04, Earthwork, of these Specifications.

3.02 BEDDING

- Reference Section 33.83a of 10 State Standards.
- Reference Section 33.83b of 10 State Standards.
- Ductile iron, and concrete pipes shall be laid on a compacted granular material placed on the bottom of the trench to a depth of not less than 3 inches for 24-inch and smaller pipe and not less than 4 inches for pipe larger than 24-inch conforming to Class B bedding as shown on the Plans. Where shown on the Plans or required by the ENGINEER, concrete encasement or concrete cradle shall be used.

3.03 PIPE INSTALLATION

- Installation of PVC pipe shall be in confor-mance with ASTM D2321-89.
- All pipe shall be laid true to the required lines and grades. All trenches when pipe laying is in progress shall be kept dry, and all pipes and fittings shall be uniformly supported on a properly trimmed bedding with hoies at each joint to receive bells. All pipe shall be laid with bells uphill.
- All joints shall be made up in accordance with the manufacturer's instructions using materials and equipment especially prepared for the type of joint to be used.
- The grade as shown on the profiles is that of the pipe invert and that to which the work must conform. The grade shall be kept by levels, laser or other tools which shall be furnished by the CONTRACTOR at his expense. Each pipe shall be laid accurately to the line and grade as shown on the Plans and in such manner as to form a close concentric joint with the adjoining pipe and prevent sudden offsets of the invert. The interior of sewers shall, as the work progresses, be cleaned of all dirt, cement, debris and other superfluous materials of every description. Bulkheads shall be used to keep foreign materials out of the open end of the sewer when work is not in progress.
- The location of the piping as shown on the Plans has been determined to avoid, insofar as possible, interference with trees or structures or fixtures above ground and other underground mains, services, utilities, or structures. Any change in location or alignment of piping which may be found more feasible or practicable as the work progresses shall be made by the CONTRACTOR, as the ENGINEER may direct.
- All pipe and fittings shall be carefully lowered and moved into position in trench or vault in a controlled manner such as will prevent damage to the pipe and any coatings or lining. An excessive amount of scratching on the surface of the PVC pipe will be considered cause for rejection.
- The trench shall be backfilled closely behind the pipe laying. Unless otherwise directed or permitted by the ENGINEER, the backfilling shall follow and be completed to the top of the trench within two pipe lengths behind pipe laying.
- All cutting of the pipe shall be done in a neat workmanlike manner with the least amount of waste and without damage to existing or new lines. A fine tooth saw, tubing cutter or similar tool may be used to cut PVC pipe. Cuts must be square. Ragged edges shall be removed with a cutting tool or file.

3.04 CONNECTIONS TO EXISTING MANHOLES AND OTHER RIGID STRUCTURES

- When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cut into the manhole.
- If the existing manhole is of brick construction, a single rowlock of brick shall be turned over the new pipe and the existing manhole brick work shall be cleaned, pointed and given a 1/2-inch mortar coat on the outside surface.
- For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be clamped into the cored hole and used to make the connection.
- For connections to existing fiberglass manholes, a hole shall be cored into the manhole wall to receive the pipe. A Kor-N-Seal boot or engineer approved equal shall be installed using fiberglass reinforced pipe stubout for Kor-N-Seal boot sealing surface.

3.05 STREAM AND RIVER CROSSING

- Whenever a pipe is required to cross a stream or river, all work shall be in accordance with the provisions of Act 346, the Inland Lakes and Streams Act of 1962, and the rules and regulations promulgated thereunder. Stream crossings and all restoration required shall be completed within five days of the construction.
- The CONTRACTOR shall utilize such construction methods as are feasible and practicable to divert or stop stream flow to lay the pipe in the dry. Pipe shall be ductile iron, mechanical joint, or compression gasket joint pipe with joints at transition to other types of sewer pipe encased with no less than 1 cu yd of concrete, placed at a minimum of 6 inches thickness around the pipe. After the sewer is properly laid, jointed and encased, the stream-channel shall be cleaned of dirt and debris resulting from the CONTRACTOR's operations.
- After the crossing is made, heavy rrap and sodding shall be placed to protect the banks from corrosion as shown on the Plans.

