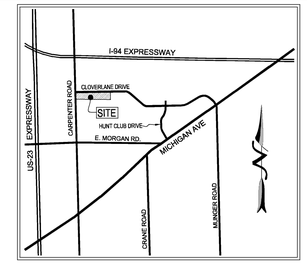
THE ENCLAVE at ARBOR RIDGE

PART OF THE SOUTHWEST 1/4 OF SECTION 13, TOWN 3 SOUTH, RANGE 6 EAST, PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN.

4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026



VICINITY MAP

DEVELOPER:
Livonia Builders
4952 Dewitt
Canton, Michigan 48188
(734) 447-3434
Danny Veri

ARCHITECT:
Alexander V Bogaerts + Associates, P.C.
Architecture • Planning • Interior Design
2445 Franklin Road
Bloomfield Hills, MI 48302
248•334•5000

ENGINEER/SURVEYOR:
MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road
Canton, Michigan 48187
(734) 459-8560
(734) 459-2585 fax
Michael L. Priest, P.E., P.S.

LANDSCAPE ARCHITECT:
Nagy & Associates
7540 South Channel Drive
Post Office Box 28044
Harsens Island, Michigan 48028
(810) 512-4004
John J. Nagy

PROPERTY DESCRIPTION:

THE ENCLAVE AT ARBOR RIDGE

PART OF THE SOUTHWEST ¼ OF SECTION 13, T. 3 S., R. 6 E., PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN DESCRIBED AS:

COMMENCING AT THE WEST ¼ CORNER OF SECTION 13, T. 3 S., R. 6 E.; THENCE ALONG THE WEST LINE OF SECTION 13 AND THE CENTERLINE OF CARPENTER ROAD S01°37'22"W 832.04 FEET TO THE POINT OF BEGINNING; THENCE ALONG THE SOUTHERLY RIGHT-OF-WAY OF CLOVERLANE ROAD THE FOLLOWING THREE COURSES: S85°51'00"E 860.00 FEET AND N01°37'22"E 17.00 FEET AND S85°51'00"E 462.13 FEET TO THE WESTERLY BOUNDARY OF WASHTENAW COUNTY CONDOMINIUM SUBDIVISION PLAN NO. 573, A.K.A. "THE WOODLANDS AT ARBOR RIDGE" (AS RECORDED IN LIBER 4712, PAGE 188, WASHTENAW COUNTY RECORDS); THENCE ALONG SAID WESTERLY BOUNDARY S01°41'32"W 241.84 FEET TO THE SOUTH LINE OF THE NORTH 64 RODS OF THE WEST HALF OF THE SOUTHWEST ¼ OF SECTION 13; THENCE ALONG SAID LINE N85°51'20"W 1321.83 FEET TO THE WEST LINE OF SECTION 13 AND THE CENTERLINE OF CARPENTER ROAD; THENCE ALONG SAID LINE N01°37'22"E 224.98 FEET TO THE POINT OF BEGINNING. SUBJECT TO THE RIGHTS OF THE PUBLIC OVER THE WESTERLY 33 FEET THEREOF AS OCCUPIED BY CARPENTER ROAD AND CONTAINING 6.9995 ACRES OF LAND.

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2. FINAL SITE PLAN & PUD AREA PLAN
3. GRADING PLAN
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TOWNSHIP SPECIFICATIONS & DETAILS:
SANITARY SEWER DETAILS
SOIL EROSION DETAILS AND NOTES
STORM SEWER DETAILS AND SPECIFICATIONS
WATER MAIN DETAILS
SANITARY SEWER SPECIFICATIONS
EARTHWORK SPECIFICATIONS
WATER MAIN SPECIFICATIONS

NOTES:

FOR PURPOSES OF LEGIBILITY, TREES TO BE REMOVED ARE NOT SHOWN ON THIS SHEET. PLEASE REFER TO SHEET 5 - TREE SURVEY FOR EXISTING TREE INFORMATION IN IT'S ENTIRETY.

NO FLOODPLAIN EXISTS ON THIS SITE PER FLOOD INSURANCE RATE MAP EFFECTIVE DATE 04-03-12. MAP NO. 26161C0406E, PANEL 406 OF 585.

BENCHMARKS:

BM #1-
ARROW ON HYDRANT LOCATED ON THE SOUTH SIDE OF CLOVERLANE DRIVE APPROX. 80' EAST OF CARPENTER RD.
ELEVATION = 840.61 NAVD 88

BM #2-
TOP OF BOTTOM FLANGE ON 3RD HYD EAST OF CARPENTER ROAD ON THE SOUTH SIDE OF CLOVERLANE DRIVE
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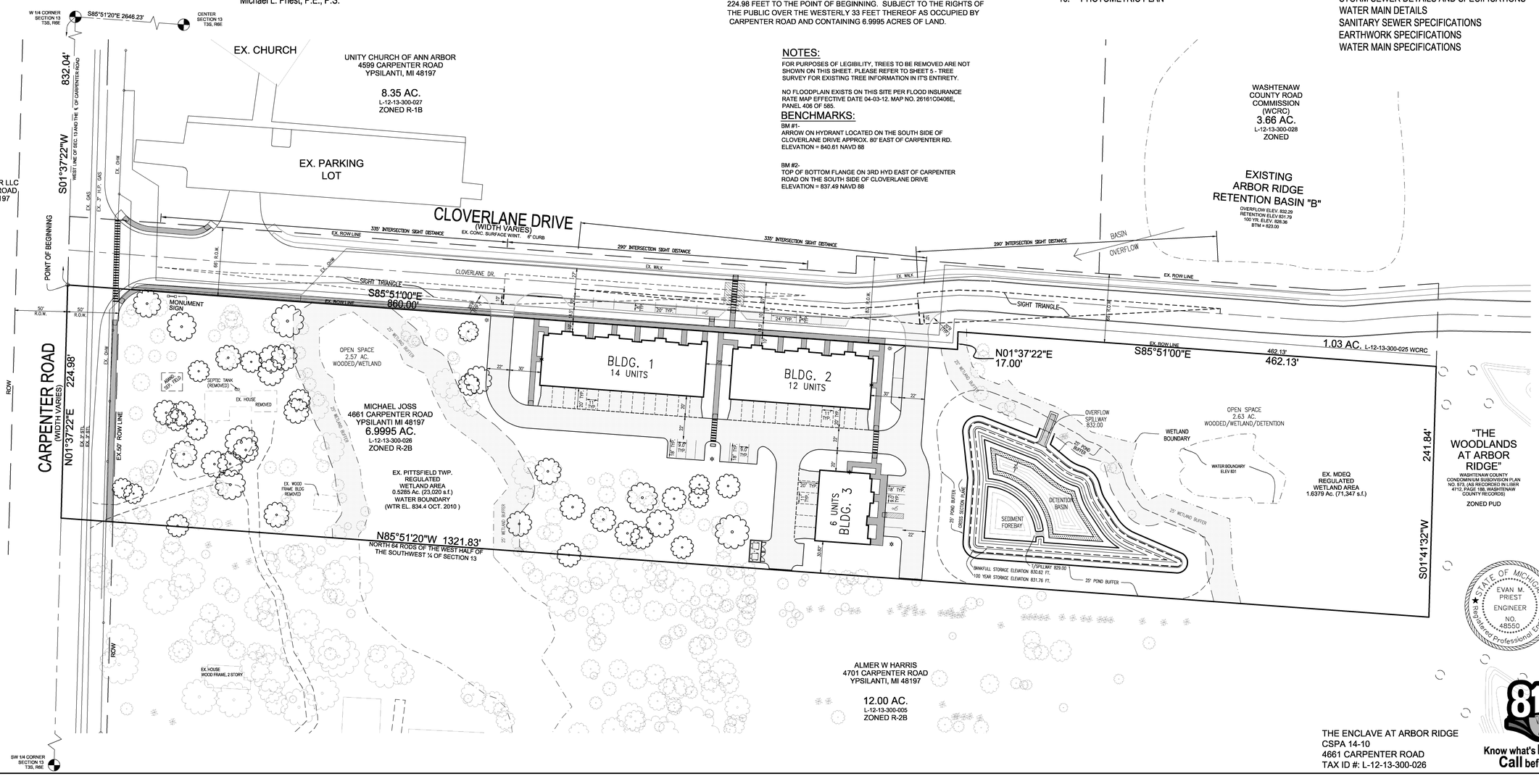

STATE OF MICHIGAN
EVAN M. PRIEST
ENGINEER
NO. 48550
Registered Professional Engineer

Know what's below. Call before you dig.

THE ENCLAVE at ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

COVER SHEET

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
REVIEW: MLP
CADD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 50'

STATUS:
JOB NO: 1019
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET
1

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THE ENCLAVE at Arbor Ridge

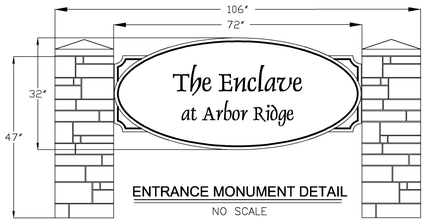
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T.3S., R.6E.

PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MI

SCALE: ONE INCH = 50 FEET

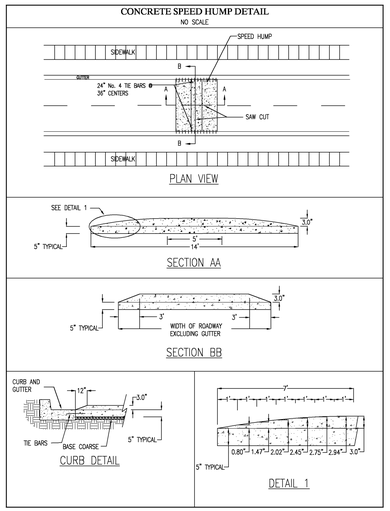
0 25 50 100 150

SCALE IN FEET



ENTRANCE MONUMENT DETAIL

NO SCALE



SITE DATA:

EXISTING SITE ZONING:	R-2B		
PROPOSED ZONING:	PUD		
PROPOSED LAND USE:	APARTMENTS		
GROSS SITE AREA	6.9995 ACRES	304,897 SF	
LESS EX. CARPENTER ROW	0.26 ACRES	11,248.8 SF	
EXISTING WETLAND AREA	2.16 ACRES	94,089.6 SF	
NET SITE AREA	4.5795 ACRES	199,558 SF	

LOT COVERAGE CALCULATION:
NUMBER OF BUILDINGS: 3
TOTAL BUILDING FOOTPRINT AREA: 18,455 S.F.
LOT COVERAGE: 9.25% (25% PUD MAX)

NET LOT COVERAGE CALCULATION:
AREA OF BUILDING FOOTPRINTS, PAVING, PARKING AND OTHER STRUCTURES 50,703 S.F.
NET LOT COVERAGE: 24.93% (40% R2B MAX)

FLOOR AREA RATIO CALCULATION:

14 UNIT BLDG.:	
LOWER LEVEL	4,525 S.F.
1ST FLOOR	7,748 S.F.
2ND FLOOR	8,003 S.F.
3RD FLOOR	3,563 S.F.
14 UNIT BLDG. GROSS HORIZ. FLOOR AREA:	23,839 S.F. x 1 = 23,839 S.F.
12 UNIT BLDG.:	
LOWER LEVEL	3,832 S.F.
1ST FLOOR	6,643 S.F.
2ND FLOOR	6,859 S.F.
3RD FLOOR	3,053 S.F.
12 UNIT BLDG. GROSS HORIZ. FLOOR AREA:	20,387 S.F. x 1 = 20,387 S.F.
6 UNIT BLDG.:	
LOWER LEVEL	1,916 S.F.
1ST FLOOR	3,322 S.F.
2ND FLOOR	3,430 S.F.
3RD FLOOR	1,527 S.F.
6 UNIT BLDG. GROSS HORIZ. FLOOR AREA:	10,195 S.F. x 1 = 10,195 S.F.
TOTAL GROSS HORIZONTAL FLOOR AREA:	54,421 S.F.
FLOOR AREA RATIO:	0.27 (0.35 PUD MAX)

DENSITY CALCULATION:
FUTURE LAND USE: URBAN RESIDENTIAL - MEDIUM DENSITY
MAXIMUM ALLOWABLE DENSITY PER PITTSFIELD TOWNSHIP COMPREHENSIVE PLAN FUTURE LAND USE MAP: 6 UNITS/AC. x 4.5795 NET AC. = 27.5 UNITS
NUMBER OF UNITS PROPOSED: 32
NET DENSITY PROVIDED: 6.9 UNITS / ACRE

SETBACKS PROVIDED:

CARPENTER ROAD	434' +
CLOVERLANE ROAD	10'
SOUTH PROPERTY LINE	30'+
EAST PROPERTY LINE	473' +
DISTANCE BETWEEN BUILDINGS	
SIDE TO SIDE	25'
REAR TO REAR	62'
OVERALL BUILDING LENGTH BLDG. 1	158.17'
OVERALL BUILDING LENGTH BLDG. 2	135.67'
OVERALL BUILDING LENGTH BLDG. 3	68.17'
OVERALL BUILDING DEPTH ALL BLDGS	53.67'
BUILDING HEIGHT	29.50'

PARKING:
REQUIRED PARKING: 2 SPACES PER UNIT = 64 SPACES REQUIRED
PROVIDED PARKING: 32 GARAGE SPACES
32 DRIVEWAY SPACES
11 PARALLEL GUEST SPACES (10' X 24')
15 GUEST SPACES (9' X 20' ALLOWABLE IN PUD)
90 SPACES

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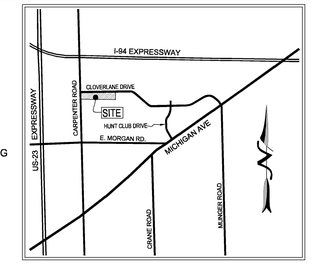
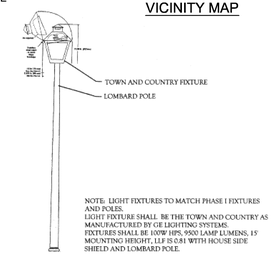


VICINITY MAP



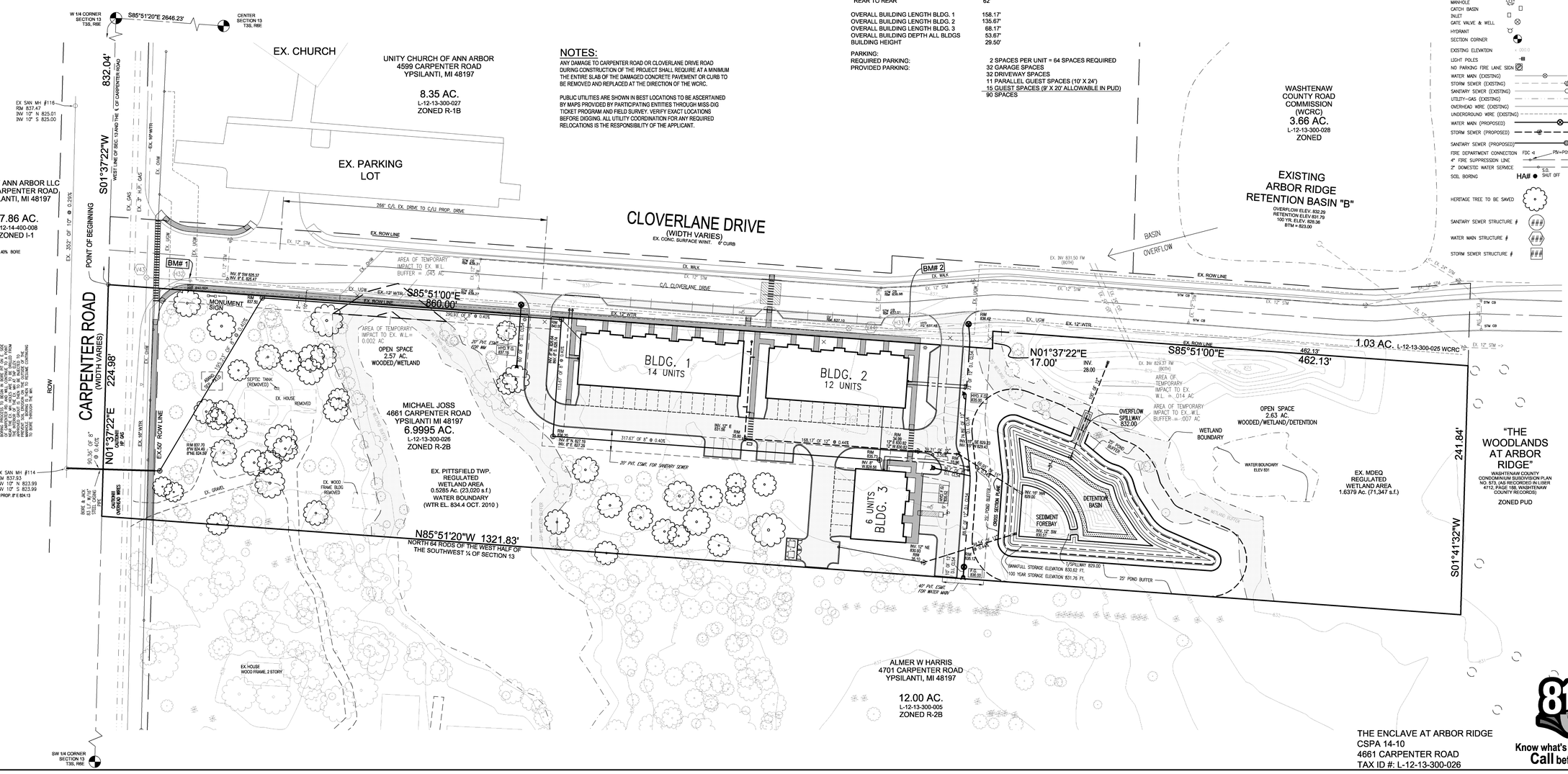
NOTE: LIGHT FIXTURES TO MATCH PHASE I FIXTURES AND POLES.
LIGHT FIXTURE SHALL BE THE TOWN AND COUNTRY AS MANUFACTURED BY GE LIGHTING SYSTEMS.
FIXTURES SHALL BE 100W HPS, 9500 LAMP LUMENS, 15' MOUNTING HEIGHT, LLF IS 0.81 WITH HOUSE SIDE SHIELD AND LOMBARD POLE.

LIGHT POLE DETAIL

NO SCALE

LEGEND:

MANHOLE
CATCH BASIN
INLET
GATE VALVE & WELL
HYDRANT
SECTION CORNER
EXISTING ELEVATION
LIGHT POLES
NO PARKING FIRE LANE SIGN
WATER MAIN (EXISTING)
STORM SEWER (EXISTING)
SANITARY SEWER (EXISTING)
UTILITY-GAS (EXISTING)
OVERHEAD WIRE (EXISTING)
UNDERGROUND WIRE (EXISTING)
WATER MAIN (PROPOSED)
STORM SEWER (PROPOSED)
SANITARY SEWER (PROPOSED)
FIRE DEPARTMENT CONNECTION FDC
PIV=POST INDICATOR VALVE
4" FIRE SUPPRESSION LINE
2" DOMESTIC WATER SERVICE
S.O. SHUT OFF
SOIL BORING HA#
HERITAGE TREE TO BE SAVED
SANITARY SEWER STRUCTURE #
WATER MAIN STRUCTURE #
STORM SEWER STRUCTURE #



NOTES:

ANY DAMAGE TO CARPENTER ROAD OR CLOVERLANE DRIVE ROAD DURING CONSTRUCTION OF THE PROJECT SHALL REQUIRE AT A MINIMUM THE ENTIRE SLAB OF THE DAMAGED CONCRETE PAVEMENT OR CURB TO BE REMOVED AND REPLACED AT THE DIRECTION OF THE WCRC.

PUBLIC UTILITIES ARE SHOWN IN BEST LOCATIONS TO BE ASCERTAINED BY MAPS PROVIDED BY PARTICIPATING ENTITIES THROUGH MISS-DIG TICKET PROGRAM AND FIELD SURVEY. VERIFY EXACT LOCATIONS BEFORE DIGGING. ALL UTILITY COORDINATION FOR ANY REQUIRED RELOCATIONS IS THE RESPONSIBILITY OF THE APPLICANT.

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

Know what's below. Call before you dig.

FINAL SITE PLAN & P.U.D. AREA PLAN

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
DRAWN: MLP
CADD: EMP
1019.DWG
VZATUM: NAVD88
SCALE: 1" = 50'

STATUS:
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14
JOB NO: 1019

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET
2

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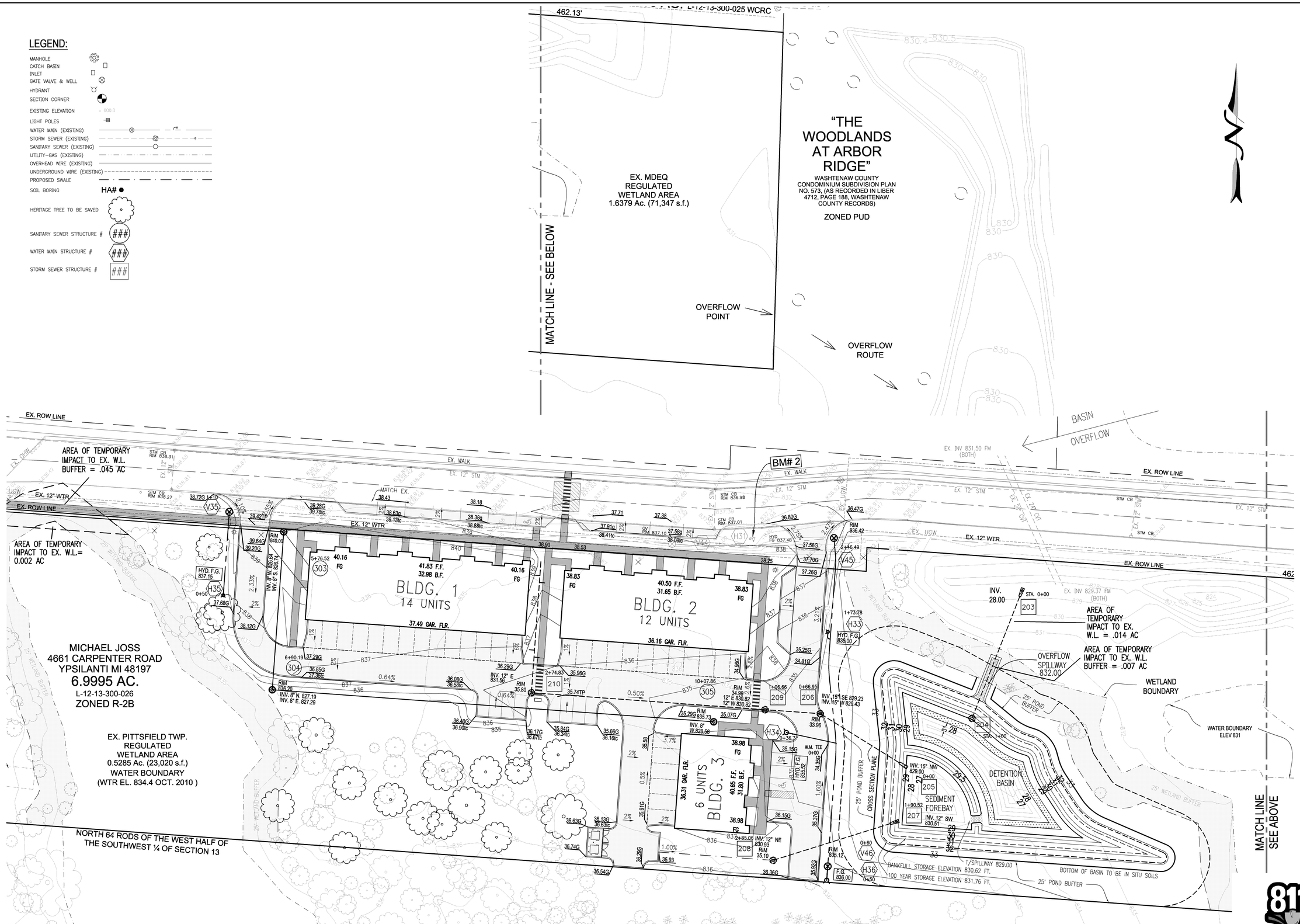
LEGEND:

- MANHOLE
- CATCH BASIN
- INLET
- GATE VALVE & WELL
- HYDRANT
- SECTION CORNER
- EXISTING ELEVATION — x 000.0
- LIGHT POLES
- WATER MAIN (EXISTING)
- STORM SEWER (EXISTING)
- SANITARY SEWER (EXISTING)
- UTILITY–GAS (EXISTING)
- OVERHEAD WIRE (EXISTING)
- UNDERGROUND WIRE (EXISTING)
- PROPOSED SWALE
- SOIL BORING — HA# ●
- HERITAGE TREE TO BE SAVED
- SANITARY SEWER STRUCTURE # — ###
- WATER MAIN STRUCTURE # — ###
- STORM SEWER STRUCTURE # — ###



THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

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GRADING PLAN

THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

MLP
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PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
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PH: 734-347-3434

DATE: 04-11-14
PM: EMP
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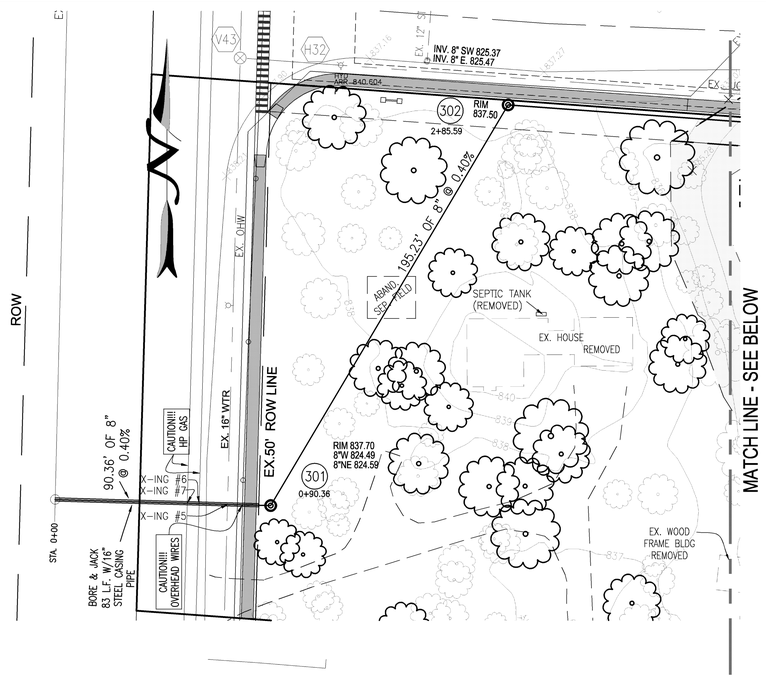
CADD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 30'

STATUS:
JOB NO: 1019
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

SHEET 3

S:\jobs\2010\1019 Pittsfield Apartments\dwg\1019.dwg, 5/21/2014 1:34:04 PM, KIP 3100.pc3

BORING PROCESS TO BEGIN IN BORE PIT ON E. SIDE OF PROPERTY AND WILL CONTINUE TO A POINT NEAR THE EX. MH. HOLES ARE TO BE DRILLED FROM THE INTERIOR OF THE EX. MH AT IAP ELEV. APPROVED GRAVEL PIT TO BE INSTALLED TO PREVENT SOIL EROSION ON THE OUTSIDE OF THE MANHOLE. BORING IS THEN TO RESUME CONTINUING TO BORE THROUGH THE MH.



LEGEND:

MANHOLE
CATCH BASIN
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HYDRANT
SECTION CORNER
EXISTING ELEVATION — x 000.0
LIGHT POLES
NO PARKING FIRE LANE SIGN
WATER MAIN (EXISTING)
STORM SEWER (EXISTING)
SANITARY SEWER (EXISTING)
UTILITY-GAS (EXISTING)
OVERHEAD WIRE (EXISTING)
UNDERGROUND WIRE (EXISTING)
WATER MAIN (PROPOSED)
STORM SEWER (PROPOSED)
SANITARY SEWER (PROPOSED)
FIRE DEPARTMENT CONNECTION — FDC — PIV=POST INDICATOR VALVE
4" FIRE SUPPRESSION LINE
2" DOMESTIC WATER SERVICE — S.O. SHUT OFF
SOIL BORING — HA#
HERITAGE TREE TO BE SAVED
SANITARY SEWER STRUCTURE #
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SANITARY SEWER

	ITEM	QUANTITY	UNIT
1	8" SDR 26	1009	L.F.
2	6" SDR 26	2021	L.F.
3	MANHOLES (10")	5	EA.
4	BORE & JACK W/24" CASING	90	L.F.

WATER MAIN

	ITEM	QUANTITY	UNIT
1	12" PC 350	247	L.F.
2	8" PC 350	97	L.F.
3	HYD ON 8"	2	EA.
4	HYD ON 12"	2	EA.
5	12" T.S.V. & WELL	1	EA.
6	12" G.V. & WELL	1	EA.

STORM SEWER

	ITEM	QUANTITY	UNIT
1	12" C76 CLIV	402	L.F.
2	15" C76 CLIV	67	L.F.
3	8" N12 WT	188	L.F.
4	4' DIA CB W/EJIW 7045 OR 7065	3	EA.
5	4' DIA CB EJIW 1040Z N COVER	1	EA.
6	12" FES W/APG	2	EA.
7	15" FES W/APG	1	EA.

SANITARY

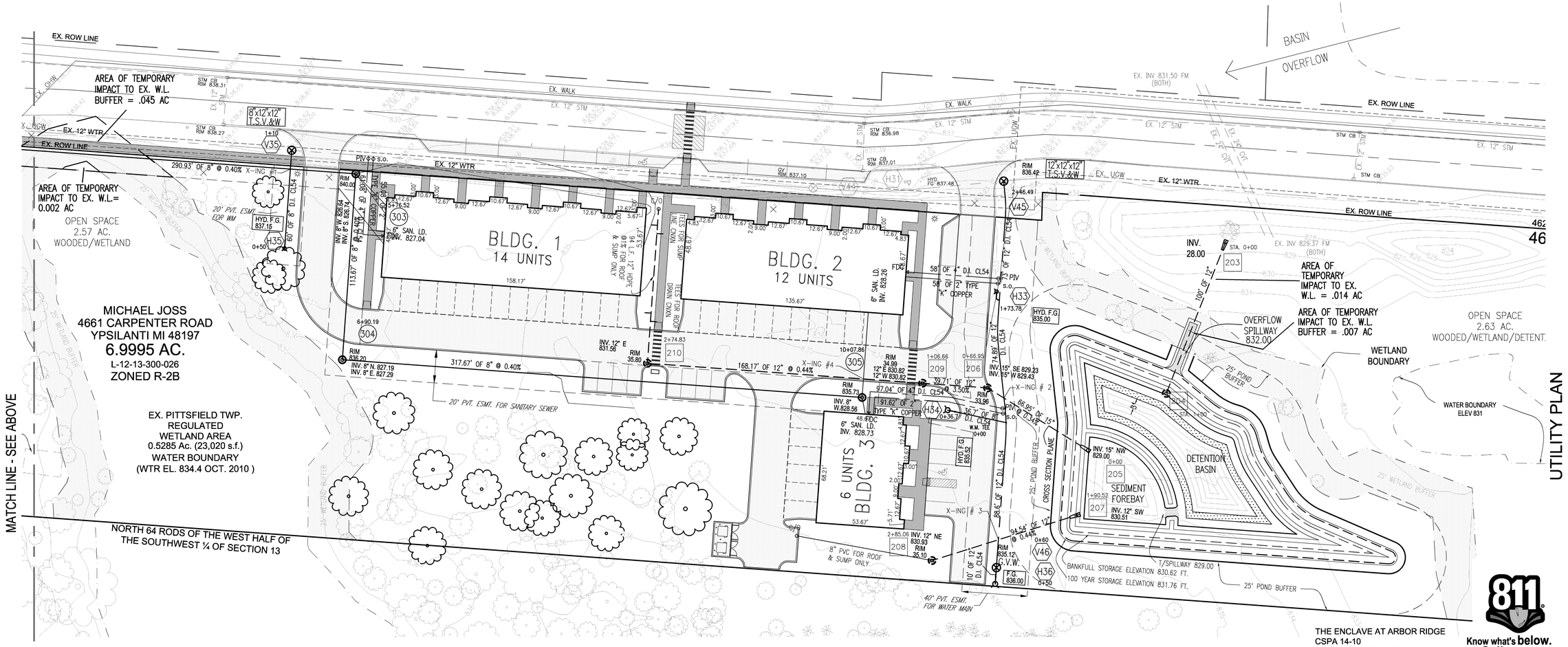
STR. NO.	RIM	STR. DIA.	SUMP	TYPE	FRAME & COVER	PIPE DIA	PIPE DIR	I.E.	COVER
301	837.70	4	2	MH	EJIW 1040Z W/	8	W	824.49	13.88
					EJIW 1040 AGS	8	NE	824.59	13.78
302	837.50	4	0	MH	EJIW 1040Z W/	8	SW	825.37	12.80
					EJIW 1040 AGS	8	NE	825.47	12.70
303	840.00	4	0	MH	EJIW 1040Z W/	8	W	826.64	14.03
					EJIW 1040 AGS	8	S	826.74	13.93
304	836.20	4	0	MH	EJIW 1040Z W/	8	N	827.19	9.68
					EJIW 1040 AGS	8	E	827.29	9.58
305	835.73	4	0	MH	EJIW 1040Z W/	8	W	828.56	7.84
					EJIW 1040 AGS				

STORM

STR. NO.	RIM	STR. DIA.	SUMP	TYPE	FRAME & COVER	PIPE DIA	PIPE DIR	I.E.	COVER
203				FES		12	S	828.00	
204	831.76	3	2	STANDPIPE		12	N	829.00	3.43
205				FES		15	W	829.00	
206	833.96	4	0	CB	EJIW 7045	15	BE	829.43	3.09
					OR EJIW 7065	12	W	829.43	3.36
209	834.99	4	0	CB	EJIW 7045	12	E	830.82	3.00
					OR EJIW 7065	12	W	830.82	3.00
210	835.80	4	0	CB	EJIW 7045	12	E	831.56	3.07
					OR EJIW 7065	12	N	831.56	3.57
207				FES		12	S	830.51	
208	835.10	4	0	CB	EJIW 1040Z	12	E	830.93	3.00
					W/1040 N	8	W	831.20	3.23

WATER MAIN

STR. NO.	RIM OR F.G.	STR. DIA.		TYPE	FRAME & COVER OR MODEL	PIPE DIA	PIPE DIR	T/MM	COVER
V45	836.42	6		WELL	EJIW 1040-12PT	12	E	830.92	5.50
					W/1040A	12	W	830.92	
						12	S	830.92	
H34	835.52			HYDRANT	EJIW 5 BR-250	8	E	830.02	5.50
					W/12" BARREL SEC.				
V46	835.12	6		WELL	EJIW 1040-12PT	12	E	829.62	5.50
					W/1040A	12	W	829.62	
H46	836.00			HYDRANT	EJIW 5 BR-250	8	E	830.50	5.50
					W/12" BARREL SEC.				
H35	837.15			HYDRANT	EJIW 5 BR-250	8	E	831.65	5.50
					W/12" BARREL SEC.				



THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

Know what's below. Call before you dig.

UTILITY PLAN

PREPARED FOR:

LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
CAD: MLP
CHKD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 30'

STATUS:
REVISIONS: 05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14
JOB NO: 1019

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

THE ENCLAVE at Arbor Ridge

FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET 4

SOILS MAP LEGEND:

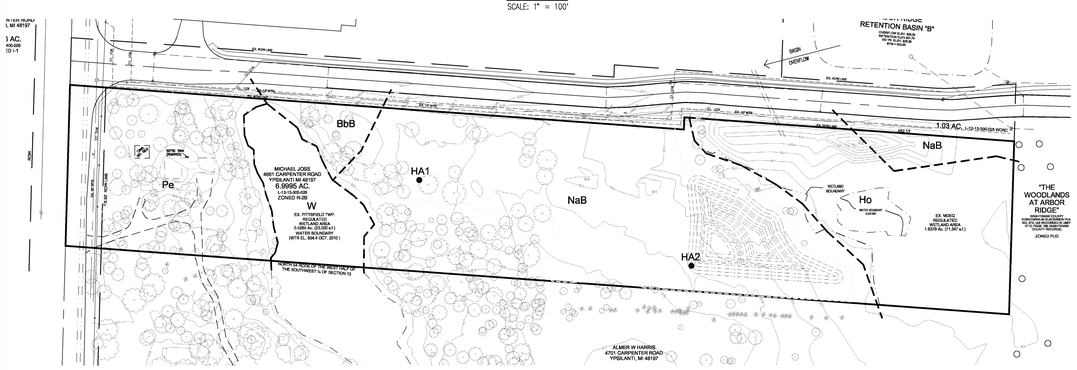
BbB	BLOUNT LOAM
Ho	HOYTVILLE SILTY CLAY LOAM
NaB	NAPPANESE SILTY CLAY LOAM
Pe	PEWAMO CLAY LOAM
W	WATER
HA# ●	SOIL BORING

NOTE:

SOIL TYPE BOUNDARY LOCATIONS ARE APPROXIMATE BASED ON USDA NRCS NATIONAL COOPERATIVE SOIL SURVEY.

SOILS MAP

SCALE: 1" = 100'



SOIL BORING INFORMATION:

Client: Livonia Builders, Inc. | PSI Project #: 0381347 | Boring Log Number: HA-1 | Sheet: 1 of 1

Project: Enclave at Woodlands Limited Soils Investigation | **Location:** Pittsfield Township, Washtenaw County, Michigan

psi — Professional Service Industries, Inc.

Sample No./Type	Description of Material	Depth (ft)	Blows Per Foot	Moisture Content (%)	Plastic Limit (%)	Liquid Limit (%)	Dry Unit Wt (lbs/cu ft)
	Surface Elevation						
1HA	Approximately 6.5" of SILTY SAND, some organics, brown, moist (Surficial Topsoil)			25			
2HA	CLAYEY SAND (SC) - fine to medium, few gravel, brown, moist			16			
3HA	SILTY CLAY (CL) - trace sand, mottled brown and orangish brown, moist			20			
4HA	SILTY CLAY (CL) - trace sand, frequent light brown silt brown, mottled grayish brown and pinkish brown, moist			16			
5HA	SAND (SP) - fine, trace silt, light brown, moist			2			
6HA	SAND (SP) - fine to medium, trace silt, brown, moist			5			
7HA				3			
	END OF BORING						

⊗ "N" Blows Per Foot (0, 20, 40, 60) ○ Unconfined Compressive Strength (tsf) ◐ Calibrated Hand Penetrometer (tsf) (0, 2, 4, 6)

Note: The stratification lines indicated here are approximate. In-situ, the transition between soil types may be gradual.

Water Level While Drilling: Dry
Water Level At Completion: Dry
Dry After Completion

Boring Started: 1/4/2011 Completed: 1/4/2011 Engineer: KFD
Drilling Method: Hand Auger Office: Plymouth Drawn By: KFD
Driller: M. Dubnicki Drill Rig: Hole Depth (ft): 8 Approved: Y
Note: Boring backfilled with auger cuttings unless otherwise noted.

Client: Livonia Builders, Inc. | PSI Project #: 0381347 | Boring Log Number: HA-2 | Sheet: 1 of 1

Project: Enclave at Woodlands Limited Soils Investigation | **Location:** Pittsfield Township, Washtenaw County, Michigan

psi — Professional Service Industries, Inc.

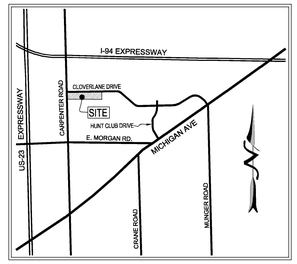
Sample No./Type	Description of Material	Depth (ft)	Blows Per Foot	Moisture Content (%)	Plastic Limit (%)	Liquid Limit (%)	Dry Unit Wt (lbs/cu ft)
	Surface Elevation:						
1HA	Approximately 7.5" of SILTY SAND, some organics, brown, moist (Surficial Topsoil)			17			
2HA	SANDY CLAY (CL) - trace sand, frequent light brown silt partings, grayish brown, moist			18			
3HA				17			
4HA				17			
	END OF BORING						

⊗ "N" Blows Per Foot (0, 20, 40, 60) ○ Unconfined Compressive Strength (tsf) ◐ Calibrated Hand Penetrometer (tsf) (0, 2, 4, 6)

Note: The stratification lines indicated here are approximate. In-situ, the transition between soil types may be gradual.

Water Level While Drilling: Dry
Water Level At Completion: Dry
Dry After Completion

Boring Started: 1/4/2011 Completed: 1/4/2011 Engineer: KFD
Drilling Method: Hand Auger Office: Plymouth Drawn By: KFD
Driller: M. Dubnicki Drill Rig: Hole Depth (ft): 7.5 Approved: Y
Note: Boring backfilled with auger cuttings unless otherwise noted.



VICINITY MAP

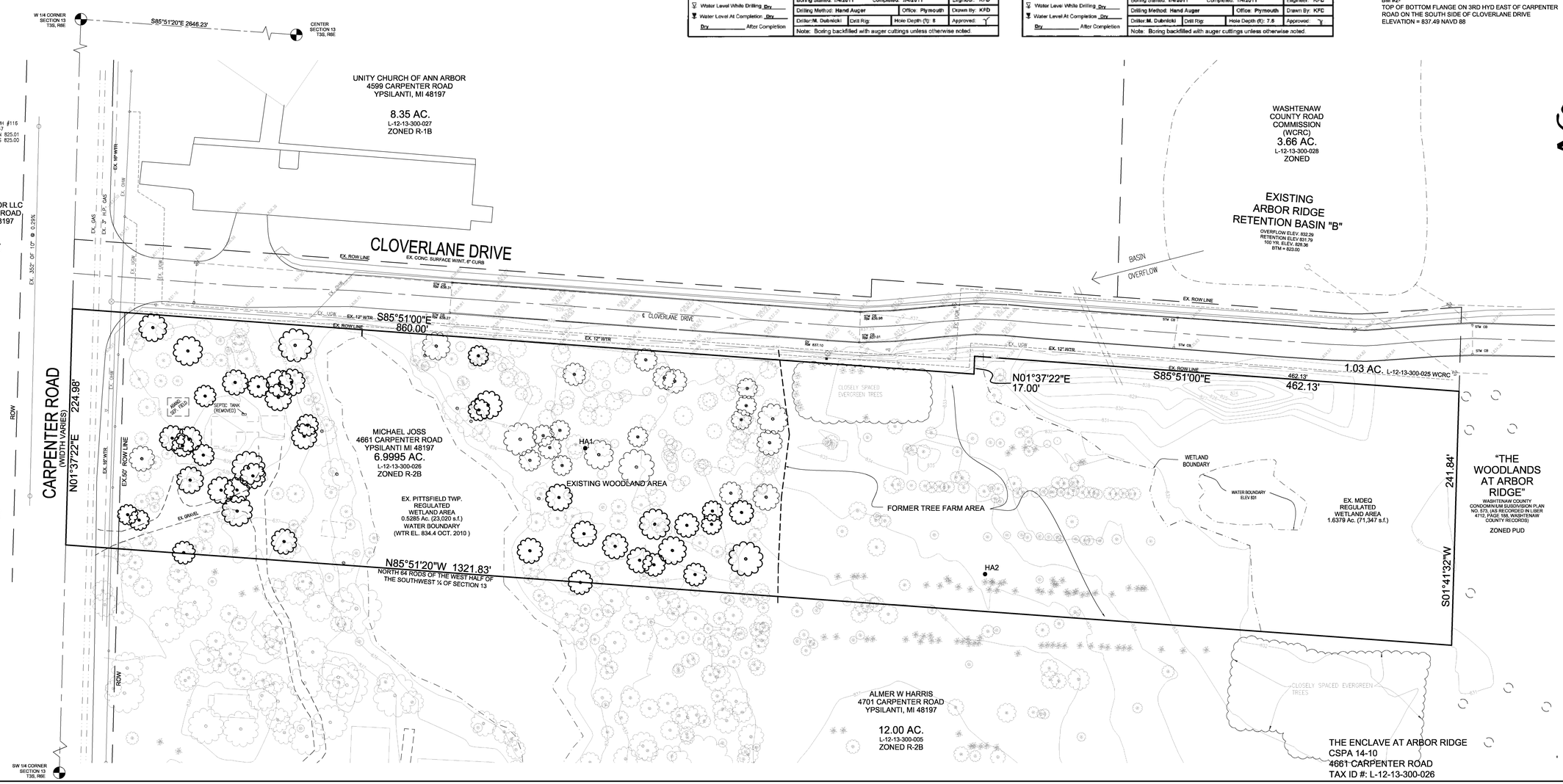
LEGEND:

MANHOLE
CATCH BASIN
INLET
GATE VALVE & WELL
HYDRANT
SECTION CORNER
EXISTING ELEVATION
LIGHT POLES
WATER MAIN (EXISTING)
STORM SEWER (EXISTING)
SANITARY SEWER (EXISTING)
OVERHEAD WIRE (EXISTING)
UNDERGROUND WIRE (EXISTING)
SOIL BORING HA# ●

BENCHMARKS:

BM #1-
ARROW ON HYDRANT LOCATED ON THE SOUTH SIDE OF CLOVERLANE DRIVE APPROX. 80' EAST OF CARPENTER RD.
ELEVATION = 840.61 NAVD 88

BM #2-
TOP OF BOTTOM FLANGE ON 3RD HYD EAST OF CARPENTER ROAD ON THE SOUTH SIDE OF CLOVERLANE DRIVE
ELEVATION = 837.49 NAVD 88



TOPOGRAPHIC SURVEY, SOILS INFORMATION & NATURAL FEATURES PLAN

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
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1019.DWG
VDATUM: NAVD88
SCALE: 1" = 50'

STATUS:
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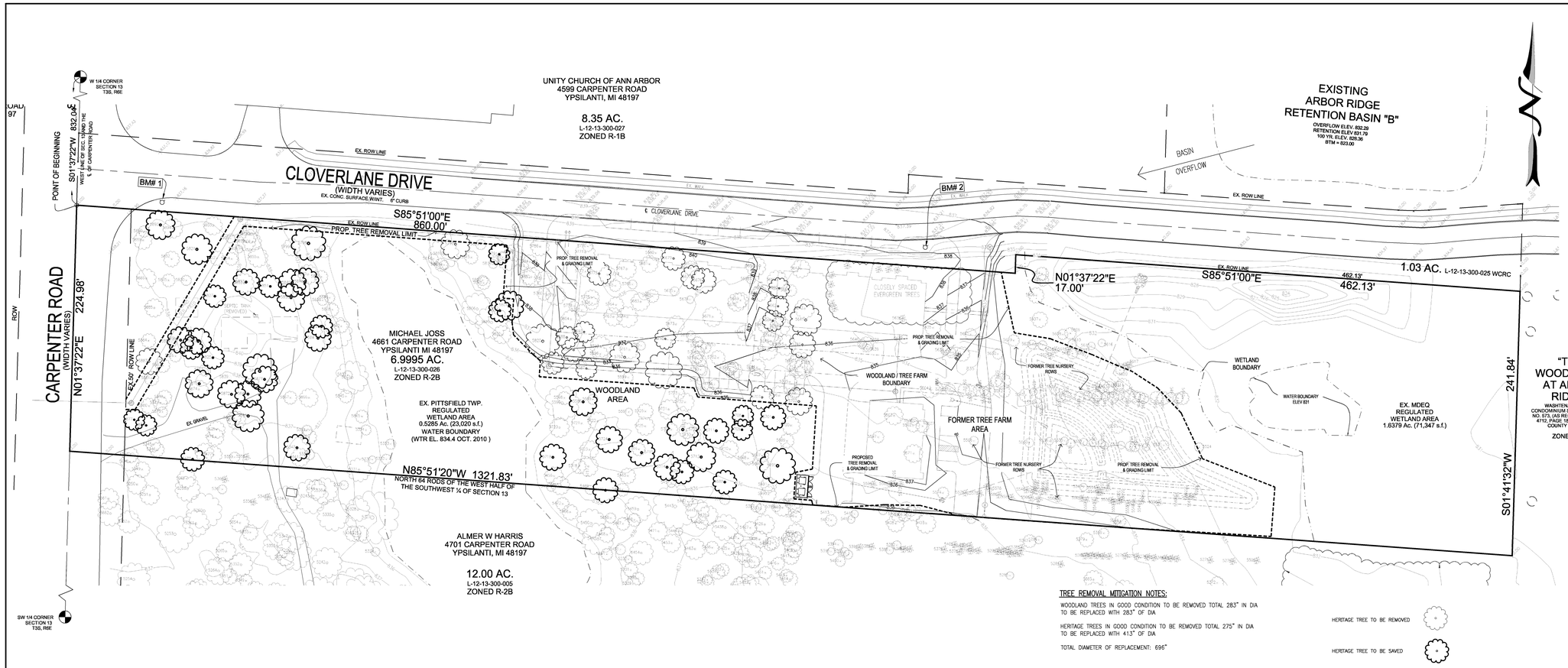
THE ENCLAVE at Arbor Ridge

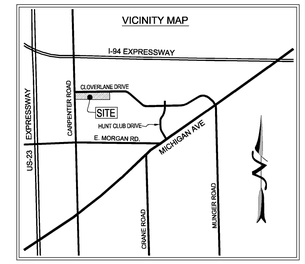
FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET
5

S:\jobs\2010\1019 Pittsfield Apartments\dwg\1019.dwg, 5/21/2014 1:49:17 PM, KIP 3100.pc3





PROPERTY DESCRIPTION:

THE ENCLAVE AT ARBOR RIDGE

PART OF THE SOUTHWEST ¼ OF SECTION 13, T. 3 S., R. 6 E., PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN DESCRIBED AS:

COMMENCING AT THE WEST ¼ CORNER OF SECTION 13, T. 3 S., R. 6 E.; THENCE ALONG THE WEST LINE OF SECTION 13 AND THE CENTERLINE OF CARPENTER ROAD S01°37'22"W 832.04 FEET TO THE POINT OF BEGINNING; THENCE ALONG THE SOUTHERLY RIGHT-OF-WAY OF CLOVERLANE ROAD THE FOLLOWING THREE COURSES: S85°51'00"E 860.00 FEET AND N01°37'22"E 17.00 FEET AND S85°51'00"E 462.13 FEET TO THE WESTERLY BOUNDARY OF WASHTENAW COUNTY CONDOMINIUM SUBDIVISION PLAN NO. 573, A.K.A. "THE WOODLANDS AT ARBOR RIDGE" (AS RECORDED IN LIBER 4712, PAGE 188, WASHTENAW COUNTY RECORDS); THENCE ALONG SAID WESTERLY BOUNDARY S01°41'32"W 241.84 FEET TO THE SOUTH LINE OF THE NORTH 64 RODS OF THE WEST HALF OF THE SOUTHWEST ¼ OF SECTION 13; THENCE ALONG SAID LINE N85°51'20"W 1321.83 FEET TO THE WEST LINE OF SECTION 13 AND THE CENTERLINE OF CARPENTER ROAD; THENCE ALONG SAID LINE N01°37'22"E 224.98 FEET TO THE POINT OF BEGINNING. SUBJECT TO THE RIGHTS OF THE PUBLIC OVER THE WESTERLY 33 FEET THEREOF AS OCCUPIED BY CARPENTER ROAD AND CONTAINING 6.9995 ACRES OF LAND.

BENCHMARKS:

BM #1-
ARROW ON HYDRANT LOCATED ON THE SOUTH SIDE OF CLOVERLANE DRIVE APPROX. 80' EAST OF CARPENTER RD.
ELEVATION = 840.61 NAVD 88

BM #2-
TOP OF BOTTOM FLANGE ON 3RD HYD EAST OF CARPENTER ROAD ON THE SOUTH SIDE OF CLOVERLANE DRIVE
ELEVATION = 837.49 NAVD 88

TREE REMOVAL MITIGATION NOTES:

WOODLAND TREES IN GOOD CONDITION TO BE REMOVED TOTAL 283" IN DIA
TO BE REPLACED WITH 283" OF DIA

HERITAGE TREES IN GOOD CONDITION TO BE REMOVED TOTAL 275" IN DIA
TO BE REPLACED WITH 413" OF DIA

TOTAL DIAMETER OF REPLACEMENT: 696"

HERITAGE TREE TO BE REMOVED

HERITAGE TREE TO BE SAVED

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5245	11	HICKORY			WOODLAND	
5246	11	HICKORY			WOODLAND	
5247	12	OAK			WOODLAND	
5330	6	ELM			WOODLAND	
5331	**18**	**OAK**	**H**			
5332	8	ELM			WOODLAND	
5333	8	ELM			WOODLAND	
5334	8	HICKORY			WOODLAND	
5337	8	HICKORY			WOODLAND	
5338	12	MAPLE			WOODLAND	
5339	8	MAPLE			WOODLAND	
5340	**20**	**OAK**	**H**			
5341	14	HICKORY			WOODLAND	
5358	10	SPRUCE			WOODLAND	
5359	8	MAPLE			WOODLAND	
5395	8	HICKORY			WOODLAND	
5404	12	LOCUST			WOODLAND	
5405	8	LOCUST		GOOD	WOODLAND	R
5409	7	LOCUST			WOODLAND	
5455	14	OAK			WOODLAND	
5456	14	OAK			WOODLAND	
5457	7	OAK			WOODLAND	
5460	7	HICKORY			WOODLAND	
5464	10	HICKORY			WOODLAND	
5465	12	HICKORY			WOODLAND	
5469	7	ELM			WOODLAND	
5470	**19**	**HICKORY**	**H**			
5473	**18**	**HICKORY**	**H**			
5474	14	OAK			WOODLAND	
5475	13	MAPLE			WOODLAND	
5476	13	OAK			WOODLAND	
5477	13	HICKORY			WOODLAND	
5478	9	OAK		GOOD		R
5479	9	OAK		GOOD		R
5480	10	OAK		GOOD		R
5481	8	OAK		FAIR		R
5483	10	OAK			WOODLAND	
5484	8	OAK			WOODLAND	
5485	10	OAK		GOOD		R
5487	8	OAK		FAIR		R
5489	8	OAK		FAIR		R
5490	10	OAK		GOOD		R
5491	8	OAK			WOODLAND	
5492	7	OAK		FAIR		R
5493	7	OAK		FAIR		R
5494	8	OAK		FAIR		R
5497	9	OAK		GOOD		R
5498	8	OAK		FAIR		R
5499	10	OAK		GOOD		R
5501	8	OAK		FAIR		R
5502	10	BOX ELDER		POOR		R
5503	14	COTTONWOOD		FAIR		R
5504	14	MAPLE		GOOD		R
5505	9	OAK		GOOD		R
5506	7	OAK		FAIR		R
5507	8	OAK		GOOD		R
5508	6	MAPLE		FAIR		R
5509	12	OAK		GOOD		R
5510	9	OAK		FAIR		R
5511	10	OAK		GOOD		R

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5512	9	OAK		GOOD		R
5513	7	MAPLE		FAIR		R
5514	9	OAK		GOOD		R
5515	10	OAK		GOOD		R
5516	6	OAK		FAIR		R
5517	9	OAK		FAIR		R
5518	9	OAK		GOOD		R
5519	9	OAK		GOOD		R
5520	12	OAK		GOOD		R
5521	6	BIRCH		FAIR		R
5522	6	BIRCH		FAIR		R
5523	6	BIRCH		FAIR		R
5524	7	BIRCH			WOODLAND	
5525	6	BIRCH		FAIR		R
5526	7	BIRCH		FAIR		R
5527	10	LOCUST		FAIR		R
5528	6	BIRCH		FAIR		R
5529	10	COTTONWOOD		FAIR		R
5530	8	BIRCH		FAIR		R
5531	8	BIRCH		POOR		R
5532	6	BIRCH		FAIR		R
5533	7	BIRCH		FAIR		R
5534	6	BIRCH		FAIR		R
5535	6	BIRCH		FAIR		R
5537	8	BIRCH		FAIR		R
5538	6	BOX ELDER		POOR		R
5539	8	SPRUCE		FAIR		R
5540	6	SPRUCE		V POOR		R
5541	7	SPRUCE		FAIR		R
5542	9	SPRUCE		V POOR		R
5543	8	HEMLOCK		GOOD		R
5544	9	BLK CHERRY		V POOR		R
5545	6	HEMLOCK		GOOD		R
5546	7	HEMLOCK		GOOD		R
5547	6	BIRCH		FAIR		R
5548	6	HEMLOCK		GOOD		R
5549	6	HEMLOCK		GOOD		R
5550	7	HEMLOCK		GOOD		R
5551	7	SPRUCE		FAIR		R
5552	7	HEMLOCK		GOOD		R
5553	6	HEMLOCK		GOOD		R
5555	6	HEMLOCK		GOOD		R
5556	6	HEMLOCK		GOOD		R
5557	6	HEMLOCK		GOOD		R
5558	6	SPRUCE		FAIR		R
5559	6	SPRUCE		FAIR		R
5560	6	SPRUCE		FAIR		R
5561	6	SPRUCE		FAIR		R
5562	6	HEMLOCK		GOOD		R
5563	8	SPRUCE		FAIR		R
5564	8	HEMLOCK		GOOD		R
5565	10	SPRUCE		FAIR		R
5566	6	HEMLOCK		GOOD		R
5567	9	HEMLOCK		GOOD		R
5568	8	SPRUCE		FAIR		R
5569	8	SPRUCE		FAIR		R
5570	6	HEMLOCK		GOOD		R
5571	14	BOX ELDER		POOR		R
5572	9	SPRUCE		V POOR		R
5573	9	SPRUCE		POOR		R

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5574	9	OAK		GOOD		R
5575	8	HEMLOCK		GOOD		R
5576	7	LOCUST			WOODLAND	
5577	6	HEMLOCK		GOOD		R
5578	14	SPRUCE		FAIR		R
5579	12	SPRUCE		FAIR		R
5580	6	HEMLOCK		GOOD		R
5581	6	HEMLOCK		GOOD		R
5582	10	SPRUCE		DEAD		R
5583	12	HICKORY		FAIR	WOODLAND	R
5584	**18**	**OAK**	**H**	**GOOD**		**R**
5585	8	HICKORY		POOR	WOODLAND	
5586	**21**	**OAK**	**H**			
5587	**16**	**MAPLE**	**H**	**GOOD**		**R**
5588	**17**	**OAK**	**H**	**GOOD**		**R**
5589	**17**	**OAK**	**H**	**FAIR**		**R**
5590	**26**	**OAK**	**H**			
5591	6	MAPLE		FAIR	WOODLAND	
5592	**16**	**OAK**	**H**	**FAIR**		**R**
5593	16	ASH		DEAD		R
5594	7	SPRUCE		POOR		R
5595	14	BLK CHERRY		POOR	WOODLAND	R
5596	12	OAK		POOR	WOODLAND	R
5597	9	COTTONWOOD		FAIR		R
5598	10	HICKORY			WOODLAND	
5599	8	BLK CHERRY		V POOR	WOODLAND	R
5600	10	OAK		GOOD	WOODLAND	R
5604	10	OAK			WOODLAND	
5605	9	OAK			WOODLAND	
5606	12	LOCUST			WOODLAND	
5607	12	LOCUST			WOODLAND	
5608	8	BIRCH			WOODLAND	
5609	9	BIRCH			WOODLAND	
5610	7	BIRCH			WOODLAND	
5611	11	SPRUCE		GOOD		R
5612	8	COTTONWOOD		FAIR		R
5613	7	SPRUCE				R
5614	8	SPRUCE			WOODLAND	
5615	6	BIRCH			WOODLAND	
5616	6	BIRCH			WOODLAND	
5617	10	PINE			WOODLAND	
5618	6	PINE			WOODLAND	
5619	7	COTTONWOOD		GOOD	WOODLAND	R
5620	8	PINE				R
5621	11	OAK		GOOD		R
5622	8	OAK		GOOD		R
5623	9	OAK		FAIR		R
5624	10	OAK		FAIR		R
5625	12	SPRUCE		GOOD		R
5626	6	SPRUCE		GOOD		R
5627	7	BIRCH		FAIR		R
5628	7	BIRCH		GOOD		R
5629	9	MAPLE		FAIR		R
5630	8	LOCUST		POOR		R
5631	9	LOCUST		FAIR		R
5632	11	LOCUST		FAIR		R
5633	8	TREE OF HEAVEN		FAIR		R
5634	7	TREE OF HEAVEN		FAIR		R
5635	12	LOCUST		FAIR		R
5636	12	SPRUCE		GOOD		R

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5637	7	BOX ELDER		V POOR		R
5638	11	TREE OF HEAVEN		FAIR		R
5639	8	LOCUST		POOR		R
5640	7	MAPLE		FAIR		R
5641	**24**	**OAK**	**H**	**GOOD**		**R**
5642	15	OAK		GOOD	WOODLAND	R
5643	14	HICKORY		FAIR	WOODLAND	R
5658	15	HICKORY		FAIR	WOODLAND	R
5659	15	HICKORY		GOOD	WOODLAND	R
5660	**16**	**HICKORY**	**H**	**GOOD**		**R**
5661	9	OAK		GOOD	WOODLAND	R
5662	**16**	**HICKORY**	**H**	**POOR**		**R**
5663	8	HICKORY		POOR	WOODLAND	R
5664	**16**	**HICKORY**	**H**	**GOOD**		**R**
5665	12	HICKORY		FAIR	WOODLAND	R
5666	12	HICKORY		FAIR	WOODLAND	R
5667	6	ELM		POOR	WOODLAND	R
5668	7	ASH		DEAD	WOODLAND	R
5669	12	OAK		GOOD	WOODLAND	R
5670	14	OAK		GOOD	WOODLAND	R
5671	15	OAK		V POOR	WOODLAND	R
5672	7	OAK		POOR	WOODLAND	R
5673	13	HICKORY		GOOD	WOODLAND	R
5674	6	BLK CHERRY		V POOR	WOODLAND	R
5675	7	MAPLE		FAIR	WOODLAND	R
5676	**19**	**HICKORY**	**H**	**GOOD**		**R**
5677	**18**	**OAK**	**H**	**GOOD**		**R**
5678	11	HICKORY		FAIR	WOODLAND	R
5679	**18**	**HICKORY**	**H**	**GOOD**		**R**
5680	11	HICKORY		GOOD	WOODLAND	R
5681	13	HICKORY		FAIR	WOODLAND	R
5682	10	MAPLE		V POOR	WOODLAND	R
5683	14	HICKORY		FAIR	WOODLAND	R
5684	16	BLK CHERRY		FAIR	WOODLAND	R
5688	**18**	**HICKORY**	**H**			
5690	12	BLK CHERRY			WOODLAND	
5691	12	ELM			WOODLAND	
5693	12	BLK CHERRY			WOODLAND	
5694	14	OAK			WOODLAND	R
5695	**27**	**OAK**	**H**	**GOOD**		
5696	10	BLK CHERRY		V POOR	WOODLAND	
5697	10	BLK CHERRY		V POOR	WOODLAND	
5698	10	BLK CHERRY		POOR	WOODLAND	
5699	11	OAK		FAIR	WOODLAND	
5700	14	OAK		FAIR	WOODLAND	R
5701	**19**	**HICKORY**	**H**	**FAIR**		
5702	**21**	**OAK**	**H**	**FAIR**		**R**
5703	8	OAK		POOR	WOODLAND	R
5704	8	OAK		FAIR	WOODLAND	R
5705	11	BLK CHERRY		V POOR	WOODLAND	R
5706	15	HICKORY		FAIR	WOODLAND	R
5707	**18**	**HICKORY**	**H**	**GOOD**		**R**
5708	**16**	**HICKORY**	**H**	**FAIR**		
5709	**16**	**OAK**	**H**	**GOOD**		
5710	13	HICKORY		FAIR	WOODLAND	
5711	**19**	**HICKORY**	**H**	**FAIR**		
5712	**22**	**OAK**	**H**	**POOR**		
5713	**18**	**OAK**	**H**			
5714	**20**	**OAK**	**H**			
5715	**20**	**OAK**	**H**	**FAIR**		