PCT July 2008



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Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SANITARY SEWER SPECIFICATIONS

Project No. 2075001300 Scale **NOT TO SCALE**

Revision

1.00 GENERAL

1.01 DESCRIPTION

A. The CONTRACTOR shall furnish all labor, materials, and equipment required to construct a water main and necessary appurtenant work as herein specified. The water main shall be installed in the locations as shown on the Plans and shall meet all acceptance tests.

1.02 NOTIFICATION

- A. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department at (734) 882-2110, 24 hours prior to flushing or chlorination of the water main.
B. CONTRACTOR shall schedule bacteriological testing with the ENGINEER 48 hours prior.
C. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department 48 hours prior to connecting to an existing water main.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, valves, hydrants and the B-1 Poly Pp. The Contractor shall submit a certification letter for all pipe proposed on the project. The letters shall contain the following: Contractor name, project name, Township name, current date, certification of pipe provided and letterhead of the certifying company.

1.04 TESTING

A. General
1. CONTRACTOR shall furnish all equipment and personnel to conduct system acceptance tests as specified herein. All tests shall be conducted under the supervision of the ENGINEER. All water mains, branches and valves shall be subject to cleaning with a poly-pig, hydrostatic pressure testing, disinfection and bacteriological testing. No acceptance tests shall be conducted until the water main has been installed and backfilled for not less than 30 days. A copy of all test results shall be furnished to the ENGINEER.

2. Hydrostatic pressure testing must be performed in accordance with ANSI/AWWA C600. Disinfection and bacteriological testing must be performed in accordance with ANSI/AWWA C651.
3. CONTRACTOR shall furnish all material and labor to provide for an acceptable full size blow-off to flush the poly-pigs out of the main at the far end of the project not connected to the existing system.

4. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair the rejected section and retest until it is within the specified allowance.
5. Only Pittsfield Township personnel or the CONTRACTOR under direct supervision of Pittsfield Township personnel may fill or flush lines.

B. Preparation

1. After the pipe has been laid and backfilled as specified, the CONTRACTOR shall fill the line, or a valve section thereof, to be tested with water in such a manner as to allow all air from the pipe. This may be done through fire hydrants at the high points; or, if no hydrant is available at such point, the CONTRACTOR shall make the taps necessary to accomplish the expulsion of all air. At the close of the test, all taps shall be satisfactory plugged with brass plugs.

C. Sequence

1. All water mains connected to an existing water system shall be flushed, swabbed, chlorinated and bacteriological tested prior to pressure testing. The sequence for acceptance testing shall be:
a. Flushing with approved B-1 Poly-Pig
b. Chlorination
c. Flushing
d. Bacteriological Testing
e. Pressure Testing

2. Where mains can be totally isolated from the existing water system with airgaps, pressure testing shall precede chlorination and bacteriological testing. The sequence for acceptance testing shall be:
a. Pressure Testing
b. Connect to System
c. Flushing with approved B-1 Poly Pig
d. Chlorination
e. Flushing
f. Bacteriological Testing

3. If a hydrostatic pressure test fails, the chlorination and flushing process must be repeated after repairs to the system are completed.

D. Flushing

1. All flushing will be conducted by the TOWNSHIP with clean potable water until the water runs clear.

E. Chlorination

1. All new mains and pipe or any existing mains contaminated by the CONTRACTOR shall be chlorinated to a minimum residual chlorine concentration of fifty (50) parts per million with commercial liquid chlorine solution or approved equal. The chlorinated water shall be allowed to stand in the mains for 24 hours. The end of the 24-hour period the chlorinated water at all parts of the mains shall show a free available chlorine residual of not less than twenty-five (25) parts per million. If less than twenty-five (25) parts per million residual is shown at the end of the first 24 hours period, additional chlorine shall be added until a residual of not less than twenty-five (25) parts per million at all parts of the system is shown after a subsequent 24 hour period. The chlorinated water shall then be removed from the mains and the mains flushed with potable water for bacteriological testing. No flushing shall take place between the two required bacteriological testing.

F. Bacteriological Testing

1. The Pittsfield Township Utilities Department will take bacteriological samples of the water in the mains for analysis at two different times. The first samples will be taken 24 hours after the mains have been satisfactorily chlorinated, flushed and filled with potable water. The second sample will be taken 24 hours later. Each sample will be incubated for 48 hours. No flushing shall be done during or between tests, unless supervised and approved by ENGINEER. Two sets of safe consecutive bacteriological samples, collected at least 24 hours apart, must be obtained before placing the water main in service.