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5716	10	OAK		FAIR	WOODLAND	
5717	15	HICKORY			WOODLAND	
5718	11	OAK			WOODLAND	
5719	**20**	**OAK**	**H**			
5720	15	HICKORY			WOODLAND	
5721	15	OAK			WOODLAND	
5722	14	OAK		GOOD	WOODLAND	
5723	14	HICKORY		DEAD	WOODLAND	
5724	**20**	**OAK**	**H**	**GOOD**		
5725	14	OAK		GOOD	WOODLAND	
5726	12	HICKORY		FAIR	WOODLAND	
5727	10	ELM		POOR	WOODLAND	
5728	**24**	**OAK**	**H**	**POOR**		
5729	12	BLK CHERRY		V POOR	WOODLAND	
5730	13	OAK		POOR	WOODLAND	
5731	15	OAK		POOR	WOODLAND	
5732	14	ASH		DEAD	WOODLAND	R
5733	9	BLK CHERRY		POOR	WOODLAND	
5734	6	BLK CHERRY		V POOR	WOODLAND	R
5735	10	BLK CHERRY		V POOR	WOODLAND	R
5736	8	BLK CHERRY		V POOR	WOODLAND	R
5738	13	OAK		GOOD	WOODLAND	R
5739	10	OAK		GOOD	WOODLAND	R
5740	8	OAK		GOOD	WOODLAND	R
5741	13	MAPLE		FAIR	WOODLAND	R
5742	15	HICKORY		FAIR	WOODLAND	R
5743	15	HICKORY		FAIR	WOODLAND	R
5744	14	HICKORY		FAIR	WOODLAND	R
5745	16	BLK CHERRY		POOR	WOODLAND	R
5746	**20**	**OAK**	**H**	**FAIR**		**R**
5747	15	OAK		FAIR	WOODLAND	R
5748	20	COTTONWOOD		FAIR	WOODLAND	R
5749	15	HICKORY		FAIR	WOODLAND	R
5750	8	BLK CHERRY		V POOR	WOODLAND	R
5751	9	BLK CHERRY		V POOR	WOODLAND	R
5752	11	BLK CHERRY		V POOR	WOODLAND	R
5753	8	BLK CHERRY		POOR	WOODLAND	R
5754	9	BLK CHERRY		V POOR	WOODLAND	R
5755	8	BLK CHERRY		V POOR	WOODLAND	R
5756	10	BLK CHERRY		V POOR	WOODLAND	R
5757	8	BLK CHERRY		DEAD	WOODLAND	R
5758	**16**	**HICKORY**	**H**	**FAIR**		**R**
5759	**28**	**OAK**	**H**	**GOOD**		**R**
5760	8	HICKORY		FAIR	WOODLAND	R
5761	14	HICKORY		GOOD	WOODLAND	R
5762	**23**	**OAK**	**H**	**GOOD**		**R**
5763	14	BLK CHERRY		V POOR	WOODLAND	R
5764	12	BLK CHERRY		V POOR	WOODLAND	R
5765	9	BLK CHERRY		V POOR	WOODLAND	R
5766	7	OAK		POOR	WOODLAND	R
5767	15	HICKORY		GOOD	WOODLAND	R
5770	8	HICKORY		FAIR	WOODLAND	R
5771	15	HICKORY		GOOD	WOODLAND	R
5772	8	BLK CHERRY		GOOD	WOODLAND	R
5773	**18**	**OAK**	**H**	**GOOD**		**R**
5774	15	BLK CHERRY		V POOR	WOODLAND	R
5775	12	BLK CHERRY		FAIR	WOODLAND	R
5776	10	BLK CHERRY		POOR	WOODLAND	R
5777	9	OAK		GOOD	WOODLAND	R
5778	8	ELM		POOR	WOODLAND	R

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5779	15	HICKORY		GOOD	WOODLAND	R
5780	10	HICKORY		GOOD	WOODLAND	R
5781	12	HICKORY		GOOD	WOODLAND	R
5782	15	BLK CHERRY		POOR	WOODLAND	R
5783	11	BLK CHERRY		POOR	WOODLAND	R
5784	11	HICKORY		FAIR	WOODLAND	R
5785	7	BLK CHERRY		POOR	WOODLAND	R
5786	14	HICKORY		GOOD	WOODLAND	R
5788	13	BLK CHERRY			WOODLAND	
5789	15	BLK CHERRY			WOODLAND	
5790	9	MAPLE			WOODLAND	
5791	**16**	**HICKORY**	**H**			
5792	**22**	**OAK**	**H**	**POOR**		**R**
5798	**26**	**OAK**	**H**			
5799	13	HICKORY			WOODLAND	
5800	15	HICKORY			WOODLAND	
5801	**22**	**HICKORY**	**H**			
5802	14	OAK			WOODLAND	
5803	**17**	**OAK**	**H**			
5804	14	OAK			WOODLAND	R
5805	**17**	**OAK**	**H**			
5806	**24**	**OAK**	**H**			
5807	8	BLK CHERRY			WOODLAND	
5808	10	BLK CHERRY			WOODLAND	
5809	8	ELM		V POOR	WOODLAND	R
5810	**23**	**OAK**	**H**			
5812	7	SPRUCE			WOODLAND	
5813	10	ELM			WOODLAND	
5814	8	ELM			WOODLAND	
5815	10	BLK CHERRY			WOODLAND	
5816	7	MAPLE			WOODLAND	
5817	10	BLK CHERRY			WOODLAND	
5818	7	BLK CHERRY			WOODLAND	
5819	**25**	**OAK**	**H**			
5820	**26**	**OAK**	**H**	**GOOD**		**R**
5821	**23**	**OAK**	**H**	**FAIR**		
5822	11	HICKORY			WOODLAND	R
5823	9	HICKORY			WOODLAND	
5824	8	HICKORY		POOR	WOODLAND	R
5825	**17**	**HICKORY**	**H**			
5826	9	HICKORY		DEAD	WOODLAND	
5827	**17**	**OAK**	**H**			
5828	10	HICKORY			WOODLAND	
5829	**18**	**OAK**	**H**			
5830	8	HICKORY			WOODLAND	
5831	**24**	**OAK**	**H**			
5832	12	HICKORY			WOODLAND	
5833	**25**	**HICKORY**	**H**			
5835	10	HICKORY			WOODLAND	
5836	10	HICKORY			WOODLAND	
5837	7	HICKORY			WOODLAND	
5838	8	HICKORY			WOODLAND	
5839	8	SPRUCE			WOODLAND	
5840	**20**	**OAK**	**H**			
5841	**20**	**OAK**	**H**			
5842	10	BLK CHERRY			WOODLAND	
5843	**24**	**OAK**	**H**			
5844	**20**	**OAK**	**H**			
5845	10	ELM			WOODLAND	
5846	8	HICKORY			WOODLAND	

TAG NO.	SIZE (in.)	COMMON NAME	HHERITAGE	CONDITION	LOCATION	
5847	**20**	**ASH**	**H**	**DEAD**		
5848	**21**	**OAK**	**H**			
5849	**21**	**OAK**	**H**			
5850	**21**	**OAK**	**H**			
5851	**17**	**OAK**	**H**			
5852	**20**	**OAK**	**H**			
5853	15	HICKORY			WOODLAND	
5854	10	HICKORY			WOODLAND	
5855	15	OAK			WOODLAND	
5856	14	HICKORY			WOODLAND	
5857	14	HICKORY			WOODLAND	
5858	13	HICKORY			WOODLAND	
5859	12	HICKORY		GOOD	WOODLAND	R
5865	10	HICKORY			WOODLAND	
5866	14	HICKORY			WOODLAND	
5867	10	HICKORY			WOODLAND	
5868	14	OAK			WOODLAND	
5869	11	OAK			WOODLAND	
5870	**26**	**OAK**	**H**			
5871	**20**	**OAK**	**H**			
5872	**21**	**OAK**	**H**			
5873	**21**	**OAK**	**H**			
5874	14	OAK			WOODLAND	
5875	8	HICKORY			WOODLAND	
5876	**16**	**OAK**	**H**			
5877	**16**	**OAK**	**H**			
5878	11	HICKORY			WOODLAND	
5879	11	HICKORY			WOODLAND	
5880	12	HICKORY			WOODLAND	
5881	11	HICKORY			WOODLAND	R
5882	11	HICKORY		DEAD	WOODLAND	
5883	**20**	**OAK**	**H**	**FAIR**		**R**
5884	11	HICKORY			WOODLAND	
5885	14	OAK			WOODLAND	
5886	15	OAK			WOODLAND	
5887	12	OAK				
5888	13	OAK				
5889	14	OAK			WOODLAND	
5890	9	OAK			WOODLAND	
5893	**22**	**OAK**	**H**			
5894	15	HICKORY			WOODLAND	
5903	14	HICKORY		GOOD	WOODLAND	R
5908	7	HICKORY		POOR	WOODLAND	R
5909	6	HICKORY			WOODLAND	
55062	7	OAK		FAIR		R

Know what's below.
Call before you dig.

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
CHK: MLP
CADD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 50'

STATUS:
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

JOB NO: **1019**

Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
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fax: (734) 459-2585

MLP

THE ENCLAVE at Arbor Ridge

FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

TREE SURVEY

SHEET
6

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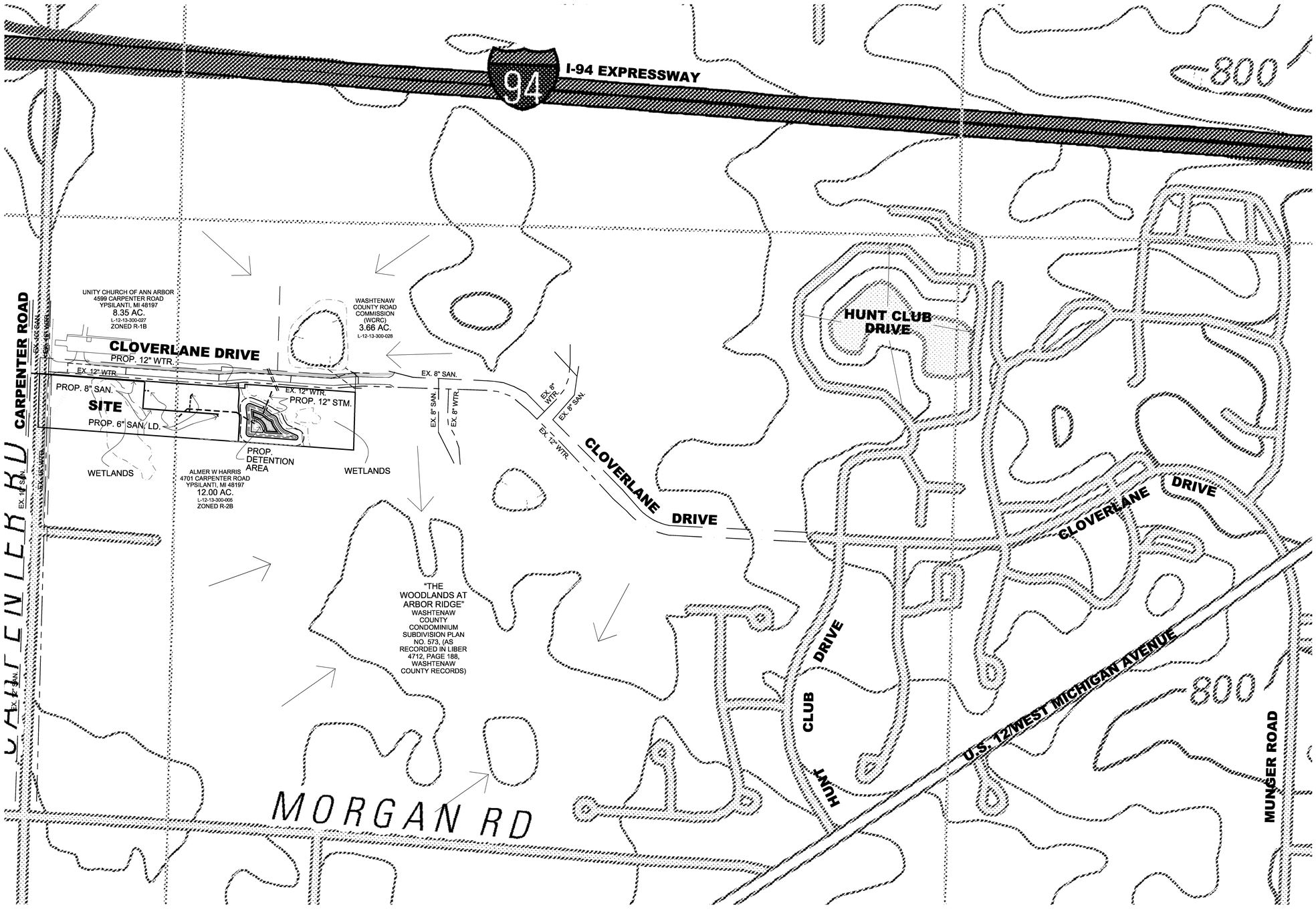

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

AREA WIDE MAP

THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
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MLP

STATUS:
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

JOB NO: **1019**

DATE: 04-11-14
PM: EMP
ENG: MLP
REVIEW: MLP
CADD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 200'

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

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PRELIMINARY DETENTION CALCS:

1. Compute Runoff Coefficient for area:

SURFACE TYPE	AREA (sf)	AREA (AC) A	C FACTOR		AxC
PAVED / BLDG	48,696	1.12	0.95	=	1.0620
WATER IN POND	7,057	0.16	1.00	=	0.1620
GRASS / LSCP	58,380	1.34	0.40	=	0.5361
OFFSITE	70,264	1.61	0.23	=	0.3710
TOTAL	184,397	4.23		=	2.1311

C avg = AxCtot. / Atot = 0.503

2. Determine maximum allowable outflow, Qa, in CFS

The Enclave is part of a site known as "Proposed Drainage Area #2" on Atwell's plans for the "Woodlands at Arbor Ridge" project. The water budget for "Wetland Mitigation Area #1" at the "Woodlands at Arbor Ridge" project planned for 366,891 s.f. (8.42 acres) from this site and that to the south at an undeveloped rate. Of that 8.42 acres, 5.77 acres flows undisturbed to the mitigation area.

Therefore, A for purposes of calculating the allowable outflow from the Enclave detention pond should be:

8.42 ac - 5.77 ac = 2.65 ac

A — Qa
2.65 ac x 0.15 cfs/ac = 0.398 cfs

The remainder of the calculations must use the contributing area and the effective cfs/ac is calculated below from the Qa calculated above:

4.23 ac x 0.09 cfs/ac = 0.398 cfs

3. Calculate the allowable outflow, Qo = Qa/(acreage)(runoff coefficient)

Qa / (A x C)
0.398 cfs / 4.23 ac x 0.503 = 0.0473 cfs/ac-imp

4. Calculate time for peak storage, T100

T100 = -25+(10312.5/Qo)^1/2 = 442.1 min

5. Calculate the maximum storage volume per ac-imp, Vs

Vs = 16500T/(T+25)-40QoT = 14,781 ft^3/ac-imp

6. Calculate the total volume of storage required, Vt

Vt = (Vs)(#ac)(runoff coefficient) Vt = 31,500 ft^3

7. Calculate First Flush Volume
Vff = 1815 x A x C Vff = 3,868 ft^3

8. Calculate Bankfull Flood Volume required
Vbf = 8170 x A x C Vbf = 17,411 ft^3

9. Calculate the volume of the sediment forebay
Vsf = Vt * 5% Vsf = 1,575 ft^3

10. Calculate storage volume provided within the system:

Sediment Forebay:

CONTOUR ELEV.	AREA (SQ.FT.)	HEIGHT, H (FT.)	INCR. VOL. (CU.FT.)	TOTAL VOL. (CU.FT.)	
827	565			0	
		1.00	866		
828	1,166			866	
		0.63	893		
828.63	1,668			1,758	> 5% Vt
		0.37	672		
829	1,963			2,430	
		0.50	1,099		
829.5	2,433			3,529	

Detention Basin:

CONTOUR ELEV.	AREA (SQ.FT.)	HEIGHT, H (FT.)	INCR. VOL. (CU.FT.)	TOTAL VOL. (CU.FT.)	
Submerged Area:					
824	56			0	
		1.00	158		
825	259			158	
		1.00	477		
826	694			634	
		1.00	1,037		
827	1,380			1,671	
		1.00	1,768		
828	2,156			3,439	
		0.00	0		
828	3,332			3,439	
		1.00	7,887		
829	5,053			11,326	> 2.5 x Vff
Detention Area:					
829	7,650			1,771	
		1.00	8,748		
830	9,845			10,518	
		1.00	11,143		
831	12,441			21,661	
		1.00	13,874		
832	15,307			35,535	
		1.00	16,815		
833	18,322			52,350	

Existing Wetland

CONTOUR ELEV.	AREA (SQ.FT.)	HEIGHT, H (FT.)	INCR. VOL. (CU.FT.)	TOTAL VOL. (CU.FT.)
824	11			0
		1.00	142	
825	273			142
		1.00	580	
826	887			722
		1.00	1,354	
827	1,820			2,076
		1.00	2,728	
828	3,636			4,804
		1.00	4,494	
829	5,352			9,298
		1.00	8,307	
830	11,262			17,605
		0.90	14,013	
830.9	19,879			31,618
		0.10	2,036	
831	20,836			

First Flush Storage Elevation:	829.24
Bankfull Storage Elevation:	830.62
100 Year Storage Elevation:	831.76

Detention Basin Overflow Spillway Design

Design Flow:	0.00	cfs
Assume depth of flow:	0.50	ft
Compute width of spillway B = Q / (3.2 x H^1.5)	0.00	ft

Outlet Control Structure

Outlet Control Structure

Outlet sizing for First Flush

Qave = V ff / 86,400 = 0.045 cfs

Determine average head, h ave:
h ave = 2/3 (Zff - Zo) = 0.16 ft

Assume the outlet pipe diameter is: 8 in

Determine orifice area needed based on the orifice equation:
A = Qave / (0.62 * (2 g h)^1/2)

Orifice area of a 1 " hole = 0.0055 ft²

Total orifice area using: 4 1 " hole = 0.0218 ft²

The actual first flush release rate is:
Q ave = C * A * (2gh)^0.5 = 0.043 cfs

Determine the actual holding time:

Tff = V ff / Q ave = 24.76 hrs
min 24 hours

Outlet Sizing for Bankfull Flood

h_{avg} = Z/3 x (Z bf - Z o) = 1.08 ft

Q = 0.62Ar (2gh$_{avg}$)^1/2 = 0.113 cfs

T = Vbf / Q = 42.89 hr

needs to be >36 hr & < 48 hr

Outlet Sizing for 100 yr Flood

Qa = 0.398 cfs

h 100 = 1.14 ft

Qa + Qbf @ h100 = 0.116 cfs

Q100 = Qa - (Qff + Qbf) = 0.282 cfs

A100 = Q100 / 0.62(2gh100)^1/2 = 0.053 ft²

Orifice area of a 1 " hole = 0.0055 ft²

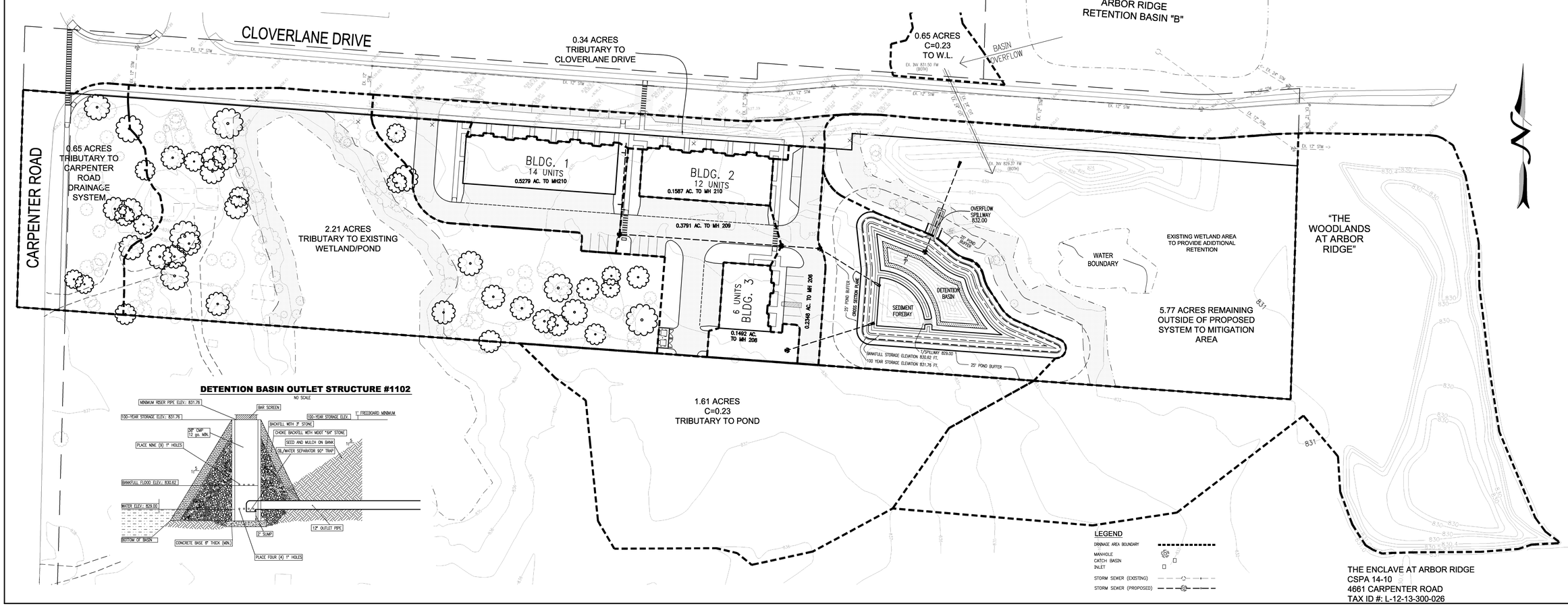
Number of holes = A100 / A orif = 9.7105 holes

Use: 9 1 " holes
at elevation 830.62

PROJECT NAME:			THE ENCLAVE				I =	175 / t + 25																						
JOB NUMBER:			1019																											
FROM MH	TO MH	C avg 0.65	AREA Ac	TOTAL AREA	A*C	TOTAL A*C	T min	I in/hr	Q=CIA cfs	Q^CALL cfs	PIPE dia	PIPE CLASS	RUN ft	HG SLOPE	FALL in HG	UPST HG ELEV	DWNST HG ELEV	T to DS MH	V AVG fps	V^MAX mannings fps	PIPE SLOPE	UPST INV ELEV	DWNST INV ELEV	UPST RIM	UPST RIM TO INV	DWNST RIM TO INV	UPST CVR	DWNST CVR	UPST RIM TO HG
210	209	0.65	0.6866	0.6866	0.4464	0.4464	**15.00**	4.38	1.95	2.36	12	4	168.17	0.30%	0.51	832.46	831.96	1.13	2.49	3.01	0.44%	831.56	830.82	835.80	4.24	4.17	3.08	3.01	3.34
209	206	0.65	0.3791	1.0657	0.2465	0.6928	16.13	4.26	2.95	6.67	12	4	39.71	0.68%	0.27	831.96	831.69	0.18	3.75	8.49	3.50%	830.82	829.43	834.99	4.17	5.67	3.01	4.51	3.03
206	205	0.85	0.2348	1.3005	0.1527	0.8455	16.30	4.24	3.58	3.77	15	4	66.95	0.31%	0.21	830.23	830.00	0.38	2.92	3.07	0.34%	829.23	829.00	833.98	4.73		3.29		3.73
							16.69																						
208	207	0.65	0.1492	1.2149	0.0970	0.0970	**15.00**	4.38	0.42	2.36	12	4	94.54	0.01%	0.01	831.69	831.27	2.92	0.54	3.01	0.44%	830.89	830.47	835.10	4.21		3.05		3.41
							17.92																						

GRATE CALCULATIONS
T = 15 MIN
H = 2 IN

STR. NO.	A IN (AC)	EJIW CATALOG #	I (IN/HR)	C	Q (CFS)	A REQ (IN2)	A PROVIDED (IN2)
210	0.3428	7045	4.38	0.80	1.20	85.06	160
209	0.3792	7045	4.38	0.80	1.33	94.09	160
206	0.2348	7045	4.38	0.80	0.82	58.26	160
208	0.0694	1040	4.38	0.40	0.12	8.61	140



THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

STORM WATER DRAINAGE PLAN

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
CKD: MLP
CADD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 50'

STATUS:
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14
JOB NO: **1019**

Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
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THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

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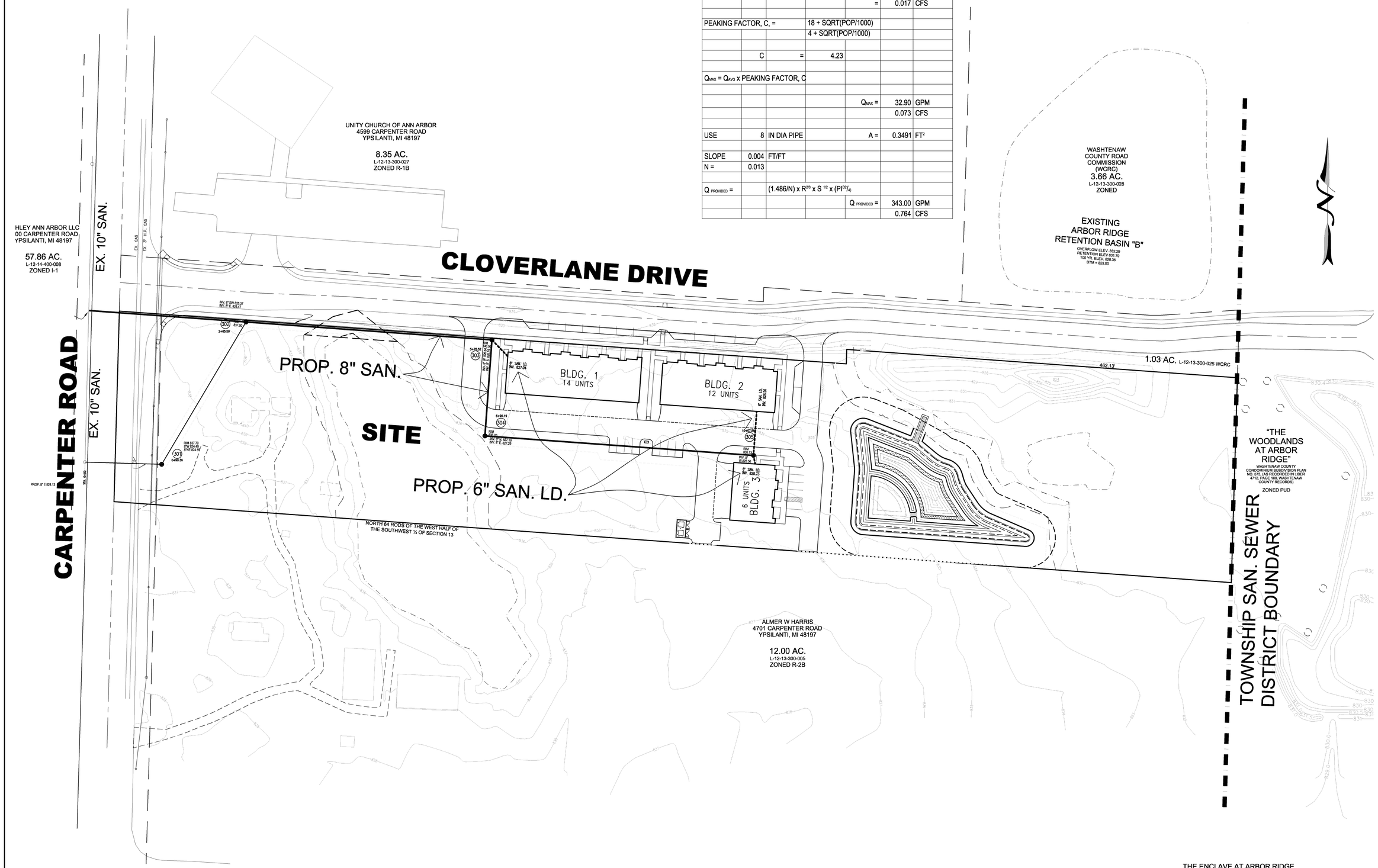
SANITARY SEWER BASIS OF DESIGN

32	D.U.	3.5	PPL/D.U.	=	112	PPL
Q_{AVG} =	112	PPL @	100	GPD =	11200	GPD
				=	7.78	GPM
				=	0.017	CFS
PEAKING FACTOR, C, =			18 + SQRT(POP/1000)			
			4 + SQRT(POP/1000)			
	C	=	4.23			
Q_{MAX} = Q_{AVG} x PEAKING FACTOR, C						
				Q_{MAX} =	32.90	GPM
					0.073	CFS
USE	8	IN DIA PIPE		A =	0.3491	FT^2
SLOPE	0.004	FT/FT				
N =	0.013					
$Q_{PROVIDED}$ =		$(1.486/N) \times R^{2/3} \times S^{1/2} \times (PI^{D2}/4)$				
				$Q_{PROVIDED}$ =	343.00	GPM
					0.764	CFS



SANITARY SEWER SERVICE AREA MAP

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

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THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET
9

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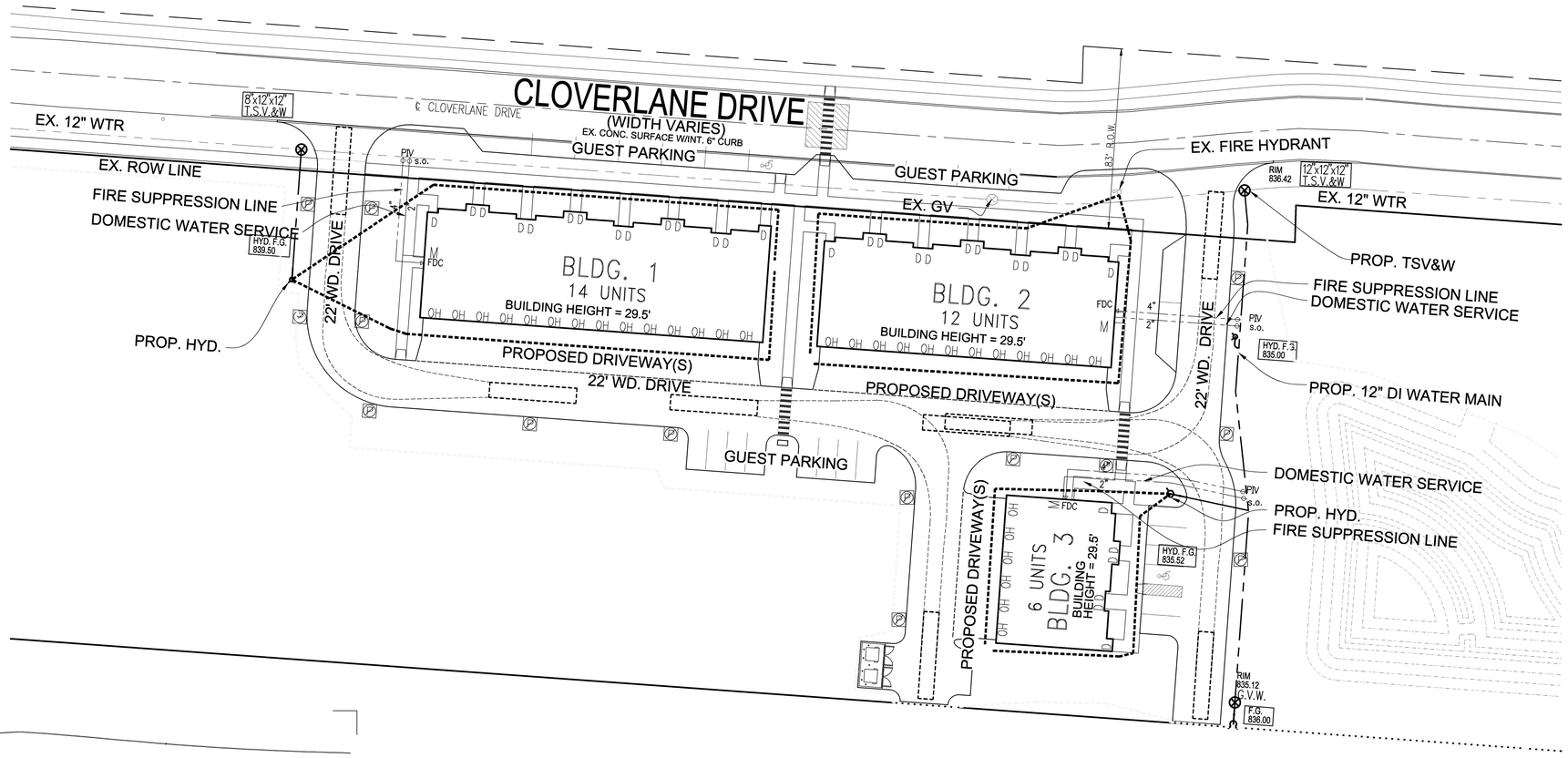