2. The CONTRACTOR shall provide a sufficient number of corporation cocks and copper tubing for taking samples. Samples shall not be collected from hoses or fire hydrants.

3. Bacteriological testing must begin on Mondays to allow Pittsfield Township personnel and the testing laboratory a full work week to conduct the testing.

G. Hydrostatic Pressure Testing

1. The CONTRACTOR shall pressure test sections of water main as sections of 2,000 feet or less unless otherwise authorized by the ENGINEER. When permitted to test lengths in excess of 2,000 feet, only the allowable leakage for 2,000 feet will be permitted.
2. All water mains shall be subjected to a hydrostatic pressure of 150 psi based on the elevation of the lowest point in the system. The main shall be maintained under the test pressure for a minimum continuous period of two (2) hours by pumping potable water into the line at frequent intervals. The volume of water so added shall be measured and considered to represent the leakage from the main. No pipeline installed will be accepted until the leakage measured is less than 0.092 gallons per inch diameter of the pipe per 1 hour per 1,000 feet.

3. In the event that the leakage exceeds the specified amount, the main shall be carefully inspected for leaks and repaired as necessary. Any cracked or defective pipe, fittings, valves or hydrants discovered shall be removed and replaced with sound material and the test repeated to the satisfaction of the ENGINEER.

4. If the CONTRACTOR chooses to pressure test against an existing valve he assumes the responsibility of meeting the leakage requirements. The CONTRACTOR may at his discretion provide a physical break and cutting in sleeve for pressure testing.

5. Temporary connections (jumpers) between existing water mains and the newly constructed system for testing purposes, shall include a reduced zone backflow preventer to prevent backflow and possible contamination of the public water.

H. Material Tests

1. The CONTRACTOR shall have test of pipe and strength made by an independent testing laboratory. Tests of up to 4 lengths of water main per hundred lengths may be required to show compliance with the Specifications. All pipe delivered to the job site shall be accompanied with a manufacturer's certificate of compliance to the specifications.

2.00 PRODUCTS

A. All products shall be consistent with the current component part submittal sheet posted on the Township website.

2.01 PIPE AND FITTINGS

A. Ductile-iron pipe water main shall meet all the requirements of the latest revision of ANSI/AWWA C151/A21.51. Pipe shall be furnished in eighteen-foot or twenty-foot lengths, unless otherwise required. All joints, to include joints for fittings, valves and hydrants, must be of the push on joint type and compatible tyton joint gaskets. Ductile iron pipe must be designed in accordance with the latest revision of ANSI/AWWA C150/A21.50 to meet requirements for Pressure Class 350.

B. Ductile iron pipe and fittings shall be double-cement lined with an approved bituminous seal coat in accordance with ANSI/AWWA C104/A21.4.

C. Ductile iron fittings shall meet all the requirements of the latest revision of ANSI/AWWA C110/A21.10 for full body fittings and ANSI/AWWA C153/A21.53 for compact fittings for a minimum working pressure of 250 psi and be of the push-on joint type. Plugs, where shown on the plans, shall be solid mechanical joint plug type.

D. Restrained mechanical joints of the wedge action type shall use a follower gland and shall include a restraining mechanism which, when activated, impart multiple wedging action against the pipe, increasing its resistance as the pressure increases. Twist off nuts shall be used to insure proper actuating of the restraining device. Restrained mechanical joints for ductile iron pipe shall be Megalug, Series 1100, or approved equal. Mechanical joints shall be in conformity with the requirements of the latest revision of the ANSI AWWA C111/A21.11. Bolts and nuts must be type 304 stainless steel.

E. Push-on joints shall meet all requirements of ANSI/AWWA C111/A21.11. Push-on joints shall consist of a ductile-iron bell provided with a recess to receive a circular molder rubber gasket to effect the joint seal. A rubber gasket and sufficient lubricant to assemble the joint shall be furnished with each joint. The lubricant shall have no deleterious effect upon the color, taste or odor of potable water and shall not be corrosive to either the pipe or gasket. Pipe furnished with push-on type joints shall be equal in strength and leak tightness to pipe furnished with mechanical joints as specified when installed under identical conditions, and shall meet all other requirements of these specifications. In addition to the above requirements, the gasketed lubricant shall conform to the latest revision of ANSI/AWWA C111/A21.11. When it is necessary to utilize a locking mechanism for a push-on joint upstream and downstream of a restrained mechanical joint, field-lok gaskets or equal shall be utilized and shall be used in conformance with DIPRA Standards for restraint distance from a restrained mechanical joint fitting.

F. All pipe and fittings shall be manufactured in the United States of America.

G. The ENGINEER shall witness the delivery and unloading of all pipe and collect the appropriate manufacturer's certificate of compliance per Section 1.04 of this Specification.

2.02 VALVES

A. All valves installed under this Specification shall conform to the applicable requirements of ANSI/AWWA C500, C504 and C509 standards governing construction materials and workmanship. Each valve shall carry the name or trademark of the manufacturer. All valves shall have operating nuts that turn to the right (clockwise) to open.

B. Resilient-Seated Gate Valves

1. Resilient seated gate valves shall conform to the applicable requirements of ANSI/AWWA C515. Valves shall have a minimum working pressure of 250 psi. The gate shall be ductile iron encased in a bonded synthetic rubber to form resilient seating surfaces. Stem shall be bronze with a non-rising design and double o-ring packing. Joints shall be push-on type.
2. Resilient Seated Gate Valves shall be manufactured by American Flow Control or Clow.

C. Tapping Sleeves and Valves

1. Tapping sleeves shall be full length of heavy-duty stainless steel construction designed for use with the type of pipe to be tapped. Tapping sleeve flange and body shall be type 304 stainless steel. Bolts and nuts shall be 304 stainless steel. Gasket shall be full circumferential SBR compounded for water service. Tapping sleeve shall contain a test plug to assure seal prior to tapping. Tapping sleeve shall be JCM Industries 432, Romac Industries SST, Ford FAST, Powerseal 3490AS; Dresser 630 or equal.
2. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

3. The tapping sleeves and valves shall be subjected to a hydrostatic pressure of 200 psi. The sleeves and valves shall be maintained under pressure for a minimum continuous period of 5 minutes by pumping potable water into the sleeve. Upon any visual leakage observed by the ENGINEER, the tapping sleeve and valve shall be removed and replaced, and the test repeated at the CONTRACTOR'S expense to the satisfaction of the ENGINEER.

D. Corporation Stops

1. Corporation stops used for insertion into mains shall be ball valve type. All stops shall have no lead brass bodies, keys, stem washers and nuts. Inlet threads shall conform to the latest revision of AWWA C800. The outlet connection shall be of the compression type to receive copper service pipe.

E. Valve Boxes

1. Valves boxes shall be 5-1/4-inch and be of cast-iron construction. They shall be of three-piece, screw-type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The base shall not rest upon the valve assembly. Valve boxes shall be Tyler 8860 Item DD with number 6 base, or equal.

F. Valve Extensions

1. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem. The length of the extension stem shall reach within 6.5 feet of the ground surface. Details of the extension system and method of installation shall be approved by the ENGINEER prior to installation.

G. Post Indicators and Valves

1. Post Indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating OPEN and SHUT. Post indicators shall open left.
2. Post indicator valves shall be American Flow Control Model 2500 or Clow model P-6120. All valves shall open left.
3. Post indicators and their corresponding valves must be made by the same manufacturer.

4. Bolards must be placed to protect post indicators, except as specified by the ENGINEER.

5. Bolards shall be 4-inch diameter galvanized schedule 40 steel posts 36 to 48 inches high with minimum depth of 24 inches. The posts shall be set in and filled with 3000 psi concrete. Bolards protecting hydrants and PIVs shall be painted red.

2.03 GATEWELLS

A. Gatewells shall conform to the latest revision of ASTM C478 for Precast Reinforced Concrete Manhole Sections. Section joints shall be rubber gasketed and shall conform to ASTM C990. Cone sections shall be eccentric, with an offset step configuration.
B. All gatewell components shall have the name of the manufacturer stenciled on the inside. The lettering shall be a minimum of 4-inches high.
C. Gatewells constructed over an existing water main shall have a doghouse mudded to an 8-inch thick cookie. All other gatewells shall have precast integral base sections.