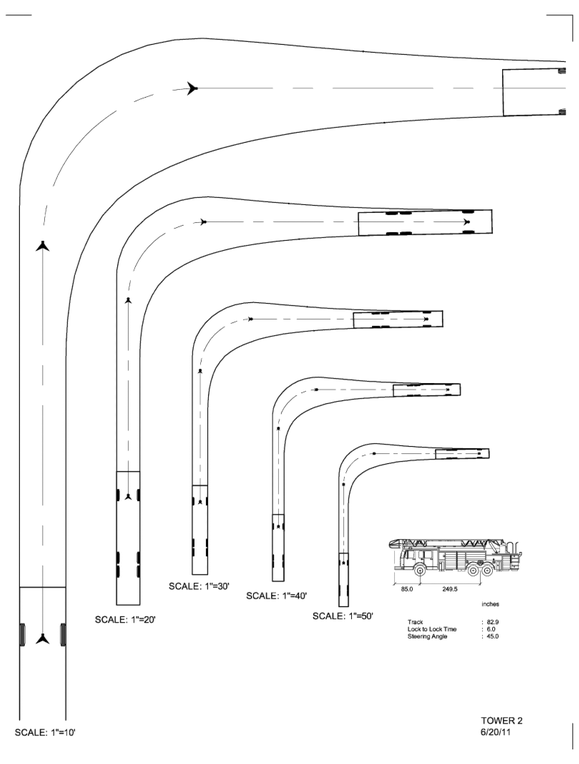

LEGEND:

- GATE VALVE & WELL
- HYDRANT
- WATER MAIN (EXISTING)
- WATER MAIN (PROPOSED)
- 4" FIRE SUPPRESSION LINE — PIV=POST INDICATOR VALVE
- 2" DOMESTIC WATER SERVICE — S.O.=SHUT OFF
- FIRE DEPARTMENT CONNECTION (PROPOSED) — FDC
- ENTRY DOOR LOCATION — D
- OVERHEAD (GARAGE) DOOR LOCATION — OH
- METER ROOM LOCATION — M
- FIRE HOSE LAY LINE

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

FIRE PROTECTION PLAN

THE ENCLAVE at Arbor Ridge

FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

PREPARED FOR:

LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
DRWN: MLP
CHKD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 30'

STATUS:
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14
JOB NO: 1019

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

SHEET
10

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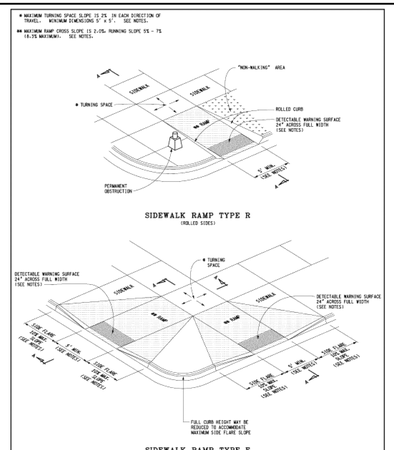
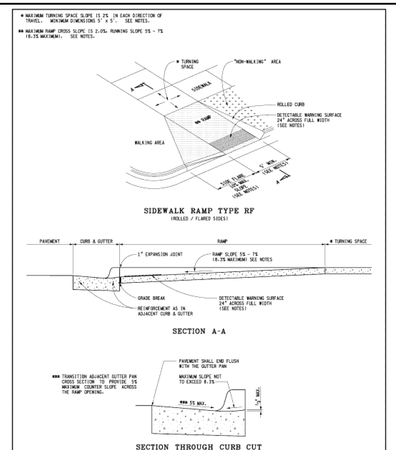


MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

1-25-2013	10-3-2012	R-28-H	SHEET 1 OF 1
F.H.W.A. APPROVAL	PLAN DATE		



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BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
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1-25-2013	10-3-2012	R-28-H	SHEET 2 OF 1
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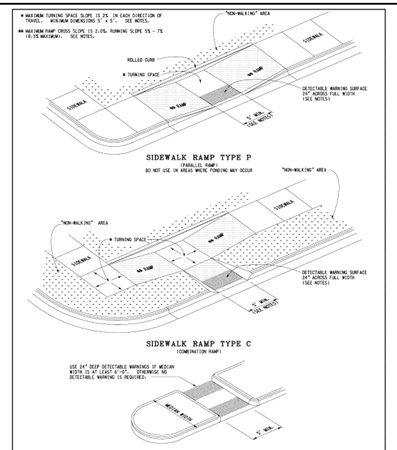

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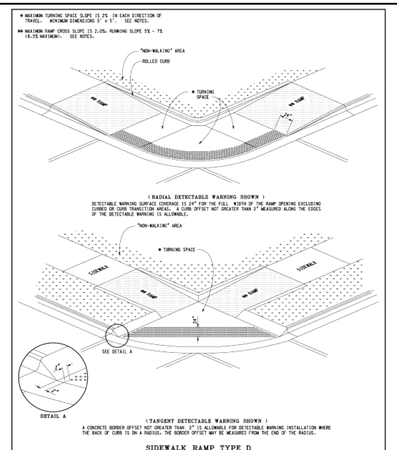
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS

1-25-2013	10-3-2012	R-28-H	SHEET 3 OF 1
F.H.W.A. APPROVAL	PLAN DATE		



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1-25-2013	10-3-2012	R-28-H	SHEET 4 OF 1
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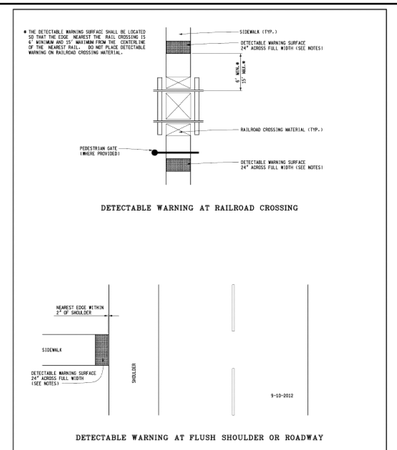

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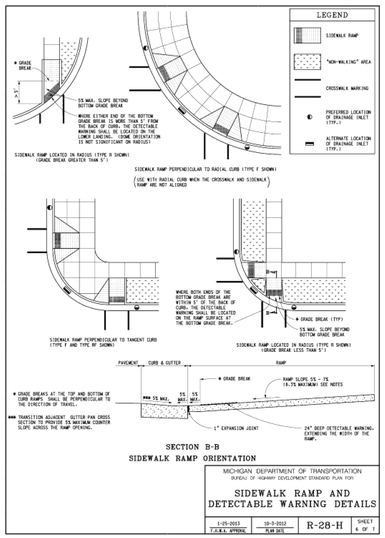

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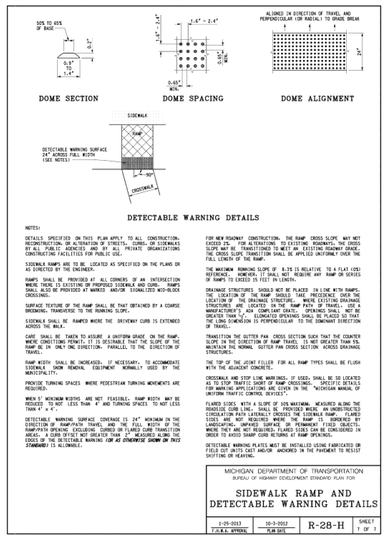

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1-25-2013	10-3-2012	R-28-H	SHEET 7 OF 1
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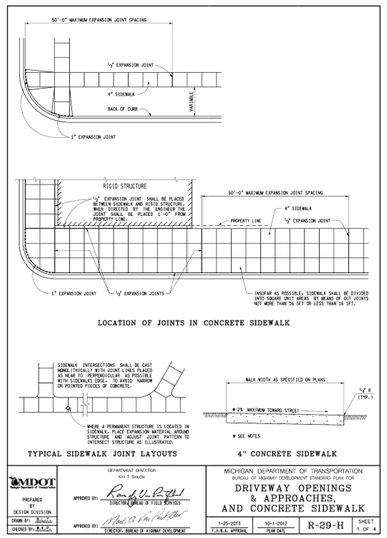
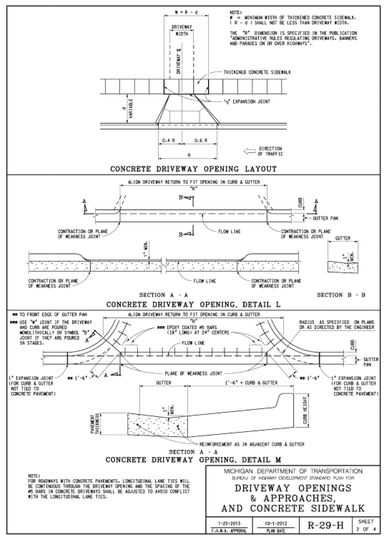


MDOT PREPARED BY DESIGN DIVISION
DEPARTMENT DIRECTOR KIM T. DAVIS
APPROVED BY: DIRECTOR, BUREAU OF HIGHWAY DEVELOPMENT
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
DRIVEWAY OPENINGS & APPROACHES, AND CONCRETE SIDEWALK

1-25-2013	10-1-2012	R-29-H	SHEET 1 OF 4
F.H.W.A. APPROVAL	PLAN DATE		



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BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
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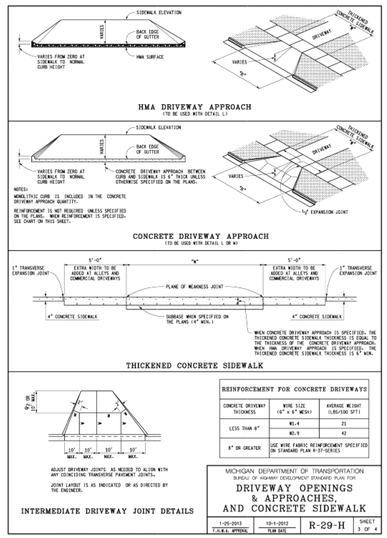
1-25-2013	10-1-2012	R-29-H	SHEET 2 OF 4
F.H.W.A. APPROVAL	PLAN DATE		



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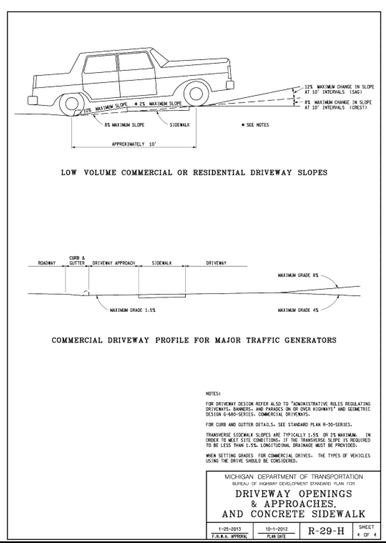

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BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
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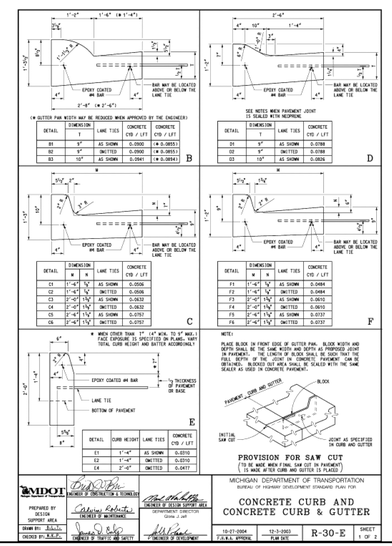
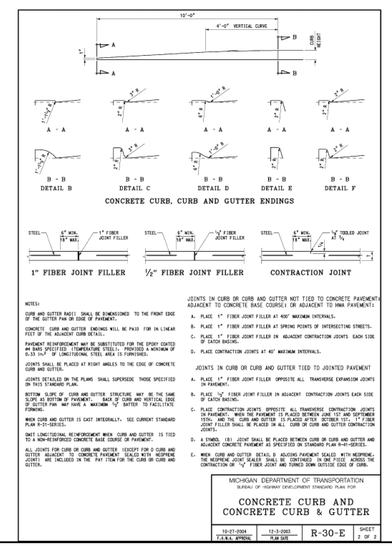


MDOT PREPARED BY DESIGN SUPPORT AREA
DEPARTMENT DIRECTOR Gloria J. Jeff
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
CONCRETE CURB AND CONCRETE GUTTER

10-27-2004	12-3-2003	R-30-E	SHEET 1 OF 2
F.H.W.A. APPROVAL	PLAN DATE		



MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
CONCRETE CURB AND CONCRETE GUTTER

10-27-2004	12-3-2003	R-30-E	SHEET 2 OF 2
F.H.W.A. APPROVAL	PLAN DATE		

NOTE:

THE DRIVE APPROACH SHALL BE CONSTRUCTED OF A REINFORCED CONCRETE IN THE RIGHT-OF-WAY TO MATCH THE ROADWAY AND SHALL HAVE A CONCRETE DRIVEWAY OPENING, DETAIL M CURB.

ANY DAMAGE TO CARPENTER ROAD OR CLOVERLANE DRIVE ROAD DURING CONSTRUCTION OF THE PROJECT SHALL REQUIRE AT A MINIMUM THE ENTIRE SLAB OF THE DAMAGED CONCRETE PAVEMENT OR CURB TO BE REMOVED AND REPLACED AT THE DIRECTION OF THE WCRC.

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

MDOT DETAILS

THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
CALC: EMP
CADD: EMP
1019.DWG
VZATUM: NAVD88
SCALE: 1" = 30'

STATUS:
REVISIONS: 05-19-14 PER TWSP RWMS OF 04-23-14 & 04-30-14
JOB NO: **1019**

MLP Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

SHEET
11

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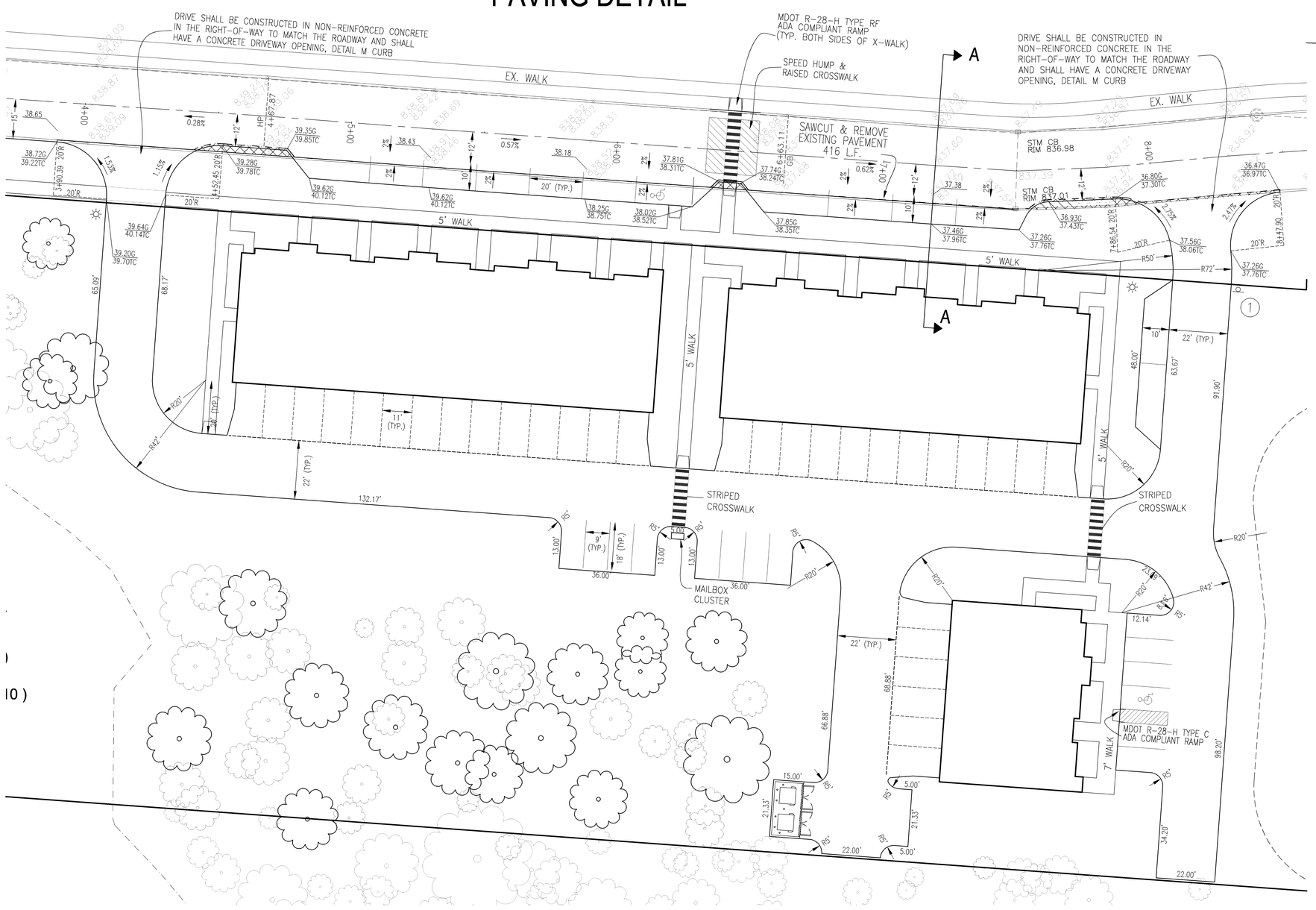
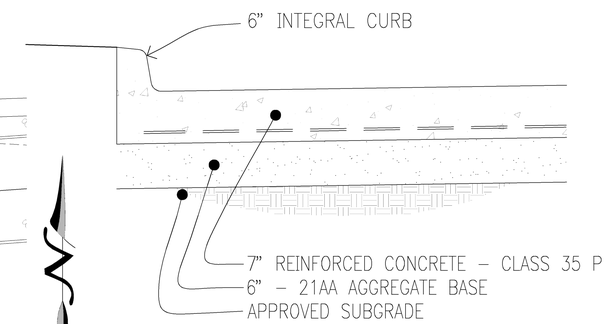
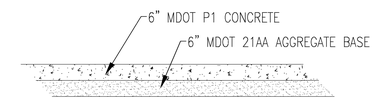
PAVING DETAIL





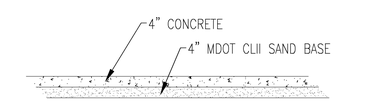
TYPICAL PAVEMENT CROSS-SECTION

NTS



NOTE: PAVEMENT SECTION DEPICTED HEREIN IS FOR EXAMPLE ONLY. ACTUAL PAVEMENT SHALL BE DESIGNED BY A QUALIFIED PAVEMENT ENGINEER BASED ON SUBSURFACE AND FIELD CONDITIONS AT THE TIME OF CONSTRUCTION.

DRIVEWAY/PARKING AREAS PAVING SECTION
NTS



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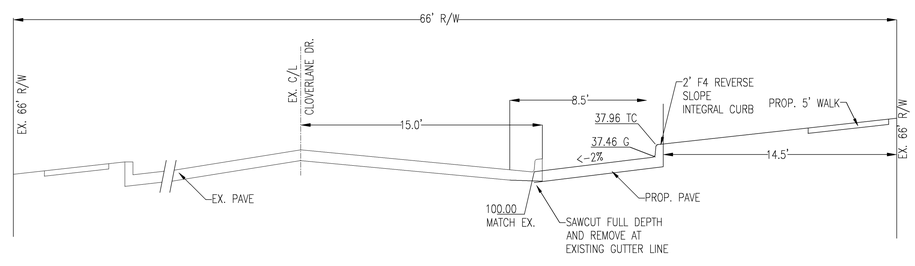
SIDEWALK PAVING SECTION
NTS

X-SEC A-A



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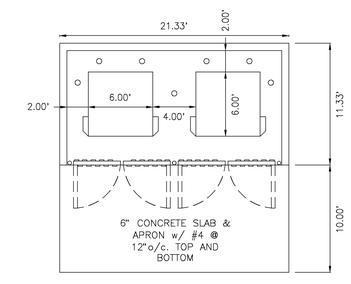

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

Know what's below. Call before you dig.

PAVING DETAILS

THE ENCLAVE at Arbor Ridge
FINAL SITE PLAN
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
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1019.DWG
VDATUM: NAVD88
SCALE: 1" = 20'

STATUS:
REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

JOB NO: **1019**

MLP
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40655 Koppernick Road, Canton, MI 48187
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SHEET
12

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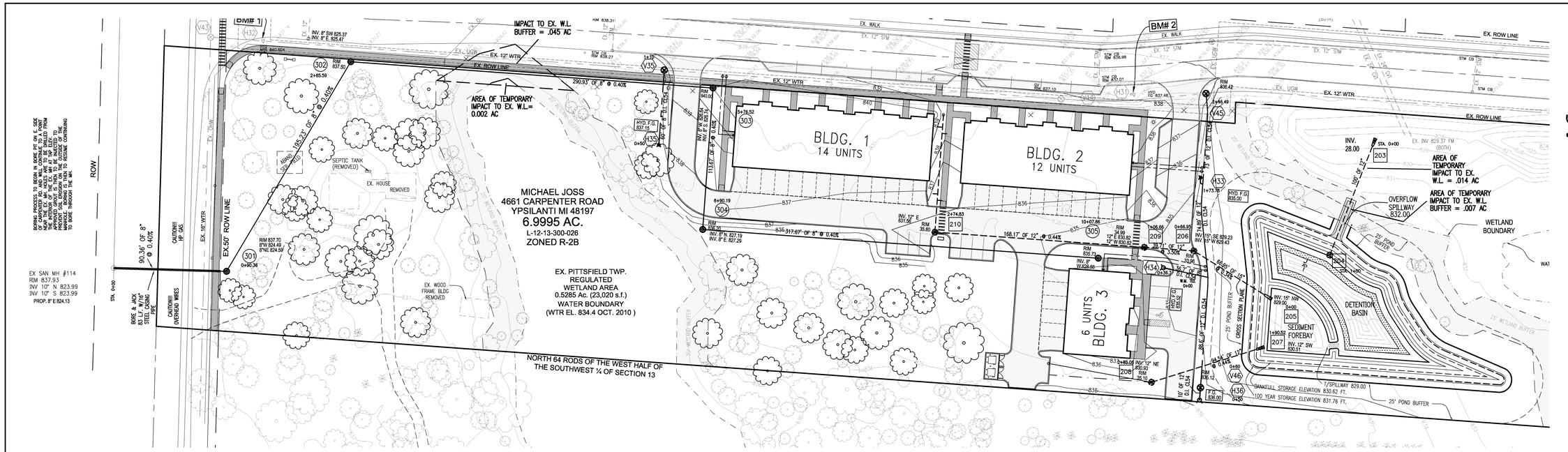
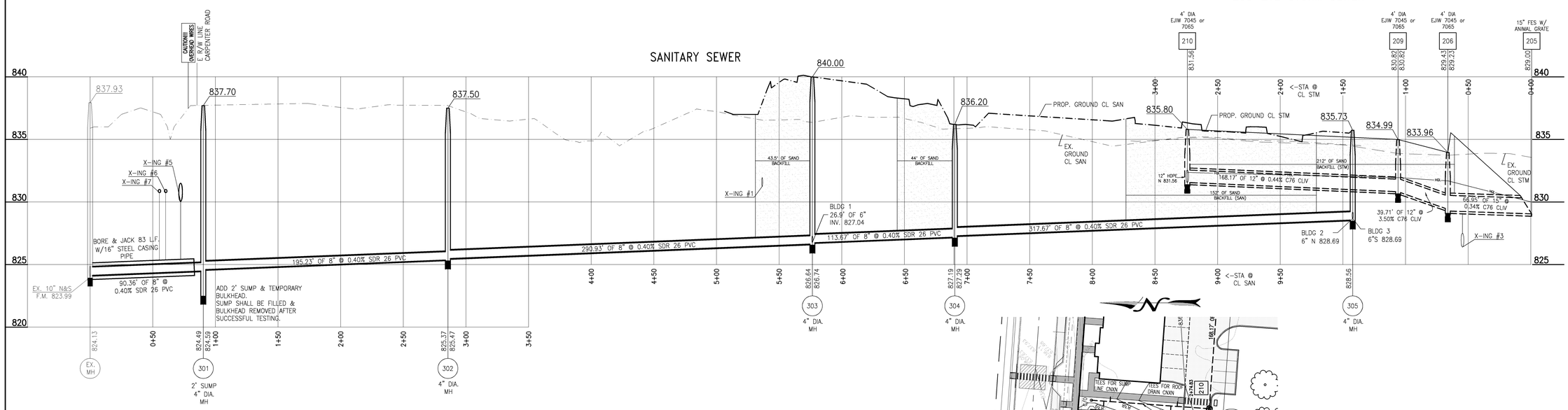
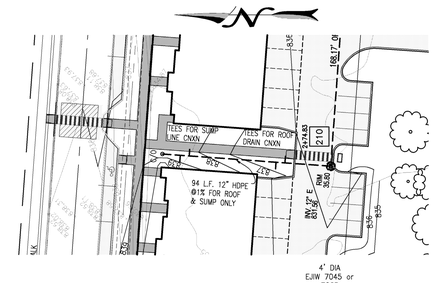
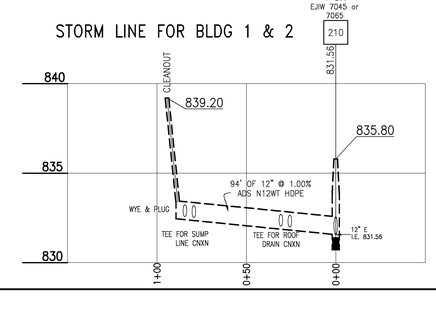


205–212 STORM SEWER





STORM LINE FOR BLDG 1 & 2



UTILITY CROSSING

X–ING #1 BTM WTR 831.24 TOP SAN 827.14 CLEARANCE 4.10	X–ING #5 BTM WTR* 830.50 TOP CASING 825.87 CLEARANCE 4.63
X–ING #2 BTM STM 829.00 TOP WTR 827.50 CLEARANCE 1.50	*ASSUMED 5.5' BURIAL DEPTH OF 16" W.M. EXPOSE & FIELD VERIFY PRIOR TO CROSSING
X–ING #3 BTM STM 830.57 TOP WTR 829.02 CLEARANCE 1.55	X–ING #6 & 7 BTM GAS* 830.75 TOP CASING 823.25 CLEARANCE 7.50
X–ING #4 BTM STM 830.81 TOP SANLD 829.30 CLEARANCE 1.51	*ASSUMED 6' BURIAL DEPTH OF 3" GAS EXPOSE & FIELD VERIFY PRIOR TO CROSSING

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

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PROFILES

PREPARED FOR:
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Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734–347–3434

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VDATUM: NAVD88
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13

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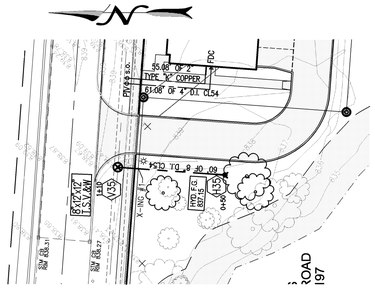
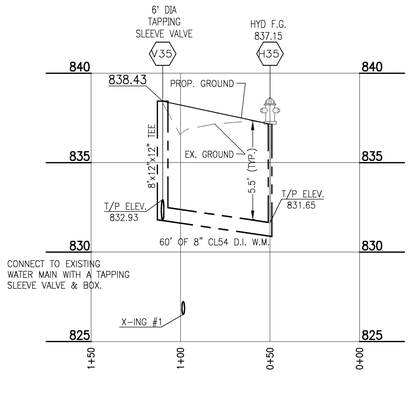
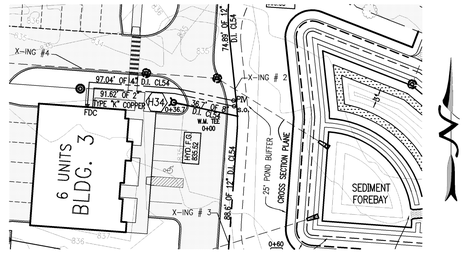
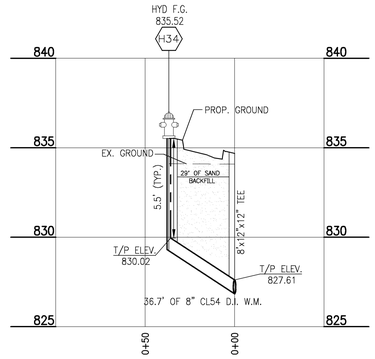


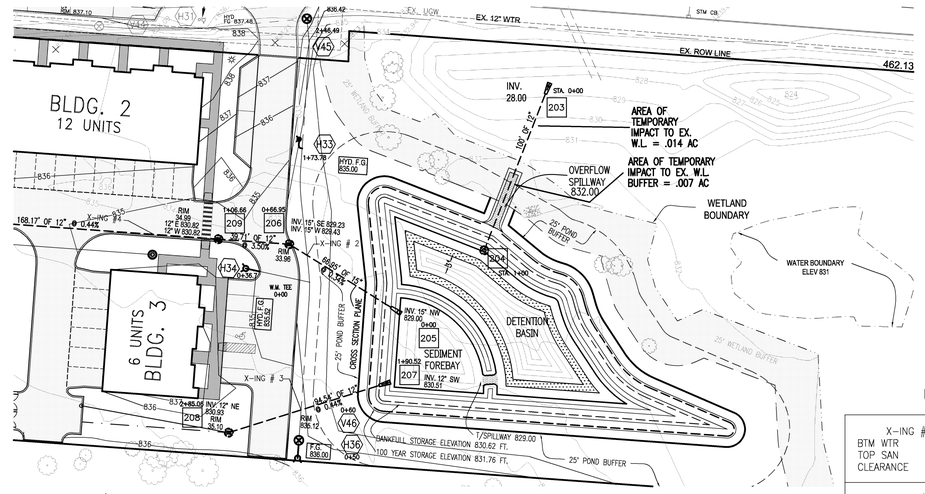
WATER MAIN FROM V35 TO H35





WATER MAIN FROM TEE TO H34





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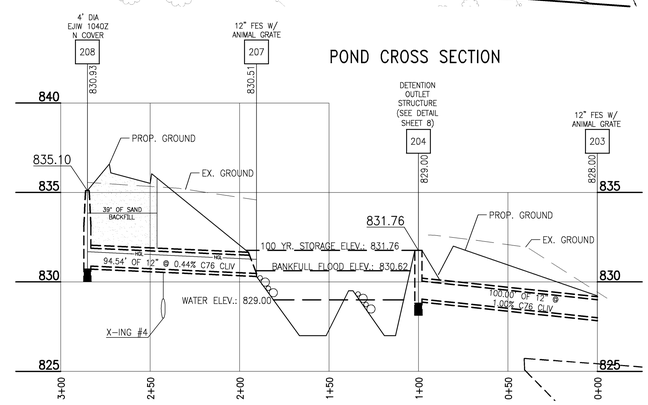
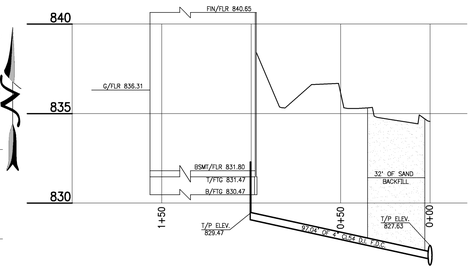
X-ING #4 BTM STM 830.81 TOP SANLD 829.30 CLEARANCE 1.51	*ASSUMED 6' BURIAL DEPTH OF 3" GAS EXPOSE & FIELD VERIFY PRIOR TO CROSSING

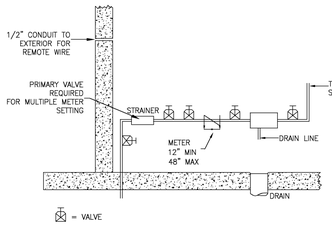
POND CROSS SECTION

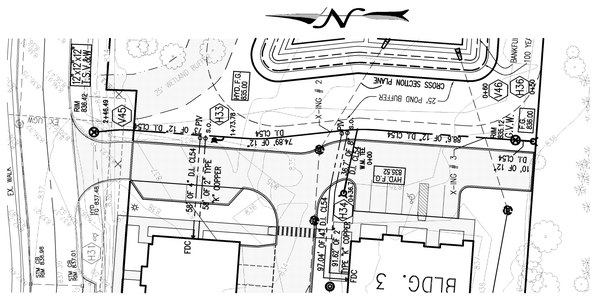


BLDG 3 FIRE SUPPRESSION LINE

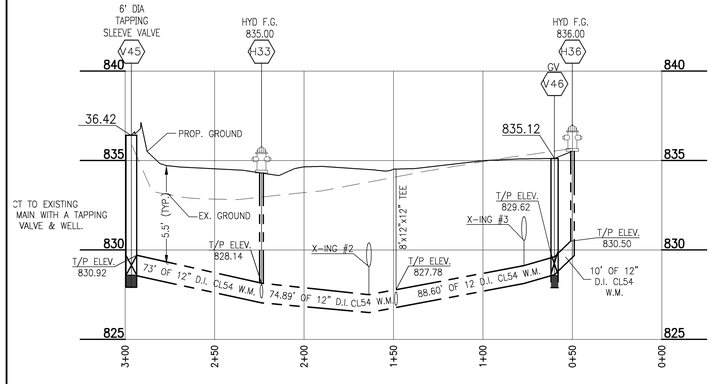


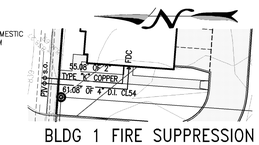
WATER SERVICE DETAIL





WATER MAIN FROM V45 TO H36





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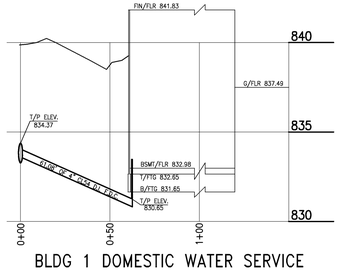
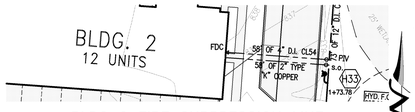
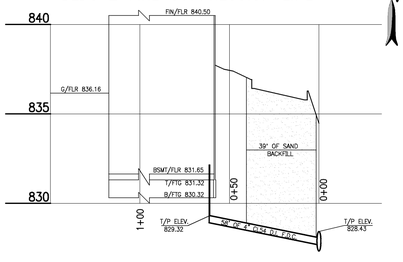
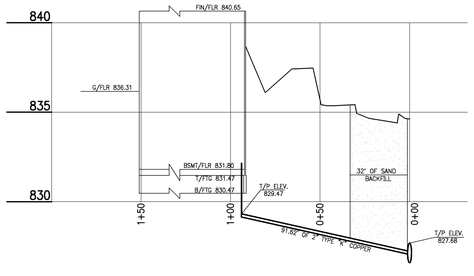




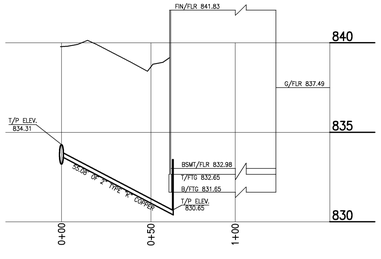
BLDG 2 FIRE SUPPRESSION LINE



BLDG 3 DOMESTIC WATER SERVICE



BLDG 1 DOMESTIC WATER SERVICE



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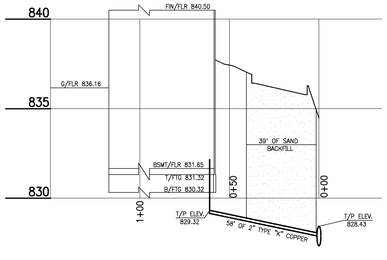

THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

Know what's below. Call before you dig.