D. Mortar for masonry or plastering outside of gatewells shall be made of one part of Portland Cement to two parts fine aggregate. Mortar materials and mixing shall correspond, in general, to those for concrete. All openings in gate wells shall be closed with brick and mortar in a manner that will make them watertight.

E. Gatewell steps shall be reinforced polypropylene coated steel. They shall be M.A. industries models PS1-PF or PS1-B, or approved equal.

2.04 GATEWELL FRAMES AND COVERS

A. Gatewell frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitable notched for convenient removal of the cover.
B. Frames and covers shall be East Jordan Iron Works Model 1040Z frame with 1040 A cover. Each cover shall have the Pittsfield Township logo and the letters "PITTSFIELD TWP WATER" cast integrally into the cover.
C. All frames and covers shall be coated at the place of manufacturer with coal tar pitch varnish or other asphaltum coating approved by the ENGINEER.

2.05 GATEWELL CONNECTIONS

A. Water pipe to gate well connections shall be through a watertight flexible pipe-to-manhole connector, which shall be securely clamped into a core-drilled port. Pipe ports shall be core-drilled at the point of manufacturer and shall be accurately located within 1/2-inch of the proposed water main centerline. Flexible pipe-to-manhole connectors shall meet the requirements of ASTM C923 and shall be NPC, Kor-N-Seal, or equal.
B. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

2.06 GATEWELL ADJUSTMENTS

A. All final grade adjustment of gatewell cover and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by Ladtech, Inc. or approved equal. The adjustment rings shall be manufactured from polyethylene plastic meeting the requirements of ASTM D4978. Brick adjustments are not acceptable.
B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.
C. Each adjustment ring shall be sealed with a 3/16 to 1/4-inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet the requirements of ASTM C990.

D. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead Trubolt concrete anchors, or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.
E. When the depth of the gate well requires an adjustment greater than the maximum allowed, the CONTRACTOR shall provide additional pre-cast gate well barrel sections required to maintain acceptable chimney heights.

2.07 HYDRANTS

A. Fire hydrants shall comply with the latest revision of ANSI/AWWA C502. Hydrants shall be compression type to open with the pressure. They shall have a 5-1/4" valve opening and 6" mechanical joint inlet. Hydrants shall have two 3-1/2" (4.05" O.D.) pumper connections with National Standard 7-1/2 threads per inch. All hydrants shall have City of Ann Arbor standard thread pattern.

B. Fire hydrants shall have an inside barrel dimension of not less than 7.375" I.D. from top to bottom. The 1-1/8" pentagon operating nut shall open left (counter clockwise).

C. All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.
D. Hydrant shall be fully bronze mounted, including top of the operating stem where it passes through the double o-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of composition rubber and the cast iron valve clamps shall be packed with o-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.

E. Hydrant shall be designed for 150 psi working pressure and tested to 300 psi. Those portions of the hydrant above grade shall have two coats of red enamel. All unpainted surfaces shall have two coats of coal tar pitch varnish.

F. The hydrants shall be EJJW WaterMaster 5BR 250 with mechanical joint connections and break flange barrel with standard head.
G. Hydrant bolts located below grade shall be type 304 stainless steel.

H. All hydrants shall have a 4" Harrington Integral Hydra-Storz (IHHS) adaptor. The IHHS shall meet the requirements of AWWA C502 regarding material and pressure testing. Storz nozzle shall have a brass metal face and hard anodized ramps and lugs. The aluminum finish shall be hardcoat anodized to Mil-A-8625F, type 3 dark gray. The adaptor shall be made from forged or extruded 6061-T6 aluminum.

I. The blind cap shall have hard anodized aluminum Storz ramps and lugs, made of forged or extruded 6061-T6 aluminum. The cap shall be equipped with suction seal. The cap shall be connected to the adaptor or the hydrant with 0.125 vinyl coated aircraft cable.

J. Fire hydrant extensions shall be manufactured by the hydrant manufacturer for use with the model hydrant being installed.
K. Hydrants adjacent to truck routes on commercial developments shall be protected by bollards.