PROFILES

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 04-11-14
PM: EMP
ENG: MLP
CHK: MLP
CADD: EMP
1019.DWG
VZATUM: NAVD88
SCALE: 1" = 40'

STATUS:
REVISIONS: 05-19-14 PER TWSP RWMS OF 04-23-14 & 04-30-14
JOB NO: 1019

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

THE ENCLAVE at Arbor Ridge

FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET
14

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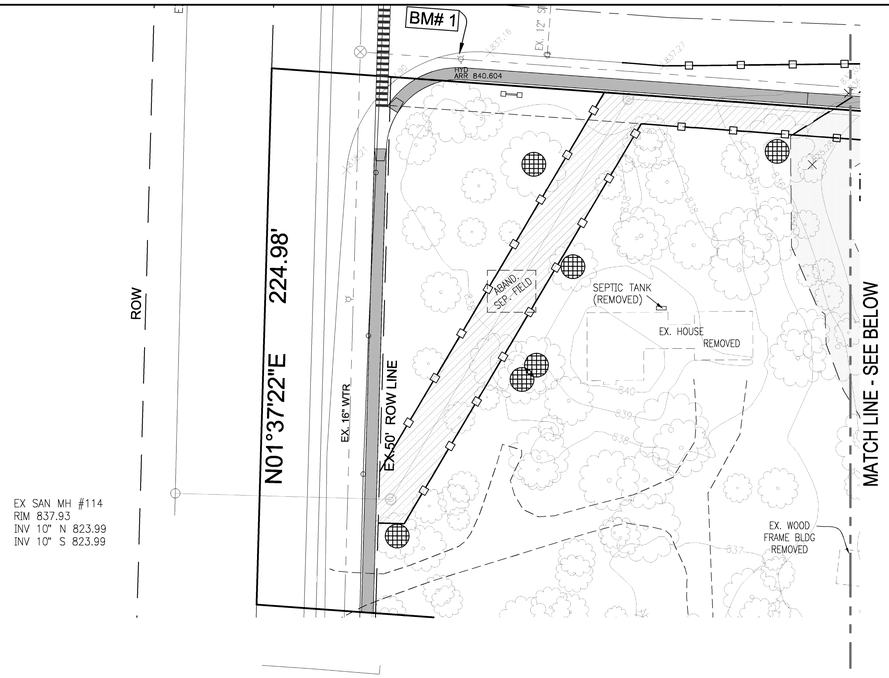


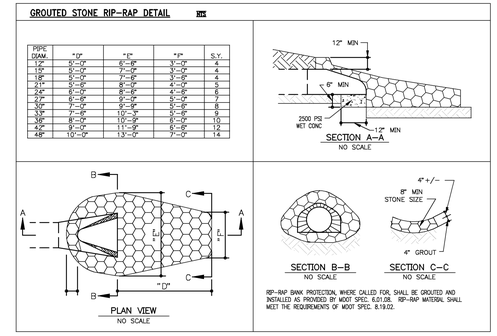
LEGEND:

- MANHOLE
- CATCH BASIN
- INLET
- GATE VALVE & WELL
- HYDRANT
- SECTION CORNER
- EXISTING ELEVATION — x 000.0
- LIGHT POLES
- NO PARKING FIRE LANE SIGN
- WATER MAIN (EXISTING)
- STORM SEWER (EXISTING)
- SANITARY SEWER (EXISTING)
- UTILITY-GAS (EXISTING)
- OVERHEAD WIRE (EXISTING)
- UNDERGROUND WIRE (EXISTING)
- WATER MAIN (PROPOSED)
- STORM SEWER (PROPOSED)
- SANITARY SEWER (PROPOSED)
- FIRE DEPARTMENT CONNECTION — FDC — PIV=POST INDICATOR VALVE
- 4" FIRE SUPPRESSION LINE
- 2" DOMESTIC WATER SERVICE — S.O. SHUT OFF
- SOIL BORING — HA# ●
- HERITAGE TREE TO BE SAVED
- SANITARY SEWER STRUCTURE # — ###
- WATER MAIN STRUCTURE # — ###
- STORM SEWER STRUCTURE # — ###
- SILT FENCE
- SILTSACK
- TREE PROTECTION FENCE
- RIP RAP
- STABILIZE IMMEDIATELY WITH 4" TOPSOIL, SEED, FERTILIZER, AND MULCH.
- STONE TRACKING PAD

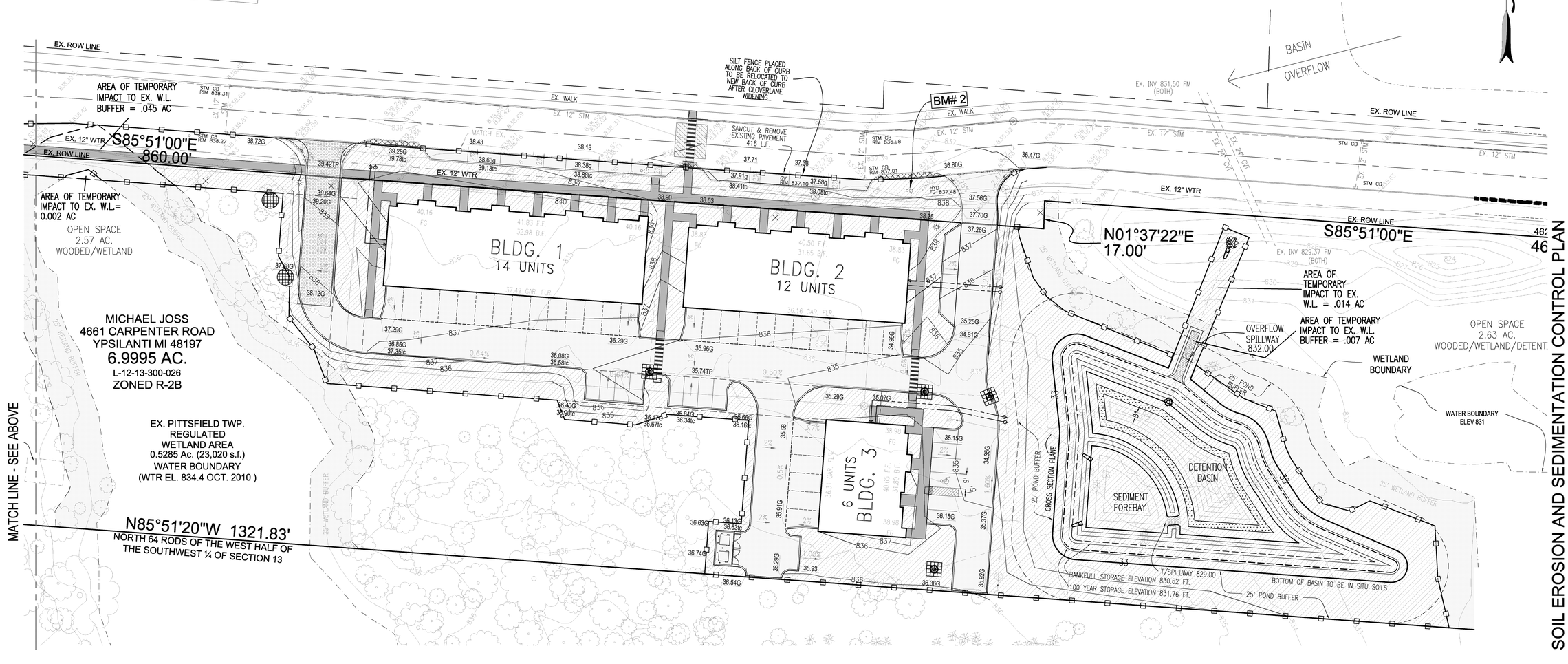
GROUTED STONE RIP-RAP DETAIL

NTS

PIPE DIAM.	"D"	"L"	"P"	S.Y.
12"	5'-0"	6'-0"	3'-0"	4
15"	5'-0"	7'-0"	3'-0"	4
18"	5'-0"	7'-0"	3'-0"	4
21"	5'-0"	7'-0"	4'-0"	5
24"	6'-0"	8'-0"	4'-0"	6
27"	6'-0"	9'-0"	5'-0"	7
30"	7'-0"	9'-0"	5'-0"	8
33"	7'-0"	10'-0"	5'-0"	9
36"	8'-0"	10'-0"	6'-0"	10
42"	9'-0"	11'-0"	6'-0"	12
48"	10'-0"	13'-0"	7'-0"	14



811 Know what's below. Call before you dig.



SOIL EROSION AND SEDIMENTATION CONTROL PLAN

THE ENCLAVE at Arbor Ridge

FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

MLP
Michael L. Priest & Associates, Inc.
40855 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

STATUS:

REVISIONS:
05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

JOB NO: 1019

DATE: 04-11-14
PM: EMP
ENG: MLP
SURV: N/A
CADD: EMP
1019.DWG
VZATUM: NAVD88
SCALE: 1" = 30'

PREPARED FOR:

LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

SHEET
15

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LITHONIA LIGHTING®

Catalog Number

Notes

Type

FEATURES & SPECIFICATIONS

INTENDED USE — Streets, walkways, parking lots and surrounding areas.

CONSTRUCTION — Rugged, die-cast, single-piece aluminum housing. Unique flow-through design for optimized thermal management. Modularity allows for ease of maintenance and potential for future system upgrades. Integral arm provides easy installation to a pole or wall. Metallic screen covers the top of the housing, preventing debris buildup while allowing for airflow. Housing is sealed completely against moisture and environmental contaminants. Low-profile design minimizes wind loading.

Finish: Standard finish is corrosion-resistant powder coat. Available in dark bronze, black, white or natural aluminum. Textured and non-textured finishes available.

OPTICS — Individual, precision-molded lens assemblies provide optimal luminaire spacing and improved uniformity. Three distributions available: Type III (asymmetric), Type IV (forward throw) and Type V (symmetric). House side shield is available to limit light trespass (Type III and IV only).

ELECTRICAL — Utilizes high-efficiency LEDs mounted to a metal core circuit board and aluminum heat sink, ensuring optimal thermal management. 5100 K CCT, CRI > 70. Standard drivers are 120V through 277V, 50 Hz through 60 Hz operation. Optional 347V and 480V packages are available. Electronic drivers are accessible through a hinged door. LED drivers have power factor > 90% and THD < 10%. Integral LED driver protection provides transient voltage protection in accordance with IEEE/ANSI C62.41.2 guidelines.

Optional solid-state photocontrol: Specifically designed to address concerns of LED luminaires. Integral "Fail Off" feature eliminates "dayburners." Surge protector features two 320J/9,500A MOVs with additional in-series inductor and high-frequency filter, protecting driver from electrical transients. Enhanced ambient sensing provides reduced sensitivity to LED illumination.

INSTALLATION — Heavy-duty mounting block attaches to pole or wall to provide ease of installation as well as ensured alignment and leveling. ALX pole-mount luminaires utilize the AERIS series pole drilling pattern.

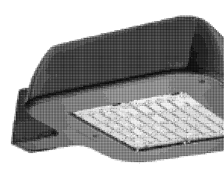
LISTING — CSA Certified to U.S. and Canadian standards for 40°C ambient. Designed to provide more than 50,000 hours of performance (L70) in ambient temperatures up to 104°F (40°C). Down orientation only. Luminaire is IP66 rated. Light engine is IP67 rated. ELED: U.S. Patent No. 7,737,640.

NOTE: Specifications subject to change without notice.

ALX LED Luminaires

Area Luminaire

ALX1



Specifications

EPA: 0.7 ft²
Length: 23-1/2 (59.7)
Width: 18-1/2 (46.9)
Depth: 5-7/8 (14.9)
*Weight (7000L): 37 lbs (16.8 kg)
*Weight (14000L): 50 lbs (22.7 kg)
*Weight as configured in example below.
All dimensions are inches (centimeters) unless otherwise noted.

ORDERING INFORMATION Lead times will vary depending on options selected. Consult with your sales representative.

Example: ALX1 7000L SR5 MVOLT SPA DDBXD

Series	Lighting package	Distribution	Voltage	Mounting	Options	Finish
ALX1	7000L 14000L	SR3 Type III asymmetric SR4 Type IV forward throw SR5 Type V symmetric	MVOLT 347 480	Shipped included SPA Square pole mounting RPA Round pole mounting WBA Wall bracket (down only) Shipped separately KMA8 Mast arm adapter	Shipped installed PER NEMA twist-lock receptacle only (no photocontrol) 2ELED Emergency LED secondary source (two-module) battery pack (-4°F min. operating temp) HS Houseside shield (SR3, SR4) SF Single fuse (120, 277, 347V) DF Double fuse (208, 240, 480V) Shipped separately DLL/PS MVOLT M12 NEMA twist-lock SCU Shorting cap VG Vandal guard BS Bird-deterrent spikes	DDBXD Dark bronze DBLXD Black DNAXD Natural aluminum DWHXD White DDBTXD Dark bronze textured DBLBXD Black textured DNATXD Natural aluminum textured DWHGXD White textured

Lighting package	System wattage 120-277V	System wattage 347-480V
7000L	110	122
14000L	220	244

Note: ALX shares a unique drilling pattern with the AERIS™ and OMERO™ families. This pattern should be used when specifying poles. See example below.
Example: SSA 20 4C DM19AS DDBXD
Aeris Drilling Pattern
DM19AS 1 at 90 degrees
DM28AS 2 at 180 degrees
DM29AS 2 at 90 degrees
DM39AS 3 at 90 degrees
DM49AS 4 at 90 degrees
DM32AS 3 at 120 degrees (round poles only)

Accessories: Tenon Mounting Slipfitter
Order as separate catalog number. Must be used with pole mounting (RPA).

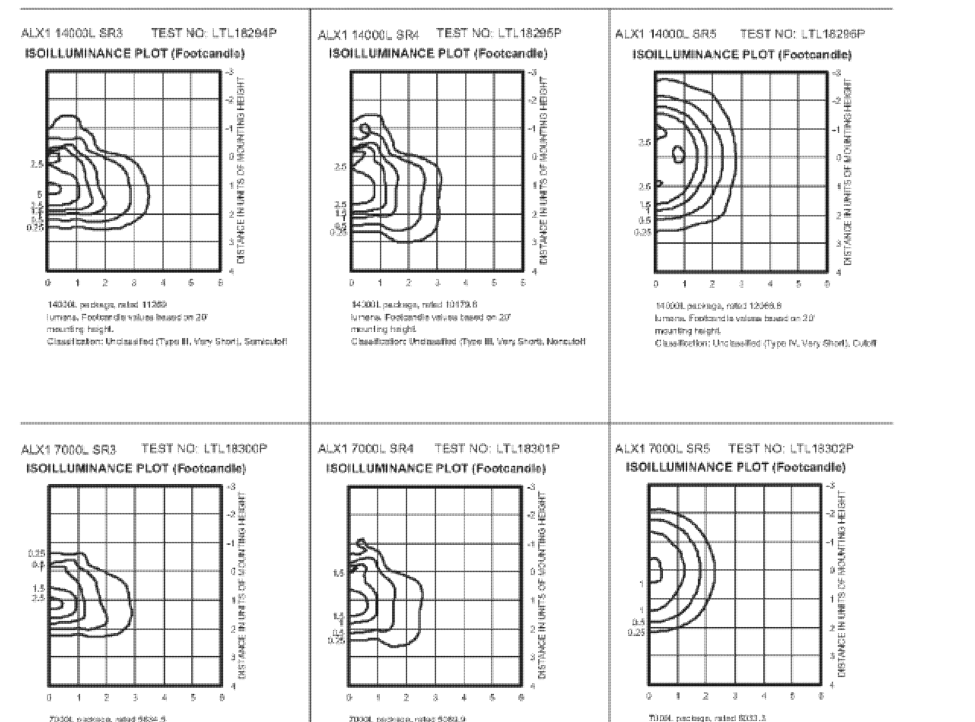
Tenon O.D.	One	Two@180°	Two@90°	Three@120°	Three@90°	Four@90°
2-3/8"	AST20-190	AST20-280	AST20-290	AST20-320	AST20-390	AST20-490
2-7/8"	AST25-190	AST25-280	AST25-290	AST25-320	AST25-390	AST25-490
4"	AST35-190	AST35-280	AST35-290	AST35-320	AST35-390	AST35-490

Notes
1 Optional multi-volt ballast capable of operating on any line voltage from 120V-277V.
2 May be ordered as an accessory.
3 Must specify finish when ordering as an accessory.
4 Prefix with AC2 when ordering as an accessory.
5 Not available with 347V or 480V. Order from Acuity Brands Controls.
6 Must order PER option. Must be ordered as a separate line item.
7 For accessory, order as ALXGS.
8 Must specify finish.

NIGHTTIME FRIENDLY™ Consistent with LEED® goals & Green Globes™ criteria for light pollution reduction

OUTDOOR ALX1-LED

ALX1 LED Area Lighting



Notes
1 Photometric data for other distributions can be accessed from the Lithonia Lighting web site (www.lithonia.com).
2 For electrical characteristics consult outdoor technical data specification sheets on www.lithonia.com.
3 Various operating factors can cause differences between laboratory and actual field measurements. Dimensions and specifications are based on the most current data and are subject to change. **Tested to IESNA LM-79-08 standards.**

Mounting Height Correction Factor
(Multiply the fc level by the correction factor)
10 ft. = 4
15 ft. = 1.78
30 ft. = 0.44

Existing Mounting Height² / New Mounting Height² = Correction Factor

LITHONIA LIGHTING® An Acuity Brands Company

ALX1-LED

OUTDOOR: One Lithonia Way Conyers, GA 30012 Phone: 770.922.9000 Fax: 770-918-1209 www.lithonia.com

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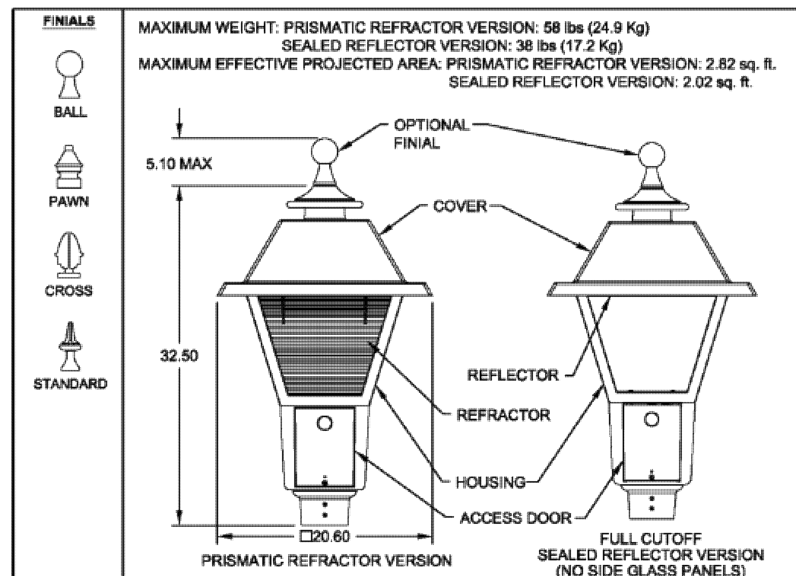
Minuteman™ Utility Lantern

Architectural Outdoor

HOLOPHANE® LEADER IN LIGHTING SOLUTIONS An Acuity Brands Company

MAXIMUM WEIGHT: PRISMATIC REFRACTOR VERSION: 58 lbs (24.9 Kg)
SEALED REFLECTOR VERSION: 38 lbs (17.2 Kg)
MAXIMUM EFFECTIVE PROJECTED AREA: PRISMATIC REFRACTOR VERSION: 2.82 sq. ft.
SEALED REFLECTOR VERSION: 2.02 sq. ft.



ORDERING INFORMATION:

LU — LU 70DMH 12 S 3 B

LUMINAIRE
LU = Minuteman Utility Lantern

Source and Wattage
20DIN = 200W Incandescent
42CFL = 42W CFL
57CFL = 57W CFL
70CFL = 70W CFL
050HP = 50W HPS Mogul Base
50DHP = 50W HPS Med. Base
070HP = 70W HPS Mogul Base
70DHP = 70W HPS Med. Base
100HP = 100W HPS Mogul Base
10DHP = 100W HPS Med. Base
15AHP = 150W/55V HPS Mogul Base
15DHP = 150W/55V HPS Med. Base
70DMH = 70W MH Med. Base
10DMH = 100W MH Med. Base
15DMH = 150W MH Med. Base
175MH = 175W MH Mogul Base*
17DMH = 175W MH Med. Base*
175PM = 175W PM Mogul Base
250MH = 250W MH Mogul Base*
055QL = 55W Induction Lamp
085QL = 85W Induction Lamp

Voltage
12 = 120 VOLT
20 = 208 VOLT
24 = 240 VOLT
27 = 277 VOLT
48 = 480 VOLT
AV = Autosensing
MA = Multivolt (120V)
MB = Multivolt (208V)
MC = Multivolt (240V)
MD = Multivolt (277V)
08 = 208 VOLT (Isolated Secondary)
34 = 347 VOLT
40 = 240 VOLT (Isolated Secondary)

Finials
N = None
B = Ball
P = Pawn
R = Cross
S = Standard

Housing Color
A = As Specified
B = Black
H = Graphite
L = Dark Blue
M = Brown Metallic
N = Green
W = White
Z = Bronze

Optics
1 = Asymmetric Prismatic Refractor
2 = Symmetric Prismatic Refractor
3 = Asymmetric Sealed Reflector
4 = Symmetric Sealed Reflector

* Not available for shipment in US due to EISA 2007 legislation

ORDER #:
TYPE:
DRAWN: BRL
DATE: 11-03-09
DWG #: MA-5350
1 of 2

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Minuteman™ Utility Lantern

Architectural Outdoor

HOLOPHANE® LEADER IN LIGHTING SOLUTIONS An Acuity Brands Company

OPTIONS
R = NEMA Twistlock Photocontrol Receptacle
P = Protected Starter
T = NEMA Twistlock Photocontrol and Protected Starter

L1H = 1.5 ft Pre-wired Leads
L03 = 3 ft Pre-wired Leads
L10 = 10 ft Pre-wired Leads
L20 = 20 ft Pre-wired Leads
L25 = 25 ft Pre-wired Leads
L30 = 30 ft Pre-wired Leads

NE = NEMA label

P27 = DTL Twistlock 120-277V Photocontrol
P48 = DTL Twistlock 480V Photocontrol
PSC = Shorting Cap

ACCESSORIES
Lamp
IG-5 = Replacement Starter for HPS
IG-6 = Replacement Protected Starter for HPS
IG-7 = Replacement Starter for 70DMH, 10DMH & 15DMH only.
IG-30 = Replacement Starter for 175PM

Specifications

Mounting
The luminaire is designed to sit on a 3" tenon post top.

OPTICS
The refractor optical is a precisely molded, thermal resistant, borosilicate glass, refractor. There is also a reflector optical version which is a full cutoff reflector that is sealed and gasketed in the cover of the unit. Two optical distributions are available, Asymmetric and Symmetric distributions.

HOUSING
The housing contains a chamber for a utility ballast and other electrical components. The housing has four corner ribs that capture and protect the corners of the glass. The housing is of cast aluminum alloy.

BALLAST ASSEMBLY
A single plate with the ballast and other electrical components attached is held in place by screws for easy access and replacement.

BALLASTS
See ballast handbook for HID ballast information. Contact TSG for CFL or QL ballast information.

FINISH
The luminaire is finished with polyester powder paint to insure maximum durability.

UL LISTING
The luminaire is UL listed as suitable for wet location at a maximum 40 degree C ambient temperature. The 250MH is suitable for wet location at a maximum of 35 degree C ambient temperature. The QL units are suitable for wet location at a maximum of 30 degree C ambient temperature.

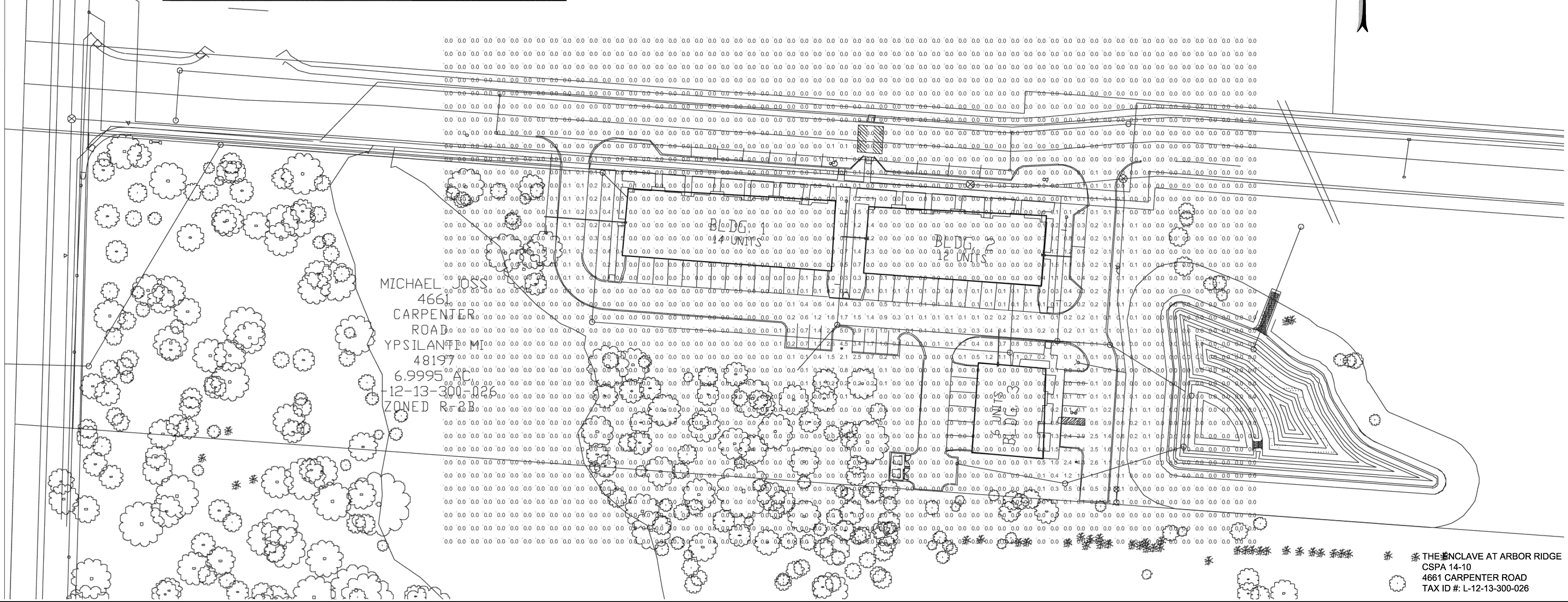
ORDER #:
TYPE:
DRAWN: BRL
DATE: 11-03-09
DWG #: MA-5350
2 of 2

LUMINAIRE LOCATIONS

No.	Label	Location X	Location Y	Location Z	MH	Orientation	Tilt	Aim X	Aim Y	Aim Z
1	A	526.8	604.5	15.0	15.0	-86.1	76.2	465.8	608.6	0.0
2	A	844.8	579.6	15.0	15.0	93.1	53.7	865.1	578.5	0.0
3	A	810.0	497.3	15.0	15.0	1.9	59.7	810.8	522.9	0.0
4	A	709.9	592.2	15.0	15.0	-85.5	50.7	691.7	593.6	0.0
5	B	691.4	508.8	12.5	12.5	0.0	0.0	691.4	508.8	0.0
6	B	869.5	422.9	12.5	12.5	0.0	0.0	869.5	422.9	0.0

LUMINAIRE SCHEDULE

Symbol	Label	Qty	Catalog Number	Description	Lamp	File	Lumens	LLF	Watts
▌	A	4	ALXW LED 1 30A350/51K SR4	LED WALLPACK WITH TYPE 4 DISTRIBUTION	ONE 113.1-WATT LED, AIMED DOWN POS.	ALXW_LED_1_30A350_51K_SR4.ies	Absolute	1.00	113.1
■	B	2	ALX1 LED 1 30A350/51K SR4 MVOLT	ALX1 HOUSING WITH ONE TYPE 4 LIGHT ENGINE AT 350mA	ONE ALX LED LIGHT ENGINE, DOWNLIGHT POS.	ALX1_LED_1_30A350_51K_SR4_MVOLT.ies	Absolute	0.86	113.9



THE ENCLAVE AT ARBOR RIDGE
CSPA 14-10
4661 CARPENTER ROAD
TAX ID #: L-12-13-300-026

811 Know what's below. Call before you dig.

THE ENCLAVE at Arbor Ridge

PHOTOMETRIC PLAN

FINAL SITE PLAN

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

STATUS:
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05-19-14 PER TWSP RVWS OF 04-23-14 & 04-30-14

JOB NO: **1019**

DATE: 04-11-14
PM: EMP
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SURV: MLP
CAD: EMP
1019.DWG
VDATUM: NAVD88
SCALE: 1" = 40'

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

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THE ENCLAVE at Arbor Ridge

PART OF THE SOUTHWEST 1/4 OF SECTION 13, T.3S., R.6E.

PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MI

SCALE: ONE INCH = 50 FEET

0 25 50 100 150

SCALE IN FEET

PROPERTY DESCRIPTION:
THE ENCLAVE AT ARBOR RIDGE

PART OF THE SOUTHWEST ¼ OF SECTION 13, T. 3 S., R. 6 E., PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN DESCRIBED AS:

COMMENCING AT THE WEST ¼ CORNER OF SECTION 13, T. 3 S., R. 6 E.; THENCE ALONG THE WEST LINE OF SECTION 13 AND THE CENTERLINE OF CARPENTER ROAD S01º37'22"W 832.04 FEET TO THE POINT OF BEGINNING; THENCE ALONG THE SOUTHERLY RIGHT-OF-WAY OF CLOVERLANE ROAD THE FOLLOWING THREE COURSES: S85º51'00"E 860.00 FEET AND N01º37'22"E 17.00 FEET AND S85º51'00"E 462.13 FEET TO THE WESTERLY BOUNDARY OF WASHTENAW COUNTY CONDOMINIUM SUBDIVISION PLAN NO. 573, A.K.A. "THE WOODLANDS AT ARBOR RIDGE" (AS RECORDED IN LIBER 4712, PAGE 188, WASHTENAW COUNTY RECORDS); THENCE ALONG SAID WESTERLY BOUNDARY S01º41'32"W 241.84 FEET TO THE SOUTH LINE OF THE NORTH 64 RODS OF THE WEST HALF OF THE SOUTHWEST ¼ OF SECTION 13; THENCE ALONG SAID LINE N85º51'20"W 1321.83 FEET TO THE WEST LINE OF SECTION 13 AND THE CENTERLINE OF CARPENTER ROAD; THENCE ALONG SAID LINE N01º37'22"E 224.98 FEET TO THE POINT OF BEGINNING. SUBJECT TO THE RIGHTS OF THE PUBLIC OVER THE WESTERLY 33 FEET THEREOF AS OCCUPIED BY CARPENTER ROAD AND CONTAINING 6.9995 ACRES OF LAND.

PLANT LIST

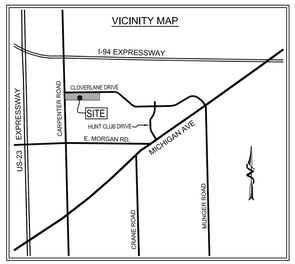
KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE
PARKING LOT TREES				
ARA	4	*Acer rubrum* 'Autumn Blaze'	Autumn Blaze Red Maple	2-1/2" cal. B&B
TC	2	*Tilia cordata* 'Greenspire'	Greenspire European Linden	2-1/2" cal. B&B
FOUNDATION PLANTINGS				
SMK	40	*Syringa patula* 'Miss Kim'	Miss Kim Lilac	24" ht., 3 gal. pot
TMD	24	*Taxus* x *media* 'Densiformis'	Densiformis Yew	24" ht. B&B
STREET TREES				
GBF	12	*Gingko biloba* 'Fastigiata'	Fastigiate Maidenhair Tree	2-1/2" cal. B&B
EMERGENT PLANTING				
ACA	32	*Acorus calamus*	Sweet Flag	Bare root, 24" o.c.
AIN	20	*Asclepias incarnata*	Swamp Milkweed	Bare root, 24" o.c.
IVR	18	*Iris virginica*	Blue Flag Iris	Bare root, 24" o.c.
LC	36	*Lobelia cardinalis*	Cardinal Flower	Bare root, 24" o.c.
PC	16	*Pontederia cordata*	Pickeral Weed	Bare root, 24" o.c.
SL	32	*Sagittaria latifolia*	Common Arrowhead	Bare root, 24" o.c.

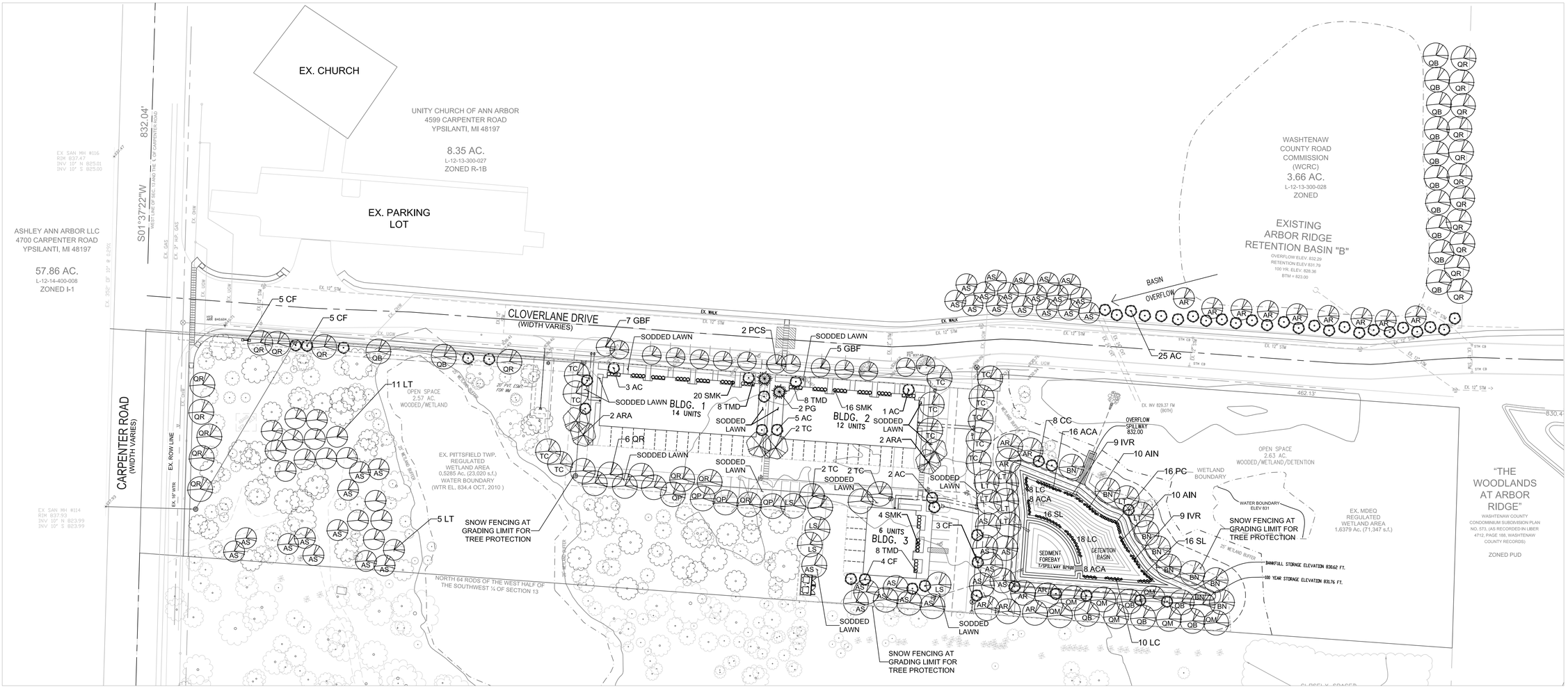
PLANT LIST

KEY	QTY.	BOTANICAL NAME	COMMON NAME	SIZE	REPLACEMENT EQUIVALENCE
REPLACEMENT TREES					
AC	36	*Amelanchier canadensis*	Serviceberry	4" cal. B&B**	144"
AR	17	*Acer rubrum* 'Red Sunset'	Red Sunset Red Maple	3" cal. B&B	51"
AS	41	*Acer saccharum*	Sugar Maple	3" cal. B&B	123"
BN	9	*Betula nigra*	River Birch	3" cal. B&B	27"
CC	8	*Carpinus caroliniana*	American Hornbeam	2-1/2" cal. B&B	20"
CF	12	*Cornus florida*	Flowering Dogwood	2-1/2" cal. B&B	30"
LS	4	*Liquidambar styraciflua*	American Sweetgum	3" cal. B&B	12"
LT	23	*Liriodendron tulipifera*	Tuliptree	3" cal. B&B	69"
PCS	2	*Pyrus calleryana* 'Cleveland Select'	Cleveland Select Callery Pear	3" cal. B&B	6"
PG	2	*Picea glauca*	White Spruce	8' ht. B&B	5"
QB	17	*Quercus bicolor*	Swamp White Oak	3" cal. B&B	51"
QM	7	*Quercus macrocarpa*	Burr Oak	3" cal. B&B	12"
QP	4	*Quercus palustris*	Pin Oak	3" cal. B&B	12"
QR	29	*Quercus rubra*	Red Oak	3" cal. B&B	87"
TC	16	*Tilia cordata* 'Greenspire'	Greenspire European Linden	3" cal. B&B	48"
					697"

* Six hundred ninety-seven (697) replacement inches provided.

** Eight foot to ten foot (8'-10') ht. Serviceberry equivalent to a four inch (4") caliper tree.





BENCHMARKS:

BM #1-
ARROW ON HYDRANT LOCATED ON THE SOUTH SIDE OF CLOVERLANE DRIVE
APPROX. 80' WEST OF CARPENTER ROAD ℄
ELEVATION = 840.60

BM #2-
ARROW ON HYDRANT LOCATED ON THE SOUTH SIDE OF CLOVERLANE DRIVE
APPROX. 80' WEST OF CARPENTER ROAD ℄
ELEVATION = 840.41

LEGEND

KEY — Replacement Trees

Parking Lot Trees

TREE REPLACEMENT NOTE:

* Six hundred ninety-six inches (696") dia. total replacement required.

Know what's **below.** **Call** before you dig.

date: November 12, 2010
revised:
11-15-10 Client review.
01-19-11 Site plan changes & Township review.
09-08-11 Site plan changes & Township review.
04-11-14 Revise for site plan changes & add replacement trees.
05-15-14 Revise for site plan changes & add replacement trees.

NOTE:
* See Sheet LP - 2: LANDSCAPE NOTES & DETAILS for planting details, landscape construction details, and landscape planting notes.

LANDSCAPE PLAN BY:
Nagy & Associates
7540 South Channel Drive
Post Office Box 28044
Harsens Island, Michigan 48028
(810) 512-4004

STATE OF MICHIGAN JOHN J. NAGY NO.425 REGISTERED LANDSCAPE ARCHITECT

John J. Nagy

SHEET 17: LANDSCAPE PLANTING PLAN

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 11-12-2010
PM: TJZ
ENG: B DEVLIN
SURV: EMP
DWG: TJZ
1019 SCHEMATIC.DWG
VDATUM: USCSKCS (W.C.)
SCALE: 1" = 50'

STATUS:
REVISIONS:
JOB NO: **1019**

Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

MLP

LANDSCAPE PLAN

THE ENCLAVE
AT ARBOR RIDGE
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

SHEET
17

LANDSCAPE DEVELOPMENT NOTES:

PLANTING

1. Installation of all plant material shall be in accordance with the latest edition of the *American Association of Nurserymen Standards for Nursery Stock* and with the specifications set forth by Pittsfield Township, Michigan.
2. The plant materials shall conform to the type stated on the plant list. Sizes shall be the minimum stated on the plant list or larger. All measurements shall be in accordance with the latest edition of the *American Association of Nurserymen Standards for Nursery Stock.*
3. The plant material shall be nursery grown and inspected by the Owner's representative before planting. The Owner's representative reserves the right to reject any plant material at any time.
4. Plants designated "B&B" shall be balled and burlapped with firm balls of earth.
5. Dig shrub pits one foot (1') larger than the shrub rootball, tree pits three (3) times the width of the tree rootball and backfill with one (1) part topsoil and one (1) part soil from excavated pit. Plant trees and shrubs at the same grade level at which they were planted at the nursery. If wet, clay soils are evident, plant trees and shrubs slightly higher.
6. The Contractor is responsible for planting the materials at the correct grades and spacing. The plants shall be oriented to give the best appearance.
7. When the plant has been properly set, the pit shall be backfilled with the topsoil mixture, gradually filling, patting, and settling with water.
8. Trees in lawn areas to have a four foot (4') circle of mulch, four inches (4') deep, and three inches (3") away from the trunk. Shrub beds are to be mulched with shredded bark mulch to a minimum depth of three inches (3"). Only natural color shredded hardwood bark mulch will be accepted.
9. Remove all twine, wire, and burlap from the top one third (1/3) of tree and shrub root balls and from tree trunks. Remove all non-biodegradable material such as plastic or nylon completely from branches and stems.
10. All plant materials shall be pruned and injuries repaired. The amount of pruning shall be limited to the removal of dead or injured limbs and to compensate for the loss of roots from transplanting. Cuts should be flush, leaving no stubs. Cuts over three quarters of an inch (3/4") shall be painted with tree paint. Shrubs along the site perimeter shall be allowed to grow together in a natural form.
11. Organic, friable topsoil shall be evenly distributed and fine graded over all areas to receive lawns at uniform depth of four inches (4") after settlement.
12. All lawn areas shall be sodded with a Grade A Kentucky Blue Grass blend over the topsoil.
13. All plantings shall be completed within three (3) months, and no later than November 30, from the date of issuance of a certificate of occupancy if such certificate is issued during the April1 thru September 30 period; if the certificate is issued during the October 1 thru March 31 period, the planting shall be completed no later than the ensuing May 31; plantings shall thereafter be reasonably maintained, including permanence and health of plant materials to provide a screen to abutting properties and including the absence of weeds and refuse.
14. Plant trees and shrubs no closer than the following minimum distances from sidewalks, curbs, and parking stalls:
   - a. Shade/Canopy Trees — Three feet (3')
   - b. Ornamental/Flowering Trees — Five feet (5')
   - c. Evergreen Trees — Five feet (5')
   - d. Evergreen/Flowering Shrubs — Four feet (4').
15. Backfill directly behind all curbs and along sidewalks and compact to the to of curbs or walk to support vehicle and pedestrian weight without settling.
16. All landscape areas, especially parking lot islands and landscape beds next to buildings shall be excavated of all building materials and poor soils to a depth of twelve inches to eighteen inches
(12"-18") and backfilled with good, medium-textured planting soil (loam or light yellow clay). Add four inches to six inches (4"-6") of topsoil over the fill material and crown a minimum of six inches (6") above the top of curbs and/or walks after earth settling unless otherwise noted on the landscape plan.
17. Conversion of all asphalt and gravel areas to landscape planting beds shall be done in the following manner:
   - a. Remove all asphalt, gravel, and compacted earth to a depth of six inches to eighteen inches (6"-18") depending on the depth of the sub base and dispose of off site;
   - b. Call the Township for an inspection prior to backfilling;
   - c. Replace excavated material with good, medium-textured planting soil (loam or light yellow clay) to a minimum of two inches (2") above the top of the curb and sidewalk, add four inches to six inches (4"-6") of topsoil and crown to a minimum of six inches (6") above the adjacent curb and walk after earth settling, unless otherwise noted on the landscape plan.

   If conversion from asphalt to landscape occurs in or between an existing landscape area(s), replace excavated material from four inches to six inches (4"-6") below adjacent existing grade with good, medium-textured planting soil (loam or light yellow clay) and add four inches to six inches (4"-6") of topsoil to meet existing grades after earth settling.
18. Edging shall consist of Ryerson Steel edging or approved equivalent.
19. Elevate the rootballs of Yew shrubs to allow for better drainage.

MATERIAL

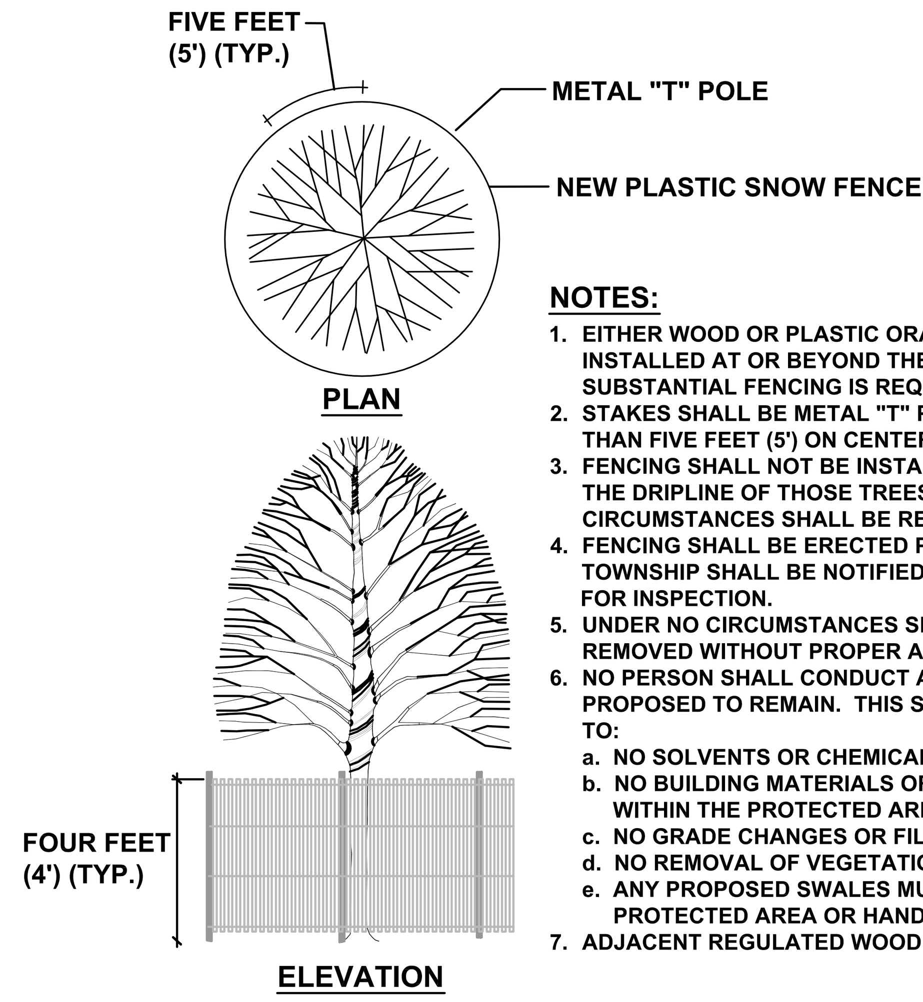
1. Required landscape material shall satisfy the criteria of the American Association of Nurserymen Standards for Nursery Stock and be:
   - a. Nursery grown;
   - b. State Department of Agriculture inspected;
   - c. No. 1 grade material with a straight, unscarred trunk, and well-developed uniform crown (park grade trees will not be accepted);
   - d. Staked, wrapped, watered, and mulched according to the details provided; and
   - e. Guaranteed for one (1) year.
2. Topsoil shall be friable, fertile soil of clayloam character containing at least five percent (5%) but not more than twenty percent (20%) by weight of organic matter with a pH range between 6.0 and 7.0. The topsoil shall be free from clay lumps, coarse sand, plant roots, sticks, and other foreign materials.
3. The seed mixture shall consist of the following types and proportions: Kentucky Blue Grass blend "Baron/Sheri/Adelphi" @ sixty percent (60%), Chewing Fescue @ twenty-five percent (25%), Creeping Red Fescue @ ten percent (10%), and Perennial Rye Grass @ five percent (5%). Weed content shall not exceed one percent (1%). The mix shall be applied at a rate of 200 pounds per acre.
4. Sod shall be two (2) year old "Baron/Sheri/Adelphi" Kentucky Blue Grass blend grown in a sod nursery on loam soil.

GENERAL

1. Do not plant deciduous or evergreen trees directly over utility lines or under overhead wires. Maintain a six foot (6') distance from the centerline of utilities and twenty feet (20') from the centerline of overhead wires for planting holes. Call MISS DIG forty-eight (48) hours prior to landscape construction for field location of utility lines.
2. The Contractor agrees to guarantee all plant material for a period of one (1) year. At that time, the Owner's representative reserves the right for a final inspection. Plant material with twenty-five percent (25%) die back, as determined by the Owner's representative shall be replaced. This guarantee includes the furnishing of new plants, labor, and materials. These new plants shall also be guaranteed for a period of one (1) year.
3. The work shall consist of providing all necessary materials, labor, equipment, tools, and supervision required for the completion as indicated on the drawings.
4. All landscape areas including parking lot islands shall be irrigated by an automatic underground irrigation system. Lawns and shrub/landscape areas shall be watered by separate zones to minimize overwatering.
5. All written dimensions override scale dimensions on the plans.
6. Report all changes, substitutions, or deletions to the Owner's representative.
7. All bidders must inspect the site and report any discrepancies to the Owner's representative.
8. All specifications are subject to change due to existing conditions.
9. The Owner's representative reserves the right to approve all plant material.
10. All ground mounted mechanical units shall be screened on three (3) sides with living plant material.

MAINTENANCE OF GENERAL LANDSCAPE AREAS

1. The Owner of the landscaping shall perpetually maintain such landscaping in good condition so as to present a healthy, neat, and orderly appearance, free from refuse and debris.
2. The Owner shall conduct a seasonal landscape maintenance program including regular lawn cutting (at least once per week during the growing season), pruning at appropriate times, watering, and snow removal during winter.
3. The Contractor is responsible for watering and maintenance of all seed areas until a minimum of ninety percent (90%) coverage, as determined by the Owner's representative.
4. All diseased and/or dead material shall be removed within sixty (60) days following notification and shall be replaced within the next appropriate planting season or within one (1) year, whichever comes first.
5. Any debris such as lawn clippings, fallen leaves, fallen limbs, and litter shall be removed from the site on a weekly basis at the appropriate season.
6. All planting beds shall be maintained by removing weeds, fertilizing, and replenishing mulch as needed.
7. Annual beds shall be kept free of weeds and mulched with sphagnum peat of a neutral pH as needed. Perennial beds shall be kept free of weeds and mulched with fine textured shredded bark as needed. Cut spent flower stalks from perennial plants at regular intervals.

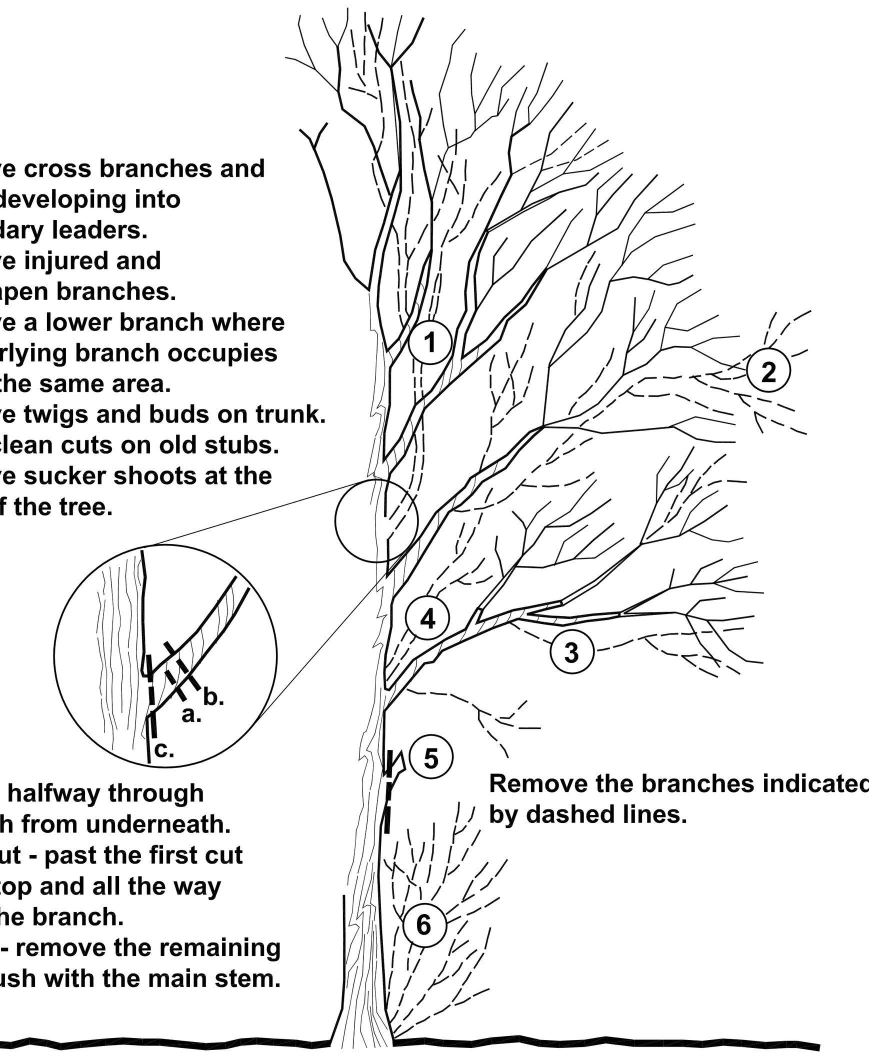


NOTES:

1. EITHER WOOD OR PLASTIC ORANGE SNOW FENCING SHALL BE INSTALLED AT OR BEYOND THE DRIPLINE, UNLESS MORE SUBSTANTIAL FENCING IS REQUIRED.
2. STAKES SHALL BE METAL "T" POLES SPACED NO FURTHER APART THAN FIVE FEET (5') ON CENTER.
3. FENCING SHALL NOT BE INSTALLED CLOSER TO THE TREE THAN THE DRIPLINE OF THOSE TREES TO BE SAVED. SPECIAL CIRCUMSTANCES SHALL BE REVIEWED BY THE TOWNSHIP.
4. FENCING SHALL BE ERECTED PRIOR TO CONSTRUCTION. THE TOWNSHIP SHALL BE NOTIFIED ONCE THE FENCING IS INSTALLED FOR INSPECTION.
5. UNDER NO CIRCUMSTANCES SHALL THE PROTECTIVE FENCING BE REMOVED WITHOUT PROPER APPROVAL FROM THE TOWNSHIP.
6. NO PERSON SHALL CONDUCT ANY ACTIVITY WITHIN THE AREAS PROPOSED TO REMAIN. THIS SHALL INCLUDE, BUT NOT BE LIMITED TO:
   - a. NO SOLVENTS OR CHEMICALS WITHIN THE PROTECTED AREA;
   - b. NO BUILDING MATERIALS OR CONSTRUCTION EQUIPMENT WITHIN THE PROTECTED AREA;
   - c. NO GRADE CHANGES OR FILL WITHIN THE PROTECTED AREA;
   - d. NO REMOVAL OF VEGETATION FROM THE GROUND UP;
   - e. ANY PROPOSED SWALES MUST BE DIRECTED AROUND THE PROTECTED AREA OR HAND DUG WITHIN THE PROTECTED AREA.
7. ADJACENT REGULATED WOODLANDS MUST ALSO BE PROTECTED.

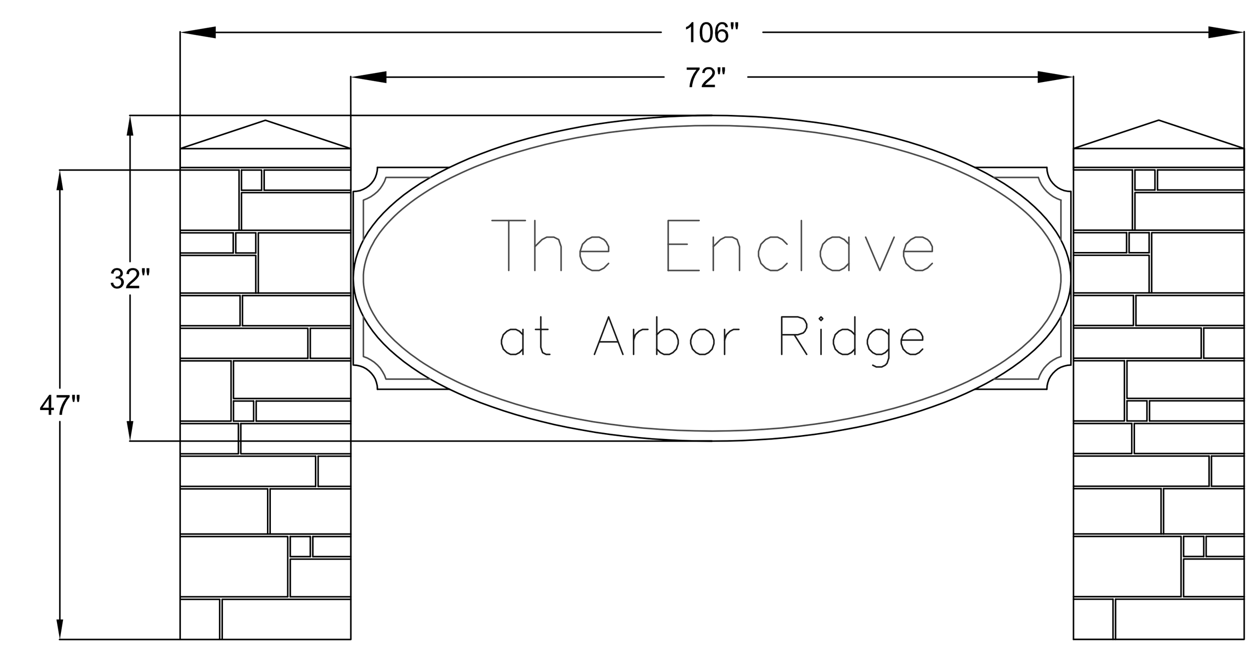
TREE PROTECTION DETAIL — not to scale

1. Remove cross branches and those developing into secondary leaders.
2. Remove injured and misshapen branches.
3. Remove a lower branch where an overlying branch occupies about the same area.
4. Remove twigs and buds on trunk.
5. Make clean cuts on old stubs.
6. Remove sucker shoots at the base of the tree.

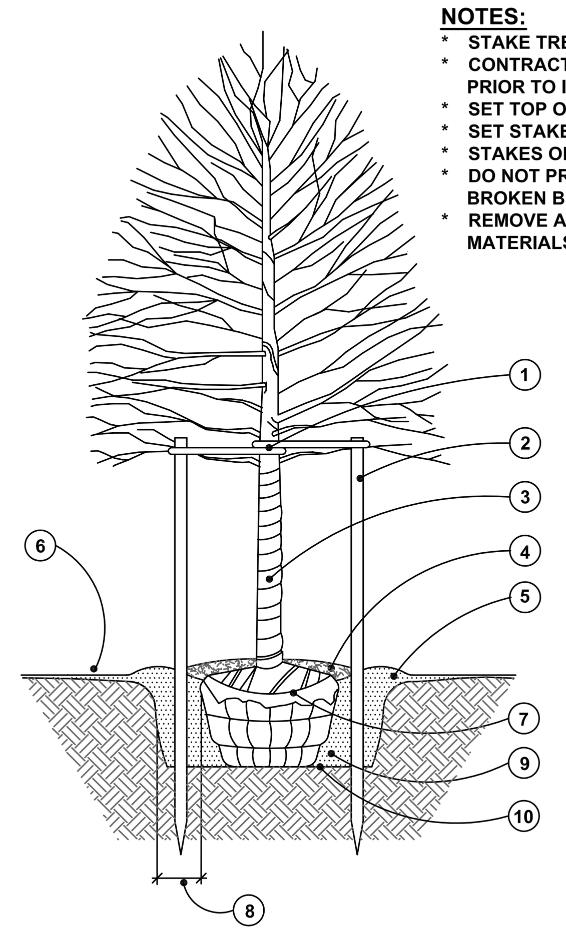


- a. First cut - halfway through the branch from underneath.
- b. Second cut - past the first cut from the top and all the way through the branch.
- c. Third cut - remove the remaining branch flush with the main stem.