2.08 SERVICE LEADS

A. Pipe for service leads 1-inch to 2-inch shall be soft annealed Type K copper. Service leads 4-inch to 8-inch shall be Pressure Class 350 Ductile Iron, Double cement lined.
B. Curb Stops
1. Curb stops used for service connections shall be ball valve type. All parts shall be no lead brass. Both the inlet and outlet connections shall be of the compression type to receive copper service pipe. Curb stops shall be consistent with the most current shop drawing check-list posted on the Township website.
C. Curb Boxes
1. Curb boxes shall be the Bibby Screw Style V010 with V169 top, V201 bottom, V223 extension, and V240 water cover. All curb boxes shall be coated inside and out with a tar base enamel. The minimum bury shall be 5'-0" (60") and the maximum 6' (72"). Curb boxes shall be consistent with the most current shop drawing check-list posted on the Township website.

D. Couplings

1. Couplings used for service connections shall be located outside the pavement and more than 10 feet from any building wherever possible. They shall have a three part union, and both connections shall be of the compression type to receive copper service pipe. All parts shall be no lead brass.
2. All service connections between two copper service pipes (two-inch or less in diameter) located under the pavement or within 10 feet of a building shall be connected using wrought copper, solder-wet type couplings conforming to ASME B16.18 or ASME B16.22. Fittings shall bear made in USA labels. Joining of copper piping shall be a solder-wet connection using lead free Siflos. The use of 95-5, Tin-Antimony or equivalent solders will not be allowed.

2.09 TRACER WIRE

A. Tracer wire to be used on open cut pipe shall be AWG #12 single strand copper with blue 30 mil HDPE insulation. Connections shall be made using 3M DBR-6 wire connectors, or equal.

2.10 POLYETHYLENE ENCASEMENT

A. All ductile iron pipe and fittings must be polyethylene encased. In addition, the initial 24-inches of copper service lead must be encased from the corporation stop. Polyethylene encasement must be manufactured in accordance with the requirements of the latest revision of ANSI/AWWA C105/A21.5.
B. Polyethylene Encasement shall be black linear low-density polyethylene with a minimum thickness of 8 mils.
C. The wrap shall overlap the joint by 12 inches to either side and be secured to the pipe with polyethylene adhesive tape.

3.00 EXECUTION

3.01 EXCAVATION AND BACKFILL

A. All excavation and backfill shall conform to the Earthwork specification.

3.02 PIPE INSTALLATION

A. The installation of ductile iron water main must conform to the requirements of ANSI/AWWA C600.

B. Any pipe damaged in transport or handling shall be rejected and removed from the site of the work.

C. Before lowering in the trench, and while suspended, each pipe and fitting shall be inspected for defects. Defective, damaged or unsound pipe shall immediately be removed from the construction site. The interior of each pipe shall be inspected for cleanliness and cleared of all dirt and foreign matter before being lowered into the trench.
D. In handling and placing ductile iron pipe and fittings, no metal shall be used in contact with the inside of the pipe to fit or support the pipe. The pipe shall be moved only through the use of belt slings or automatic release type pipe longs. Care shall be taken not to injure the pipe or pipe coating, and no damaged or imperfect pipe shall be used in the work except that minor damage to pipe coating may be repaired subject to the review of the ENGINEER.

E. Unless otherwise directed, pipe shall be laid with bell ends facing in the direction of laying. After a length of pipe is placed in the trench, the spigot shall be centered in the bell of the adjacent pipe; the pipe shoved into position and brought to a true alignment. It will then be secured with sand backfill tamped under and on each side of the pipe, except at bell holes. No earth or other foreign matter shall be allowed to enter the joint space.
F. All excavation and backfill above the pipe shall conform to specifications under Earthwork and as shown on the Drawings.

G. A minimum of 18-inches vertical clearance shall be provided between the water main and any existing underground facility, unless otherwise approved by the ENGINEER. Whenever a main is installed under any existing utility line such as gas, buried electric power, telephone line, sewer or water, provisions shall be made to properly support or distribute any concentrated load to avoid settlement and possible failure of either main. Such provisions shall consist of concrete bedding of the main, complete concrete encasement, or some other method as shown on the plans. Water mains passing under sewers, in addition, shall be protected by providing:
1. A vertical separation of at least 18-inches between the bottom of the sewer and the top of the water main.
2. Adequate structural support for the sewer to prevent excessive deflection of joints and settlement of the sewer about the water main; i.e., a concrete saddle under the pipe with a span length extending to undisturbed earth bearing.

H. Water mains shall be installed at least 10 feet horizontally from any existing or proposed gravity sanitary or storm sewer, septic tank, or subssoil treatment system. The distance shall be measured edge to edge.
I. In assembly of push-on or shove type joints, the bell socket recess and the gasket shall be wiped clean and the gasket placed properly in position. A thin film of lubricant shall then be applied to the surface of the gasket to come into contact with the entering pipe. The plain end of the entering pipe shall be cleaned and then entered and forced home to the base of the socket.

J. Where necessary to cut pipe, cutting shall be done with approved tools and cut ends of pipe shall be square and regular. Cutting shall be done in a manner to avoid damage to lining and coating. Minor damage may be repaired subject to review of the ENGINEER.

K. To prevent trench water from entering the pipe, joints, which for any reason may not be completed as the pipe is laid, shall be thoroughly packed with approved material, in a manner to make them watertight. Open ends of fittings shall be tightly closed with approved plugs and well packed, as shall the end of the last pipe laid whenever work is not in progress.
L. Each pipe shall be laid accurately to the line and grade shown on the Plans. Wherever deflections at joints are required by changes in grade or alignment or to pump valve stems, the deflection at any bell and spigot joint shall not exceed that which will cause the spigot end of pipe to be away from home in the bell of the adjacent pipe a distance of 1/4 inch at the point of greatest opening.

M. The deflection at any mechanical joint shall not exceed three-quarters of the maximum deflection recommended by the manufacturer or 3 degrees, whichever is more conservative of the joint used.
N. The CONTRACTOR shall not be entitled to any additional compensation because depth is more than specified at certain locations or due to clearances at manholes, or due to unforeseen obstacles, or occasioned in order to avoid undue changes in grade.

O. Pipe shall be laid at depths to provide minimum cover of 5' - 6" over the top of the pipe unless otherwise noted on the Drawings or elsewhere in these specifications.

3.03 GATE VALVES AND WELLS

A. All pre-cast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.
B. Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main, and unless otherwise directed by the Township ENGINEER, all gate valves shall be set with stems plumb. At each side of gate valve, the CONTRACTOR shall furnish and install a 1-inch corporation stop on the main as shown on the Standard Details.

C. All gate valves with operating nuts at a distance greater than 6.5 feet below ground surface shall be provided with an extension stem.

3.04 HYDRANTS

A. Fire hydrants shall be constructed in accordance with the details shown on the plans. Finish grade level to center of nozzle caps shall measure between 24 and 30 inches. A maximum of one hydrant barrel extension and one operating stem extension may be used to accommodate changes in grade. Under no conditions shall extended hydrant have more than one coupling in the operating stem. Pumper connections shall point toward the street.
B. Fire hydrants shall be installed with barrel vertical and properly based. Concrete thrust blocks shall be placed behind the hydrant, tee, and every bend. Care should be taken to insure the drain holes on the hydrant are not plugged by the thrust blocks. Hydrant shall be set in 1 yard of coarse gravel for drainage purposes. If ground water is encountered, the drain hole shall be plugged as directed by the manufacturer. The backfill shall be sand thoroughly tamped around the hydrant and valve box in 1 ft layers.

C. Fire hydrant and gate valve shall be set apart 24 inches. Gate valves and valve box shall be as specified under the valve paragraphs of this section.
D. Hydrant leads shall have a minimum of 5.5 feet of cover in all areas, including crossings through ditch sections.
E. Hydrants shall be carefully plumbed, braced and backfilled so they remain plumb.

F. All grade, facing, and vertical alignment adjustment of hydrants shall be completed prior to pressure testing and charging of the hydrants.
G. All hydrants shall be cleaned and painted with a rust inhibitive, oil base paint such as "rustoleum" or approved equal to the Township's color code prior to acceptance.

H. The lubricant reservoirs in all hydrants having such construction shall be filled with a lubricant acceptable to the Michigan Department of Environmental Quality and recommended by the hydrant manufacturer.
I. Backfilling around fire hydrants shall be carefully tamped sand in 12-inch layers from the centerline of the lead main to a height of 1-foot below finished grade.