PROPER PRUNING TECHNIQUES — not to scale



MONUMENT SIGN DETAIL — not to scale

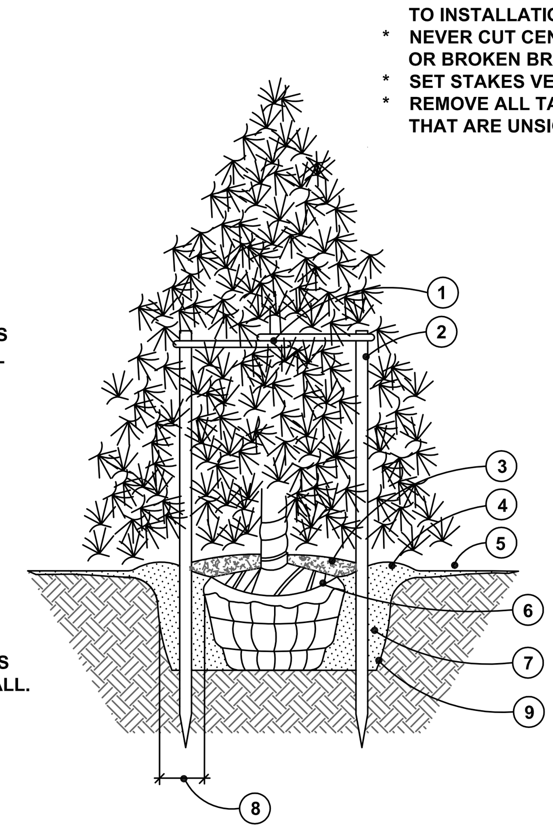


NOTES:

- * STAKE TREES UNDER FOUR INCH (4") CALIPER.
- * CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION.
- * SET TOP OF BALL THREE INCHES (3") ABOVE FINISH GRADE.
- * SET STAKES VERTICAL & EVENLY SPACED.
- * STAKES OR GUYS TO BE SECURED ABOVE THE FIRST BRANCH.
- * DO NOT PRUNE TERMINAL LEADER. PRUNE ONLY DEAD OR BROKEN BRANCHES.
- * REMOVE ALL TAGS, STRING, PLASTICS, AND OTHER MATERIALS THAT ARE UNSIGHTLY OR COULD CAUSE DAMAGE.

1. STAKE TREE JUST BELOW FIRST BRANCH USING TWO INCH TO THREE INCH (2"-3") WIDE BELT-LIKE MATERIAL OF NYLON, PLASTIC, OR OTHER ACCEPTABLE MATERIAL. (NO WIRE OR HOSE TO BE USED TO GUY TREES.) THREE (3) GUYS EVENLY SPACED PER TREE. REMOVE AFTER ONE (1) WINTER SEASON.
2. 2 x 2 HARDWOOD STAKES. POSITION SIX INCHES TO EIGHT INCHES (6"-8") OUTSIDE OF ROOTBALL AND EXTEND EIGHTEEN INCHES (18") BELOW TREE PIT INTO UNDISTURBED SOIL.
3. APPLY TREE WRAP AND SECURE WITH A BIODEGRADABLE MATERIAL AT TOP AND BOTTOM. REMOVE AFTER ONE (1) WINTER.
4. SHREDDED BARK MULCH OF A NATURAL COLOR AT FOUR INCH (4") MINIMUM DEPTH. LEAVE A THREE INCH (3") CIRCLE OF BARE SOIL AT THE BASE OF THE TREE.
5. MOUND TO FORM TREE SAUCER.
6. FINISH GRADE SLOPED AWAY FROM TREE.
7. CUT AND REMOVE WIRE, BURLAP, AND BINDINGS FROM THE TOP ONE-THIRD (1/3) OF THE ROOTBALL.
8. WIDTH OF ROOTBALL ON EACH SIDE.
9. PLANTING MIX SHALL BE AMMENDED PER SITE CONDITIONS AND PLANT REQUIREMENTS.
10. SCARIFY BOTTOM AND SIDES OF PLANTING PIT TO FOUR INCH (4") DEPTH.

DECIDUOUS TREE



NOTES:

- * STAKE ALL EVERGREEN TREES UNDER TWELVE FEET (12') HIGH. GUY ALL EVERGREEN TREES TWELVE FEET (12') HIGH AND OVER.
- * CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION.
- * NEVER CUT CENTRAL LEADER. PRUNE ONLY TO REMOVE DEAD OR BROKEN BRANCHES.
- * SET STAKES VERTICAL AND EVENLY SPACED.
- * REMOVE ALL TAGS, STRING, PLASTICS, AND OTHER MATERIALS THAT ARE UNSIGHTLY OR COULD CAUSE GIRDLING.

1. STAKE TREE AS INDICATED USING TWO INCH TO THREE INCH (2"-3") WIDE BELT-LIKE MATERIAL OF NYLON, PLASTIC, OR OTHER ACCEPTABLE MATERIAL. (NO WIRE OR HOSE TO BE USED TO GUY TREES.) THREE (3) GUYS EVENLY SPACED PER TREE. REMOVE AFTER ONE (1) WINTER SEASON.
2. 2 x 2 HARDWOOD STAKES. POSITION SIX INCHES TO EIGHT INCHES (6"-8") OUTSIDE OF ROOTBALL AND EXTEND EIGHTEEN INCHES (18") BELOW TREE PIT INTO UNDISTURBED SOIL.
3. SHREDDED BARK MULCH OF A NATURAL COLOR AT FOUR INCH (4") MINIMUM DEPTH. LEAVE A THREE INCH (3") CIRCLE OF BARE SOIL AT THE BASE OF THE TREE.
4. MOUND TO FORM TREE SAUCER.
5. FINISH GRADE SLOPED AWAY FROM TREE.
6. CUT AND REMOVE WIRE, BURLAP, AND BINDINGS FROM THE TOP ONE-THIRD (1/3) OF THE ROOTBALL.
7. PLANTING MIX SHALL BE AMMENDED PER SITE CONDITIONS AND PLANT REQUIREMENTS.
8. WIDTH OF ROOTBALL ON EACH SIDE.
9. SCARIFY BOTTOM AND SIDES OF PLANTING PIT TO FOUR INCH (4") DEPTH.

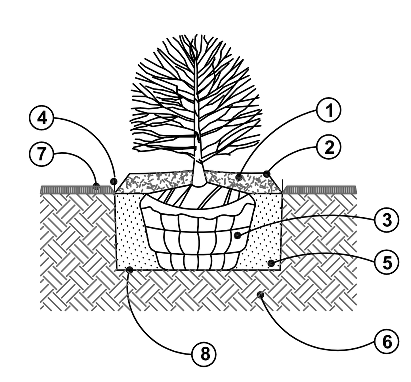
EVERGREEN TREE

GENERAL NOTES FOR ALL PLANTINGS:

- * DO NOT CUT CENTRAL LEADER.
- * REMOVE ALL TAGS, STRINGS,PLASTICS, AND ANY OTHER NON-BIODEGRADABLE MATERIALS (EXCEPT LABEL FOR PLANT NAME) FROM PLANT STEMS OR CROWN WHICH ARE UNSIGHTLY OR COULD CAUSE GIRDLING.
- * PLANTS SHALL BEAR THE SAME RELATION TO FINISH GRADE AS IT BORE TO THE PREVIOUS GRADE IN THE NURSERY. SET THE BASE OF THE PLANT SLIGHTLY HIGHER THAN EXISTING GRADE IF PLANTING IN CLAY SOILS.
- * CENTER THE ROOTBALL IN THE PLANTING HOLE. LEAVE THE BOTTOM OF THE PLANTING HOLE FIRM. USE WATER TO SETTLE THE PLANTING MIX AND REMOVE ANY AIR POCKETS AND FIRMLY SET THE TREE OR SHRUB. GENTLY TAMP IF NEEDED.

NOTE:

- * CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION.

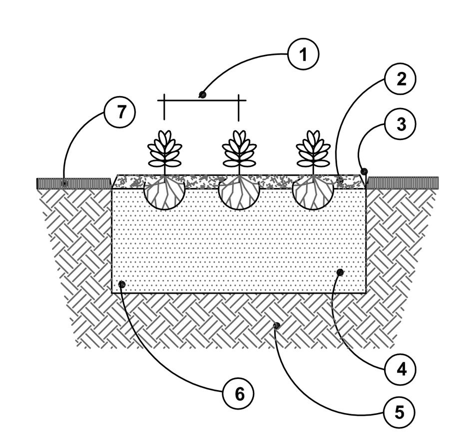


1. SHREDDED BARK MULCH AT THREE INCH (3") MINIMUM DEPTH. MULCH SHALL BE NATURAL IN COLOR.
2. FORM A SAUCER WITH MULCH AND SOIL AROUND SHRUB BED.
3. CUT AND REMOVE BURLAP AND BINDINGS FROM THE TOP ONE-THIRD (1/3) OF THE ROOTBALL.
4. 3/16" x 4" ALUMINUM EDGING (OR APPROVED EQUIVALENT) OR SPADED EDGE.
5. EXCAVATE PLANTING HOLE AND BACKFILL WITH PREPARED PLANTING MIX.
6. UNDISTURBED SUBGRADE.
7. LAWN.
8. SCARIFY SUBGRADE.

SHRUB

NOTE:

- * CONTRACTOR TO VERIFY PERCOLATION OF PLANTING PIT PRIOR TO INSTALLATION.
- * PERENNIALS TO BE PLANTED UP TO THE EDGE OF THE SAUCER AROUND A TREE OR SHRUB BED.



1. SEE PLANT LIST FOR SPACING DISTANCE.
2. SHREDDED HARDWOOD BARK OF A NATURAL COLOR MULCH AT FOUR INCH (4") MINIMUM DEPTH.
3. 3/16" x 4" ALUMINUM EDGING (OR APPROVED EQUIVALENT) OR SPADED EDGE.
4. EXCAVATE PLANTING BED AND BACKFILL WITH PREPARED PLANTING MIX AT A TEN INCH (10") DEPTH.
5. UNDISTURBED SUBGRADE.
6. PLANTING MIX TO CONSIST OF EQUAL PARTS OF SAND, LEAF COMPOST, AND NATIVE SOIL.
7. LAWN.

ANNUAL / PERENNIAL / GROUNDCOVER

PLANTING DETAILS — not to scale

NOTE:
* See Sheet LP - 1: LANDSCAPE PLANTING PLAN for the overall landscape plan, proposed plant list, replacement tree list, plant legend, and location map.

811 Know what's below. Call before you dig.

date: November 12, 2010
revised:
11-15-10 Client review.
01-19-11 Site plan changes & Township review.
09-08-11 Site plan changes & Township review.
04-11-14 Add sign detail.
05-15-14 Change sheet number.

scale as indicated

LANDSCAPE PLAN BY:
Nagy & Associates
7540 South Channel Drive
Post Office Box 28044
Harsens Island, Michigan
48028
(810) 512-4004

STATE OF MICHIGAN — JOHN J. NAGY — NO.425 — REGISTERED LANDSCAPE ARCHITECT

SHEET 18: LANDSCAPE NOTES & DETAILS

PREPARED FOR:
LIVONIA BUILDERS
Attn: DANNY VERI
4952 DEWITT
CANTON, MI 48188
PH: 734-347-3434

DATE: 11-12-2010
PM: TJZ
ENG: TJZ
SURV: EMP
CAD: B DEVLIN
1019 SCHEMATIC.DWG
VDATUM: USC&GS (W.C.)
SCALE: AS NOTED

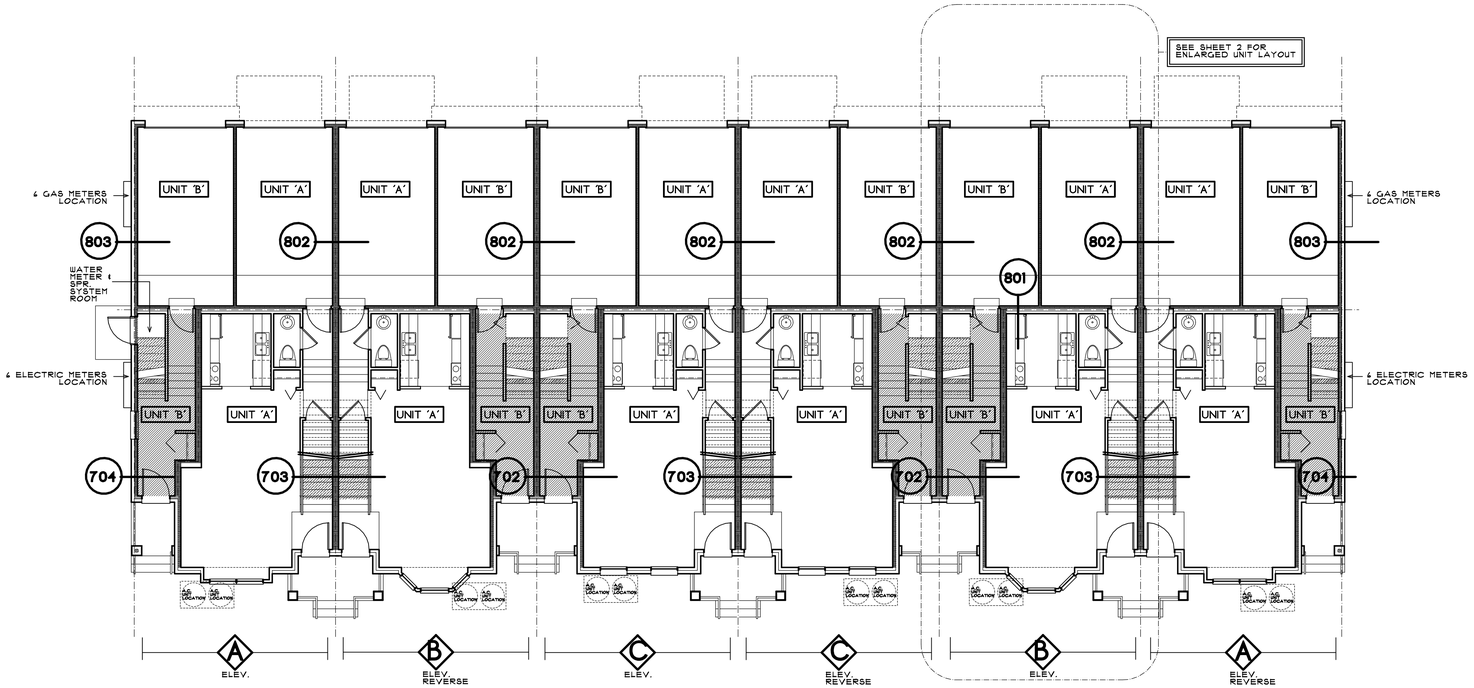
JOB NO: 1019

STATUS:
REVISIONS:
11-15-10 Client review

MLP
Michael L. Priest & Associates, Inc.
40655 Koppernick Road, Canton, MI 48187
phone: (734) 459-8560
fax: (734) 459-2585

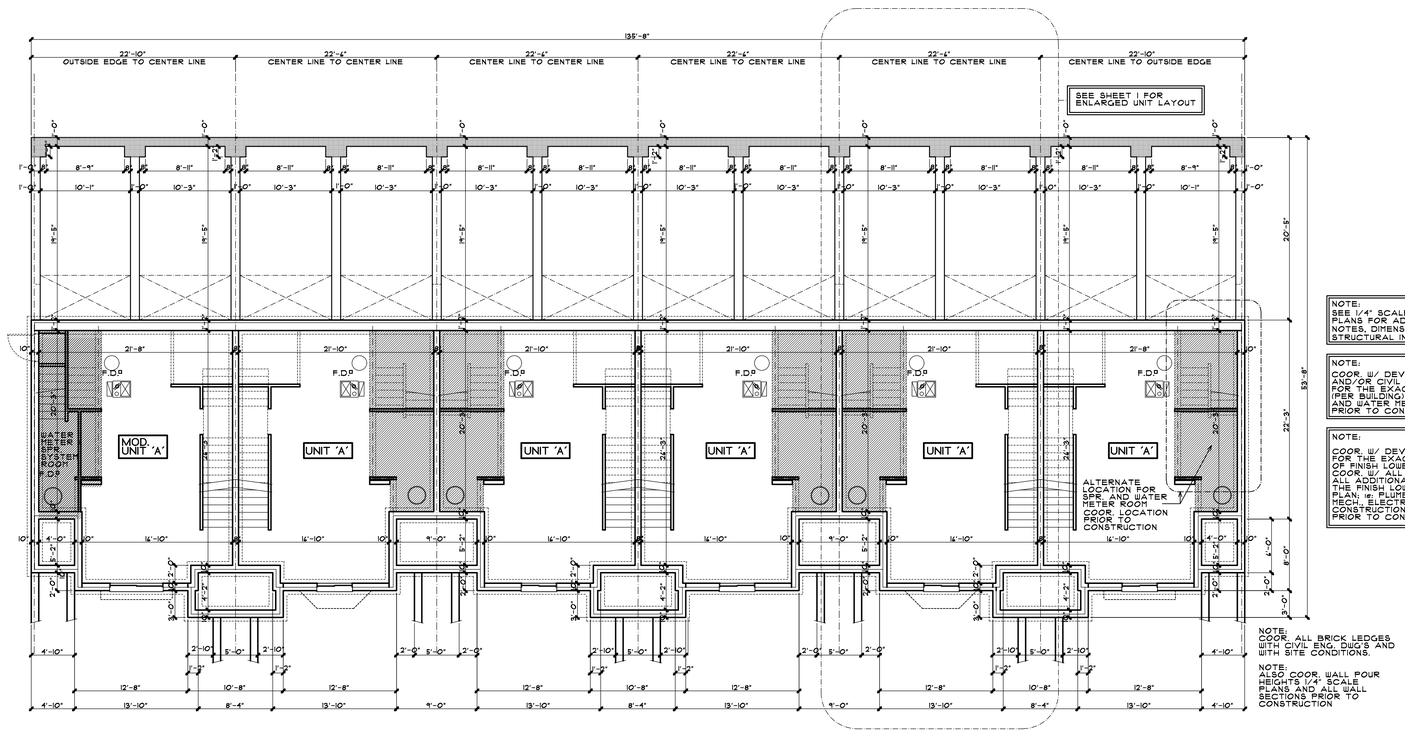
LANDSCAPE NOTES & DETAILS

THE ENCLAVE
AT ARBOR RIDGE
PART OF THE SOUTHWEST 1/4 OF SECTION 13, T3S, R6E
PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN



OVERALL FIRST FLOOR PLAN (12 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"



OVERALL FOUNDATION PLAN (12 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"

Alexander V. Bogaerts + Associates, P.C. • Architecture • Planning • Interior Design
2445 Franklin Road
Bloomfield Hills, MI 48302
248•334•5000

SHEET TITLE
OVERALL FLOOR PLANS
12 UNIT - BLDG. C

CLIENT/PROJECT
LIVONIA BUILDERS
THE ENCLAVE AT ARBOR RIDGE
PITTSFIELD TOWNSHIP, MICHIGAN

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■ PRELIMINARY 04-12-11
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REVISIONS

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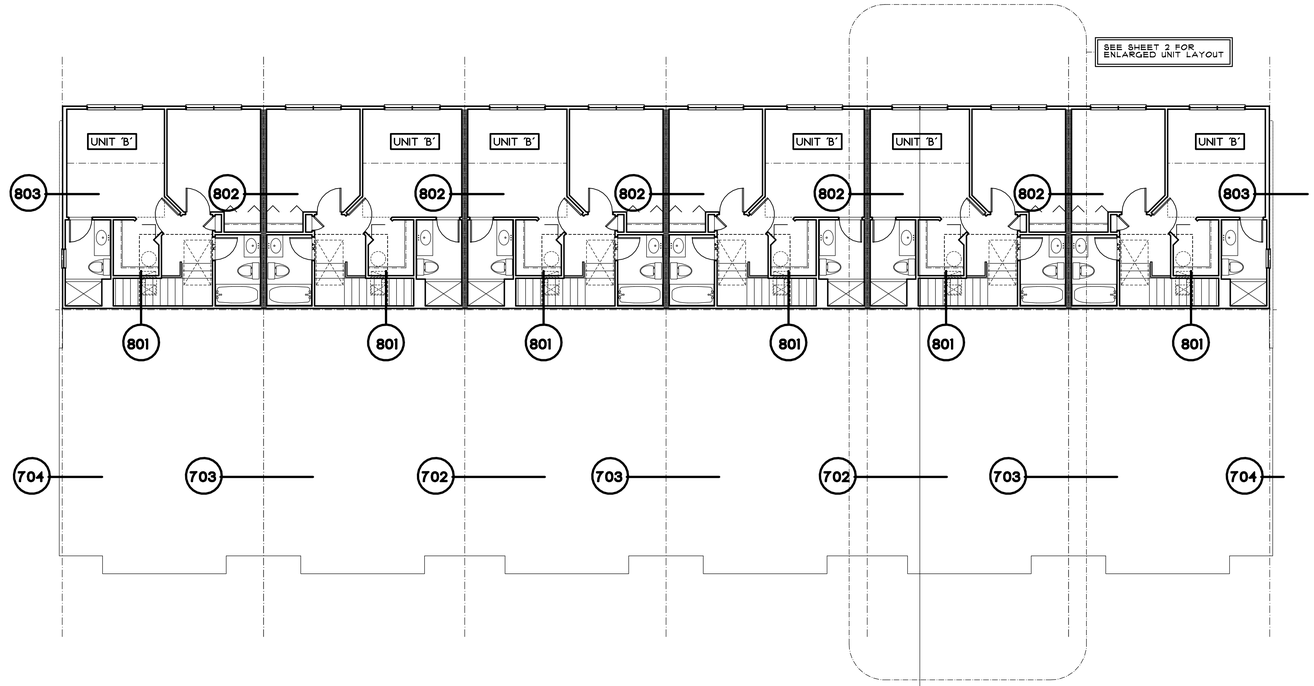
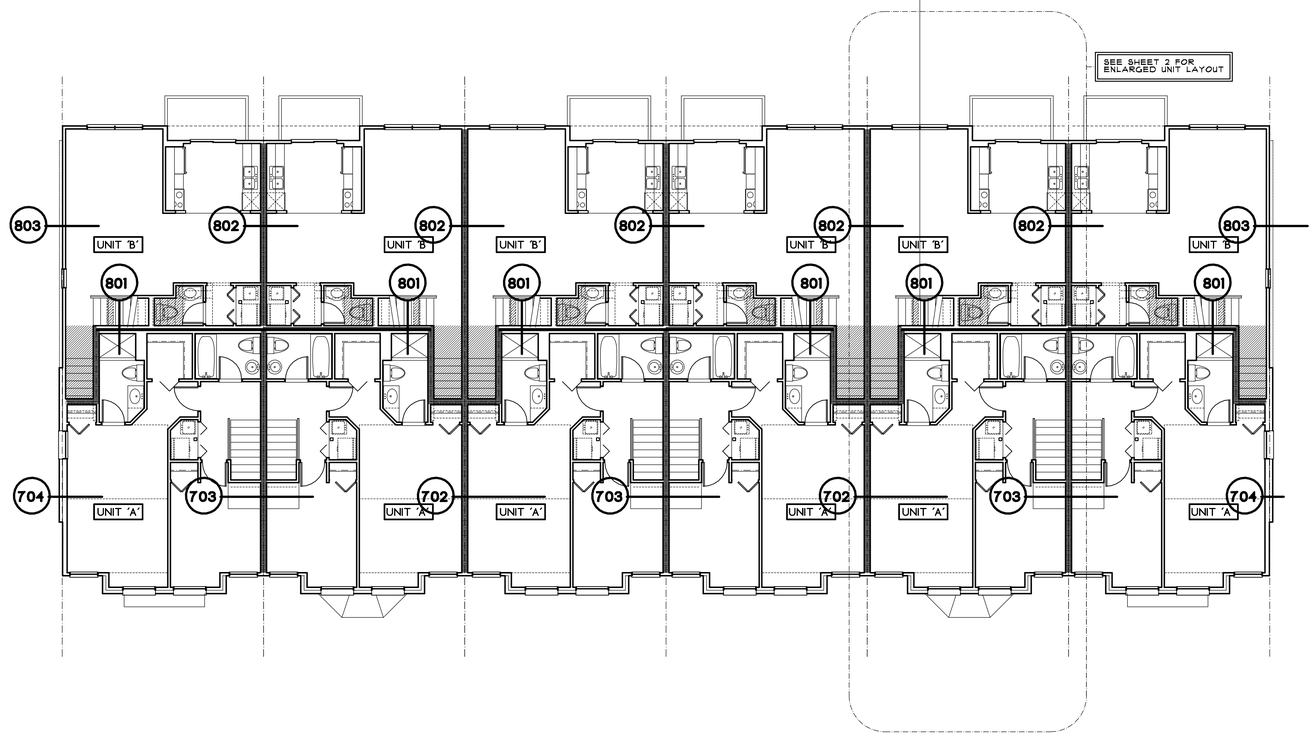
JOB NUMBER
DATE
SHEET NUMBER 19



OVERALL THIRD FLOOR PLAN (12 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"



OVERALL SECOND FLOOR PLAN (12 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"

NOTE:
SEE 1/4" SCALE UNIT PLANS FOR ADDITIONAL NOTES, DIMENSIONS & STRUCTURAL INFORMATION

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SHEET TITLE
OVERALL FLOOR PLANS
12 UNIT - BLDG. C

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THE ENCLAVE AT ARBOR RIDGE
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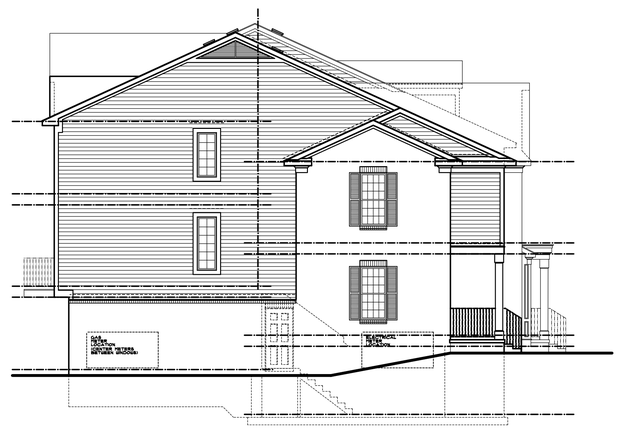
JOB NUMBER
DATE
SHEET NUMBER 2

OVERALL REAR ELEVATION

SCALE : 1/8" = 1'-0"



OVERALL LEFT SIDE ELEVATION (RIGHT SIDE ELEV. SIMILAR)

SCALE : 1/8" = 1'-0"

OVERALL FRONT ELEVATION (12 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"

NOTE:
SEE 1/4" SCALE UNIT PLANS FOR ADDITIONAL NOTES, DIMENSIONS & STRUCTURAL INFORMATION

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SHEET TITLE
OVERALL ELEVATIONS
12 UNIT - BLDG. C

CLIENT/PROJECT
LIVONIA BUILDERS
THE ENCLAVE AT ARBOR RIDGE
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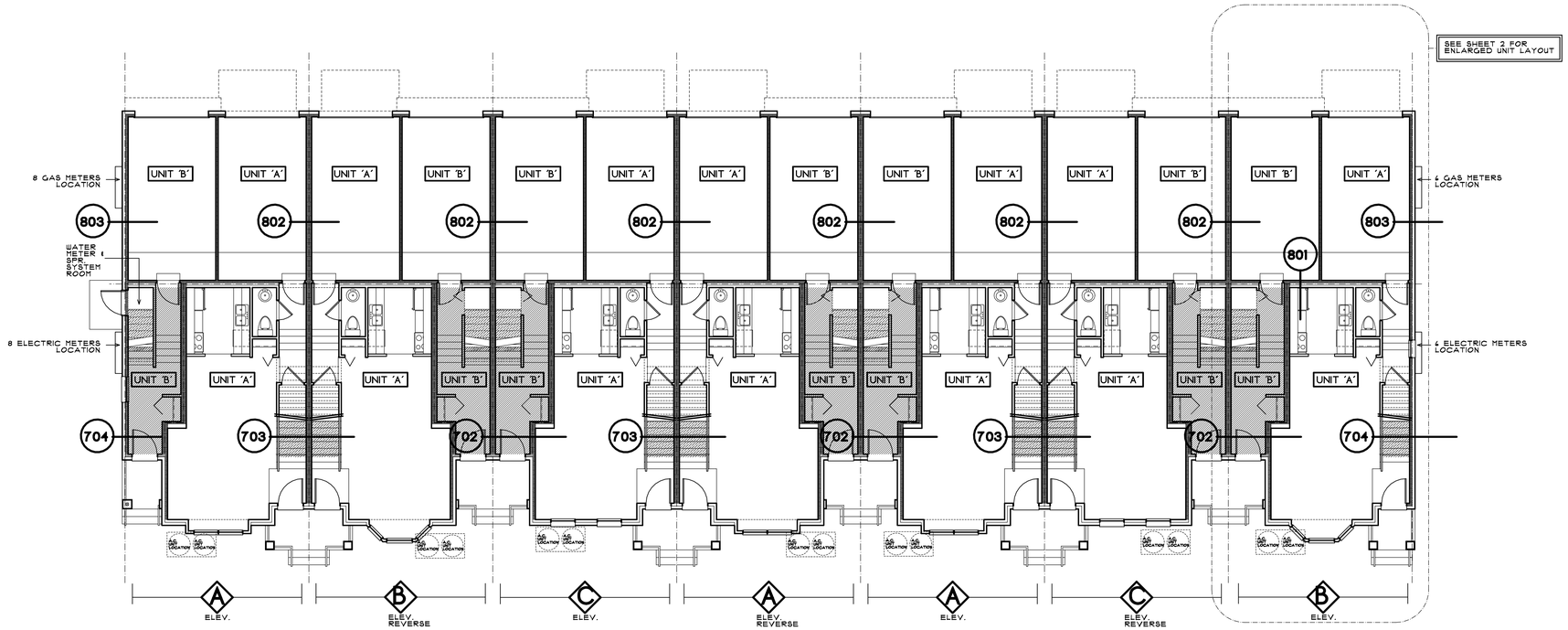
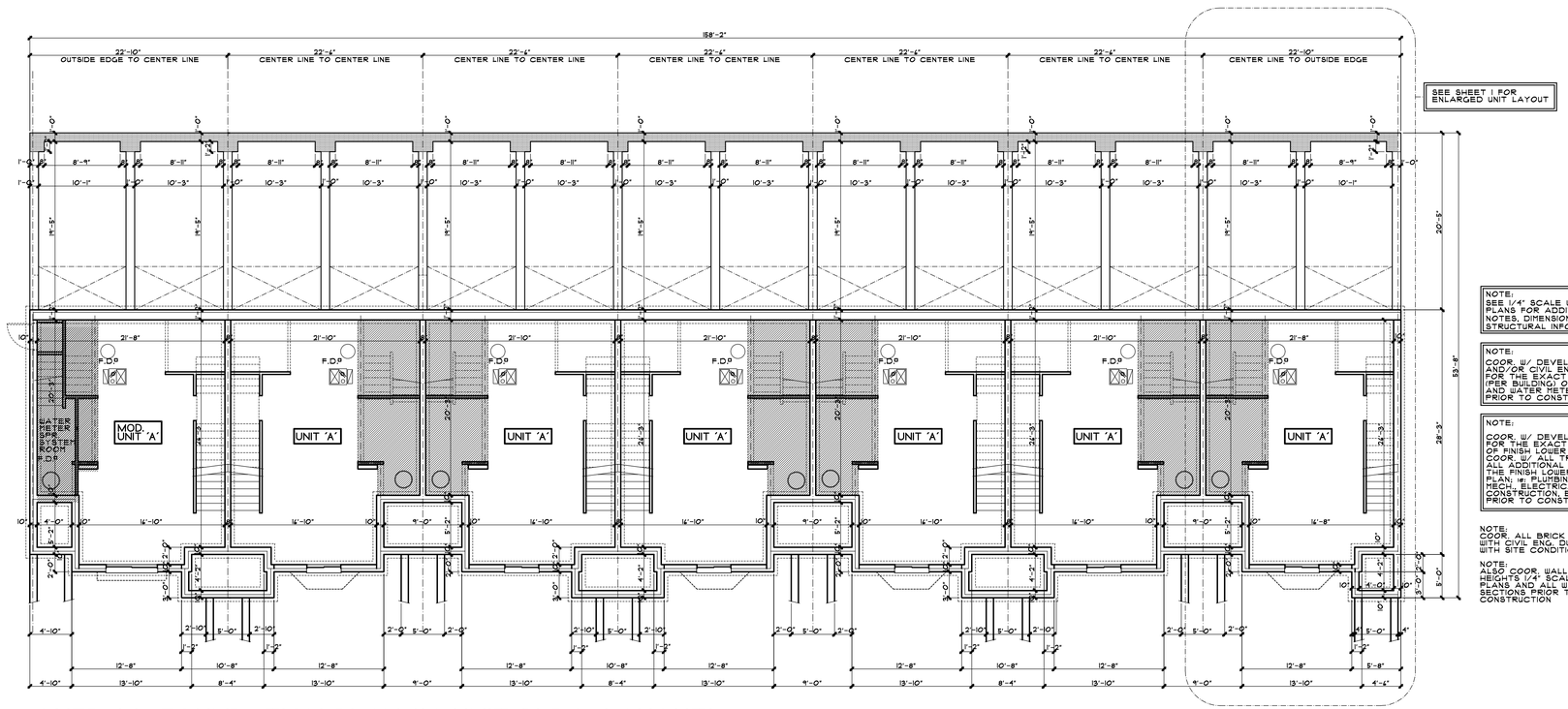
JOB NUMBER
DATE
SHEET NUMBER 21



OVERALL FIRST FLOOR PLAN (14 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"



NOTE:
SEE 1/4" SCALE UNIT PLANS FOR ADDITIONAL NOTES, DIMENSIONS & STRUCTURAL INFORMATION.