J. CONTRACTOR shall place burap sack or equivalent material over the hydrant nozzles after installation.

K. Fire hydrant nozzles shall be aligned as required by the Township Fire Marshal.

L. Fire hydrant extensions shall be provided as necessary so that the safety flange is located at or above surface grade.

3.05 TRACER WIRE

A. Tracer wire shall be installed along the top of all water mains. For directional drilling, the tracer wire shall be installed at the same time as the pipe. For open cut construction, the tracer wire shall be installed at a height of not more than 6 inches above the main line pipe or service leads. Wire shall be extended to all hydrants, blow-offs, dead ends, service leads and post indicator valves. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to the wire during construction and subsequent activities. Wire shall be trimmed to finish grade following completion of the landscaping.
B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner. For service leads and offsets of more than 20 feet in length, or installed by directional drilling method, a splice may be utilized to make the connection at the main. The tracer wire shall then be installed and terminated in an approved manner.

C. Tracer wire terminations shall be made by one of the following methods:
1. Tracer wire shall be terminated at hydrants by tying off the wire at the head flange, leaving excess material for future trimming following landscape activities.
2. Terminations at valve/curb boxes, post indicators, valves and blow-offs shall be made with 2 wraps of wire at grade around the box or pipe, leaving excess material for future trimming following landscaping.
3. Gatewell terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.
4. Terminations at existing water mains without tracer wire shall be made at the nearest hydrant or gate well as outlined above. If no hydrant or gatewell is available, an upper section of valve box shall be installed with the tracer wire stubbed up inside.

D. When connections are made to existing water mains which do not have tracer wire, the following method most applicable to field conditions shall be used.
1. When connection is made at/near a valve or hydrant, the connection shall be made in the same manner as the termination at said structures in Item C(2) above.
2. When connection takes place in a gatewell, the same procedure shall be used as in termination at a gatewell (see Item C(3) above).
3. If no valve or hydrant is available, the upper section of a valve box shall be set with the tracer wire stubbed up inside.

3.06 POLYETHYLENE ENCASEMENT

A. The polyethylene encasement must be installed in accordance with the specifications and requirements of ANSI/AWWA C105/A21.5. For open cut applications a single wrap is required, and for directional drill applications a double wrap is required.
B. The polyethylene encasement must be taped and overlapped at pipe joints and must be taped in a spiral configuration along the length of the pipe.

3.07 CONNECTION TO EXISTING MAINS

A. All connections to existing water mains shall be made at the locations as shown on the plans.

B. All valves shall be operated by the Pittsfield Township Utilities Department.

C. Prior to beginning construction of the final connections, the CONTRACTOR shall provide sequence of all final connections to the existing system and coordinate a meeting between the ENGINEER, OWNER and CONTRACTOR in the field to review the procedure.
D. When making a dry connection to an existing main, the existing main to which a connection is to be made shall be isolated by the closing of the necessary existing valves, and the water from the existing main shall then be pumped out or removed by other means so the connection may be made in the dry. After the connection has been acceptably made, the portion of the new line to the nearest valve shall be satisfactorily tested and disinfected, along with the drained portion of the existing water main, before the isolated existing main is placed back in service, except as the ENGINEER may otherwise direct. In as much as residents served by this isolated main will be temporarily out of water during this period, the work shall be executed as quickly as possible, and the time off, and the procedure in, making such connections shall be subject to the review of the ENGINEER. Such work may be required to be done at night in order to minimize inconvenience of water users. The CONTRACTOR shall not be entitled to any additional compensation because of night work or other special requirements in work under this section.

E. The CONTRACTOR shall make particular effort, prior to bidding, to ascertain whether or not valves in the existing mains to be connected to the new mains are so located as to provide isolation. If valves are not found to be adequate, then the CONTRACTOR shall utilize other means to make the connections with a minimum of interruption to service.
F. When making a wet tap connection to an existing main, a tapping sleeve designed for the type of pipe being tapped shall be utilized and the tap shall be made in accordance with the manufacturer of the tapping equipment.

G. Whenever adapters are required to properly connect the pipe with existing pipe or other material or manufacturer, the nominal I.D. of adapters shall be the same size as the nominal diameter of pipe connected thereto. Adapters shall also be furnished and used as required by the manufacturer for connection to fittings.

3.08 BEDDING