NOTE:
COORD. W/ DEVELOPER AND/OR CIVIL ENG. DWGS. FOR THE EXACT LOCATION (PER BUILDING) OF THE SPR. AND WATER METER ROOM PRIOR TO CONSTRUCTION.

NOTE:
COORD. W/ DEVELOPER FOR THE EXACT LOCATION OF FINISH LOWER LEVEL PLAN - COORD. W/ ALL TRADES FOR ALL ADDITIONAL WORK WITHIN THE FINISH LOWER LEVEL PLAN; i.e. PLUMBING FOR BATH, MECH., ELECTRICAL, WALL CONSTRUCTION, ETC. - COORD. PRIOR TO CONSTRUCTION.

NOTE:
COORD. ALL BRICK LEDGES WITH CIVIL ENG. DWG'S AND WITH SITE CONDITIONS.

NOTE:
ALSO COORD. WALL POUR HEIGHTS & 1/4" SCALE PLANS AND ALL WALL SECTIONS PRIOR TO CONSTRUCTION.

OVERALL FOUNDATION PLAN (14 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"

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SHEET TITLE
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14 UNIT

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LIVONIA BUILDERS
THE ENCLAVE AT ARBOR RIDGE
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REVISIONS

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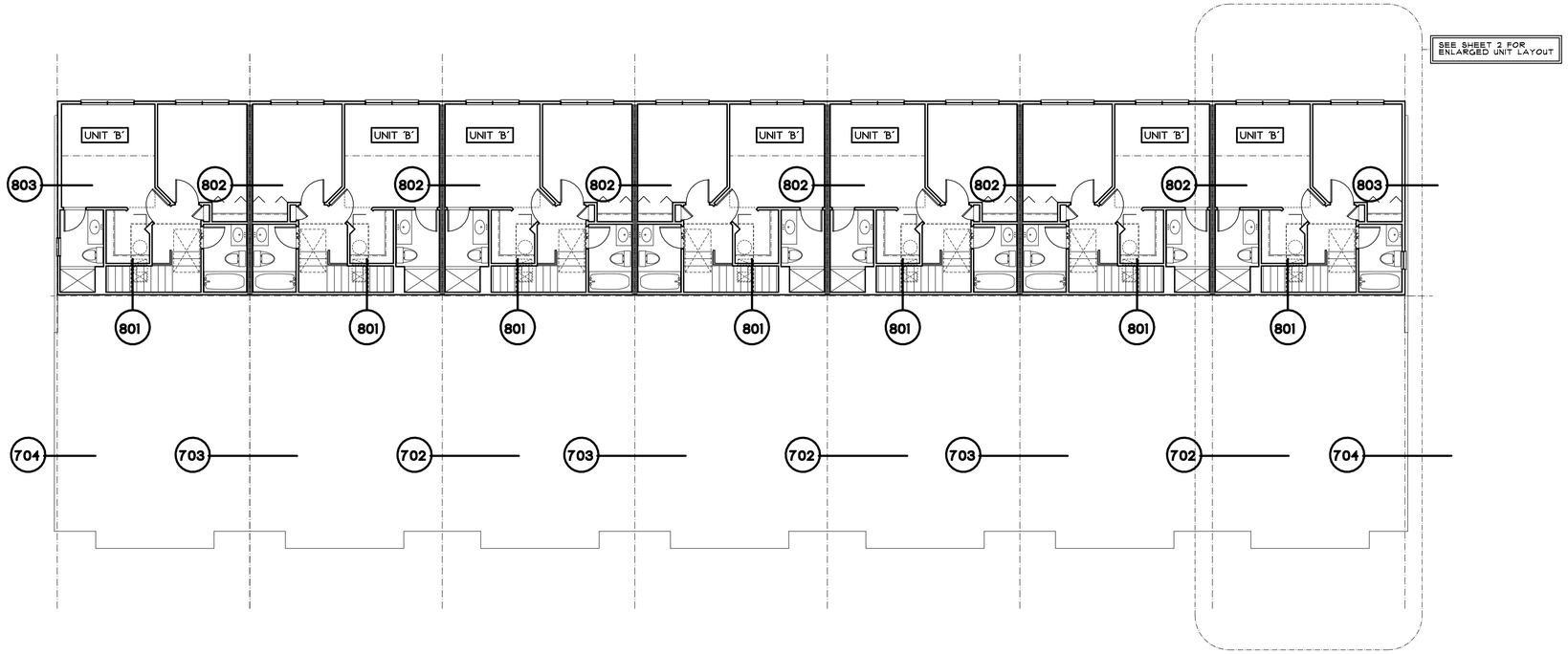
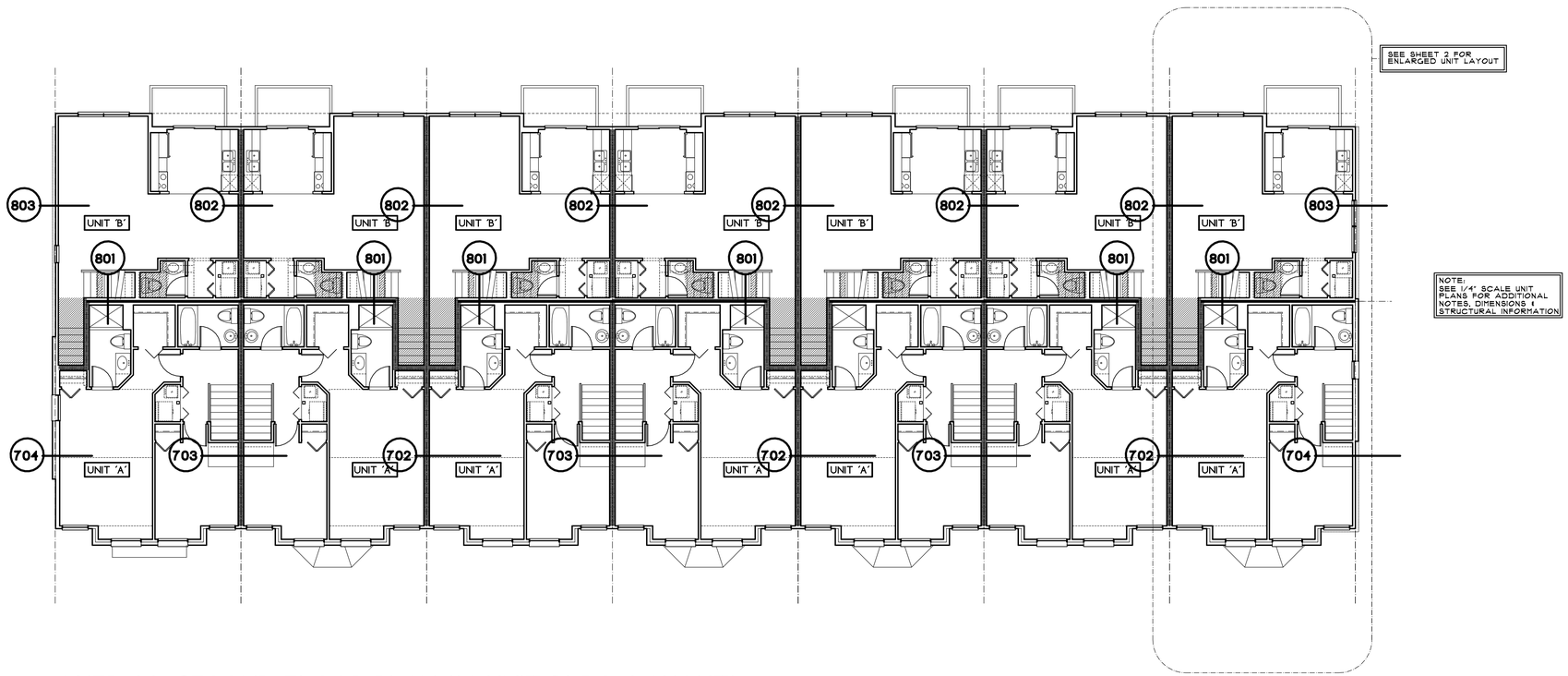
JOB NUMBER
DATE
SHEET NUMBER 2 2



OVERALL THIRD FLOOR PLAN (14 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"



OVERALL SECOND FLOOR PLAN (14 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"

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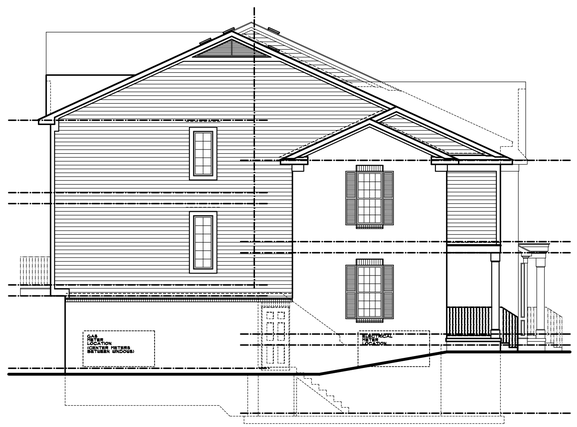
JOB NUMBER
DATE
SHEET NUMBER 23

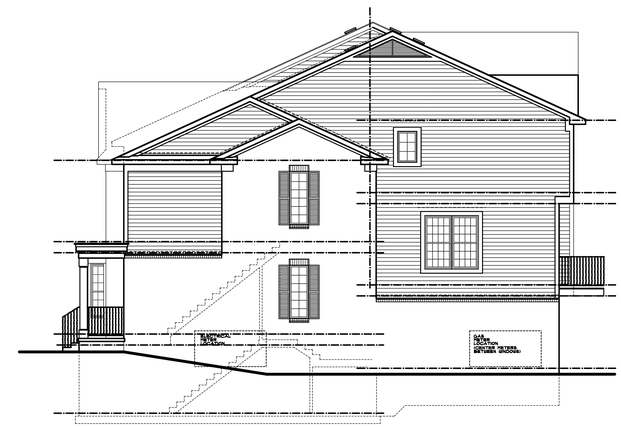
OVERALL REAR ELEVATION

SCALE : 1/8" = 1'-0"



OVERALL LEFT SIDE ELEVATION

SCALE : 1/8" = 1'-0"



OVERALL RIGHT SIDE ELEVATION

SCALE : 1/8" = 1'-0"

OVERALL FRONT ELEVATION (14 UNIT BLDG. LAYOUT)

SCALE : 1/8" = 1'-0"

NOTE:
SEE 1/4" SCALE UNIT PLANS FOR ADDITIONAL NOTES, DIMENSIONS & STRUCTURAL INFORMATION

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SHEET TITLE
OVERALL ELEVATIONS
14 UNIT

CLIENT/PROJECT
LIVONIA BUILDERS
THE ENCLAVE AT ARBOR RIDGE
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REVISIONS

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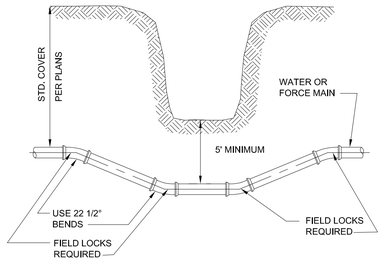
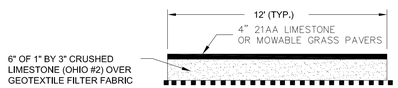
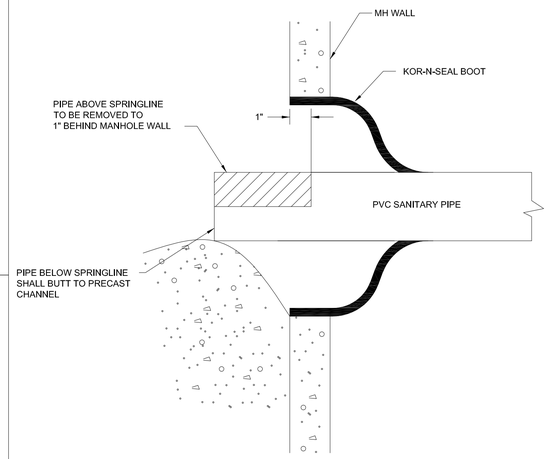
DATE:
SHEET NUMBER: 24



DITCH & STREAM CROSSING



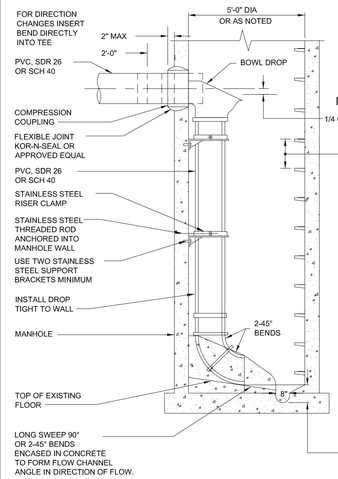
SANITARY SEWER ACCESS PATH

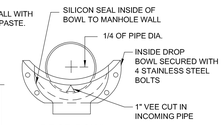


SANITARY PIPE PENETRATION

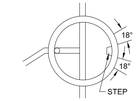
NOTES:

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" x 3 3/4" RAMSET/RED HEAD BOLTS HELD INPLACE WITH 2 STAGE EPOXY PASTE.





DROP BOWL
MOUNTING POSITION



DROP SHALL
BE NO CLOSER
THAN 18" FROM
STEP

SIZE

LINE	LINE
4"	4"
6"	6"
8"	8"
10"	8"

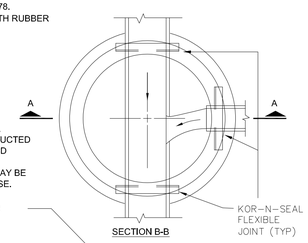
MH DIA.	MAX. DROPS
4'	2-6"
5'	4-6"
5'	2-8"
6'	3-8"

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

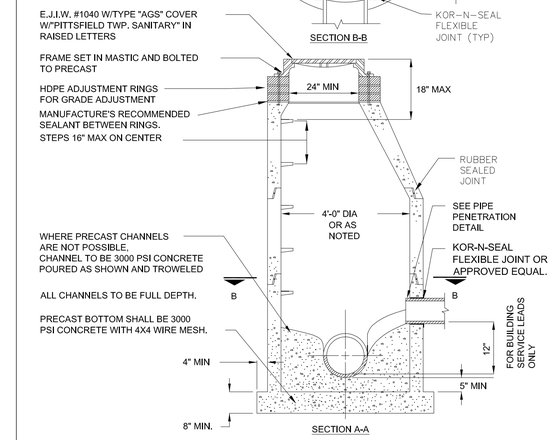
INTERIOR DROP SANITARY MANHOLE

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" HIGH.
5. PROVIDE INTEGRAL BASE WITH PRECAST CONCRETE CHANNELS.
6. WHERE MANHOLES ARE CONSTRUCTED OVER EXISTING SEWERS, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MAY BE USED IN PLACE OF INTEGRAL BASE.



SECTION B-B



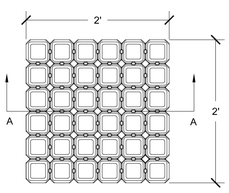
SECTION A-A

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

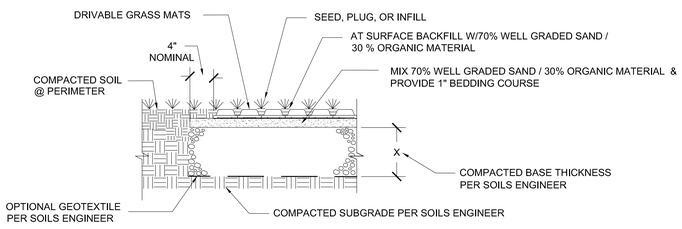
SANITARY MANHOLE

NOTE:

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

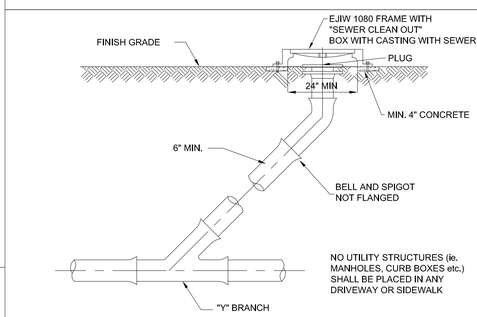


PLAN VIEW

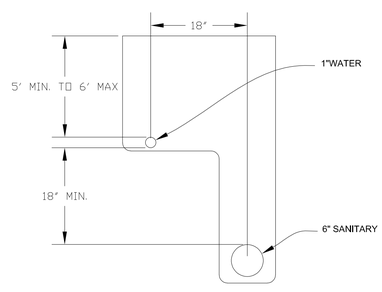


SECTION A-A

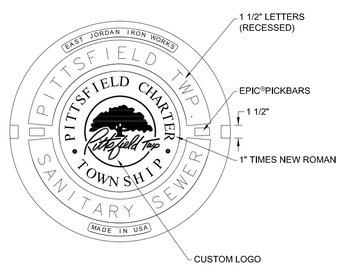
TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



SANITARY SEWER CLEANOUT

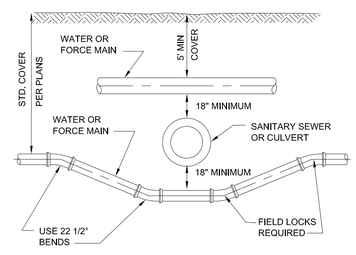


TYPICAL L TRENCH DETAIL HOUSE LEADS

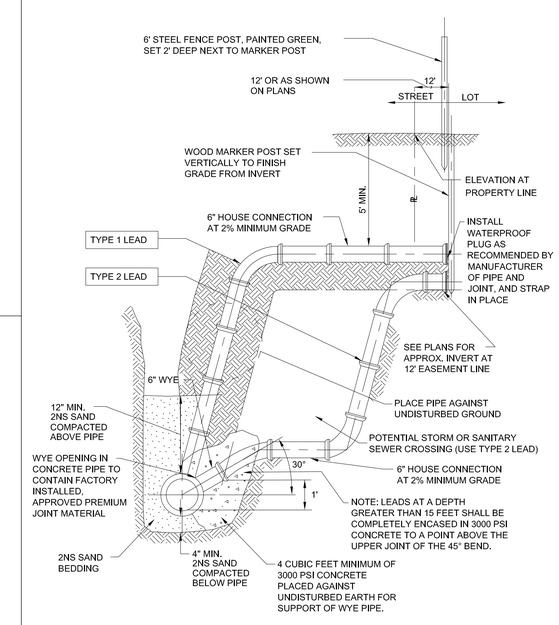


EAST JORDAN IRON WORKS 1040 Z BOLT DOWN FRAME
EAST JORDAN IRON WORKS 1040 AGS COVER

COVER DETAIL



SEWER OR CULVERT CROSSING



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

Revision	By	Appd.	YY.MM.DD
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

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

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

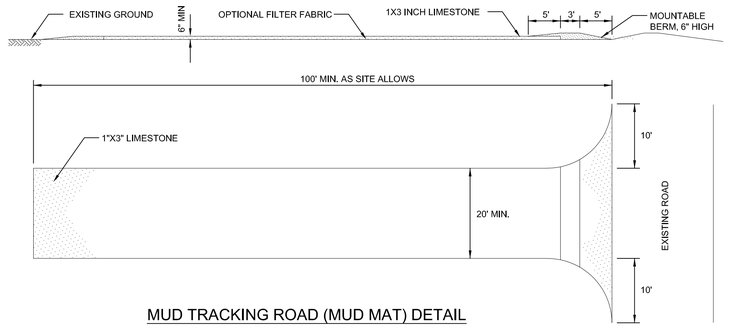
Pittsfield Township, Michigan

Title
SANITARY SEWER DETAILS

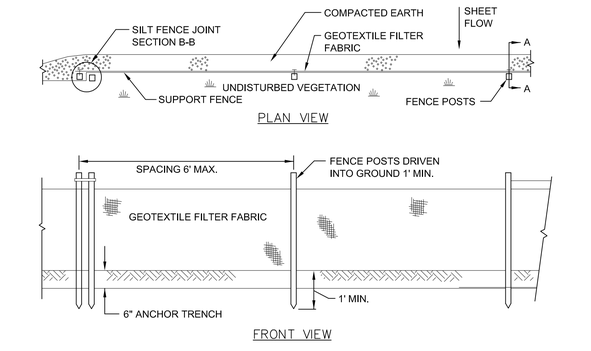
Project No.
2075001300

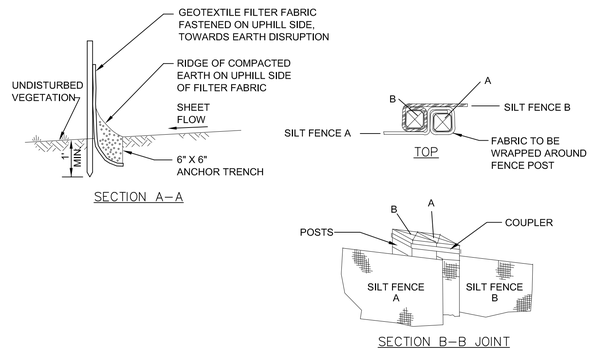
Scale
NOT TO SCALE

Revision



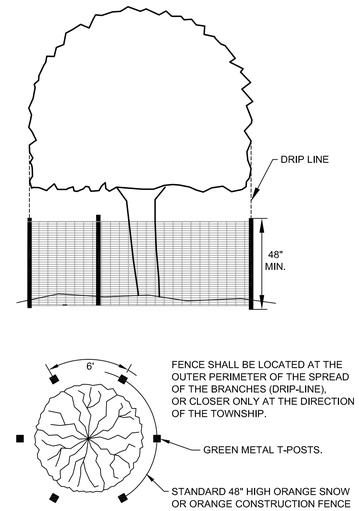
MUD TRACKING ROAD (MUD MAT) DETAIL





SILT FENCE

NOT TO SCALE



NOTES:
1. ALL TREES TO BE REMOVED WILL BE IDENTIFIED BY RED FLAGGING.
2. TREE PROTECTION FENCING IS TO BE ERECTED PRIOR TO ANY EARTHWORK OR CONSTRUCTION AND IS TO REMAIN IN PLACE UNTIL CONSTRUCTION AND GRADING IS COMPLETE.
3. ALL DEBRIS, FILL, EQUIPMENT OR MATERIAL IS TO BE KEPT CLEAR OF AREA WITHIN PROTECTIVE FENCE. NO CLEANING OF EQUIPMENT OR MATERIAL OR STORAGE OR DISPOSAL OF ANY MATERIAL WITHIN THE DRIP LINE OF ANY TREES TO BE SAVED.

TREE PROTECTION FENCE DETAIL

NOT TO SCALE

PITTSFIELD CHARTER TOWNSHIP
SOIL EROSION AND SEDIMENTATION CONTROL NOTES
GENERAL

1. 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 complied with as required or directed by the owner, project engineer or Pittsfield Township.
2. All soil erosion and sedimentation control work shall conform to the permit requirements of Pittsfield Township and the laws of the State of Michigan.
3. A NPDES construction activity permit is required for all sites greater than 5 acres.
4. 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.
5. 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.
6. All mud/dirt tracked onto roads from the site due to construction, shall be promptly removed by the contractor.
7. 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.
8. 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.
9. Special precautions will be taken in the use of construction equipment to prevent situations that promote erosion.
10. Proper dust control shall be maintained during construction by use of water trucks and/or chloride as required.
11. 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.
12. 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.
13. Tree protection fencing must remain intact until restoration of the site is complete.

SEQUENCE OF CONSTRUCTION

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

SEEDING/SOD

1. Seed or sod in accordance with project specifications.
2. All areas of disturbed earth that are not to be paved or sodded shall have 4 inches of topsoil, seed, fertilizer and mulch.
3. Immediately after seeding, mulch all seeded areas with unweathered small grain straw (preferably wheat) or hay spread. Spread uniformly at the rate of 1 ½ 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.
4. 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.
5. 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.
6. Drainage ditches and slopes steeper than 1:4 (25%) shall be stabilized with erosion control blankets.
7. Steep slopes that do not take upon initial seeding must be re-seeded and stabilized with erosion control blankets.
8. 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.

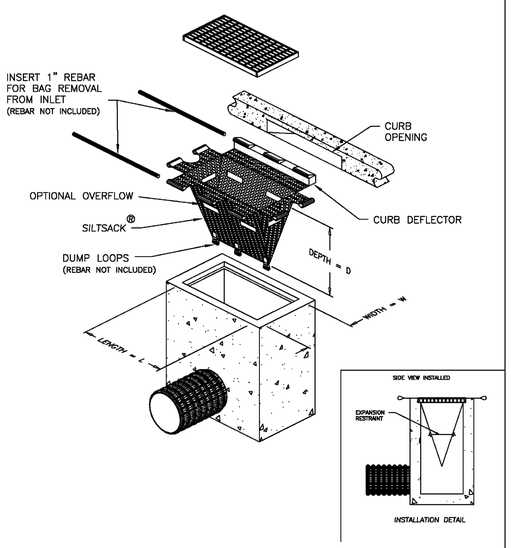
CATCH BASIN/MANHOLE PROTECTION

1. Protect storm sewer catch basins with Siltsack. or approved equivalent as follows:

ROADS

1. 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.
2. During construction of any portion of the project, roads shall be maintained free of dirt, silt and construction debris.

Pittsfield SEC 9/22/2009



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.

REGULAR FLOW SILTSACK®
(FOR AREAS OF LOW TO MODERATE PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	300 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	120 LBS
MULLEN BURST	ASTM D-3786	800 PSI
TRAPEZOID TEAR	ASTM D-4533	120 LBS
UV RESISTANCE	ASTM D-4355	80 %
APPARENT OPENING SIZE	ASTM D-4751	40 US SIEVE
FLOW RATE	ASTM D-4491	40 GAL/MIN/SQ FT
PERMITTIVITY	ASTM D-4491	0.55 SEC -1

* HI-FLOW SILTSACK®
(FOR AREAS OF MODERATE TO HEAVY PRECIPITATION AND RUN-OFF)

PROPERTIES	TEST METHOD	UNITS
GRAB TENSILE STRENGTH	ASTM D-4632	265 LBS
GRAB TENSILE ELONGATION	ASTM D-4632	20 %
PUNCTURE	ASTM D-4833	135 LBS
MULLEN BURST	ASTM D-3786	420 PSI
TRAPEZOID TEAR	ASTM D-4533	45 LBS
UV RESISTANCE	ASTM D-4355	90 %
APPARENT OPENING SIZE	ASTM D-4751	20 US SIEVE
FLOW RATE	ASTM D-4491	200 GAL/MIN/SQ 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)

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

SILTSACK DISTRIBUTORS:
PRICE & COMPANY
(www.priceandcompany.com)

METRO GRAND RAPIDS, MI
426 36TH STREET SW
WYOMING, MI 49548-2108
1-800-248-8230

METRO DETROIT, MI
29165 WALL STREET
WIXOM, MI 48393-3525
1-866-960-4300

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

SILTSACK

NOT TO SCALE

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

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

Issued	By	Appd.	YY.MM.DD
File Name: SE–01	TTN	DRW	07.10.01
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SOIL EROSION DETAILS AND NOTES

Project No. 2075001300
Scale 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 stencilled 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:
1. 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.
2. For use on drainage structures in paved areas: East Jordan 1040Z, with Type M1 cover, with "DUMP NO WASTE" lettering and trout logo.
3. For use on drainage structures in curbed areas: East Jordan 7045 or 7065, with "DUMP NO WASTE" lettering and trout logo.
4. 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 toothsaw, 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.

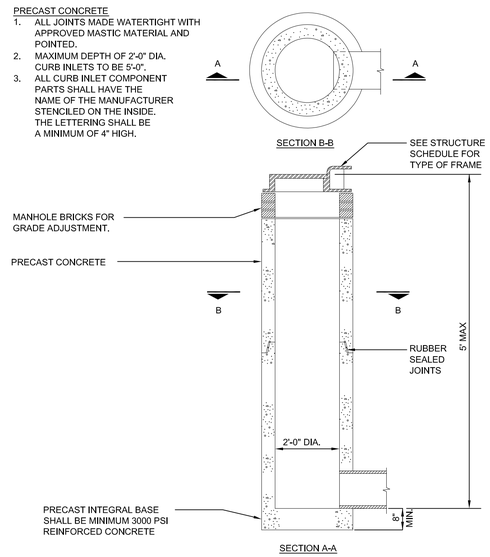
C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut out shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration.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

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

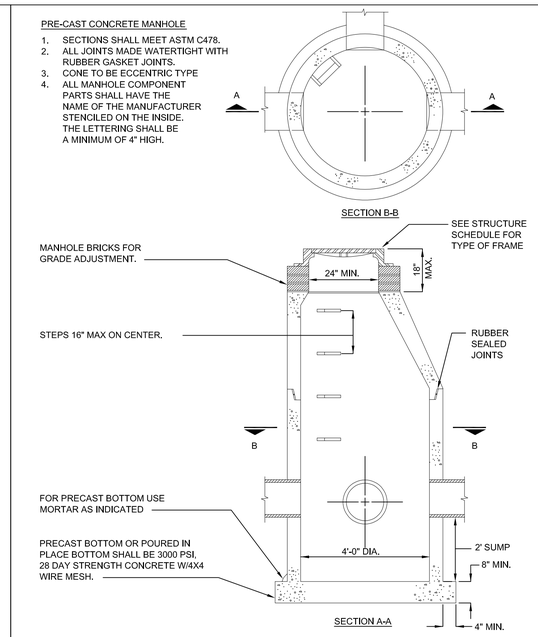
3.05 ANIMAL GRATES

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

PCT February 2008



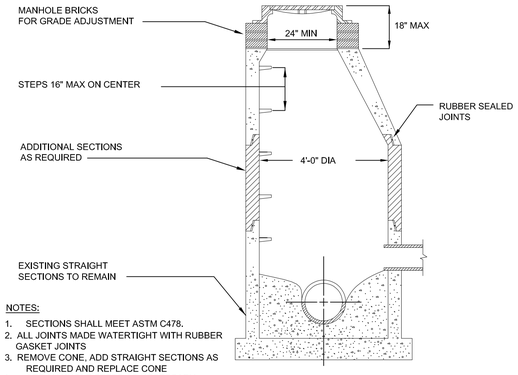
2' DIAMETER INLET



4' DIAMETER CATCH BASIN

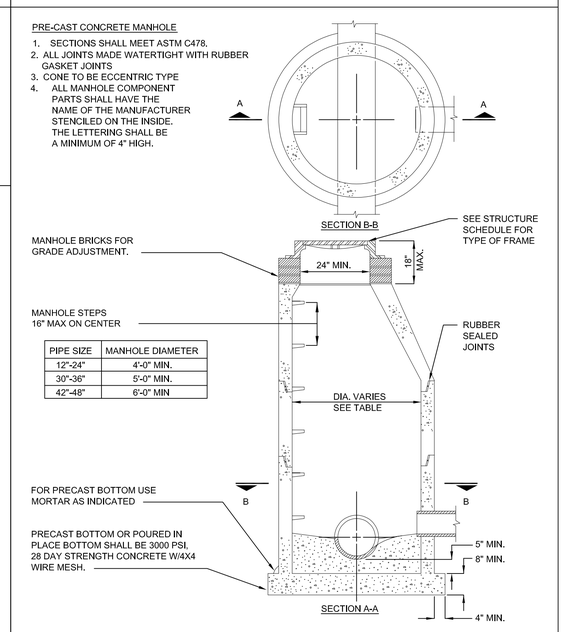
AFFIX TO SURFACE ON OR NEAR ALL DRAINAGE COVERS.

STORM DRAIN MARKER



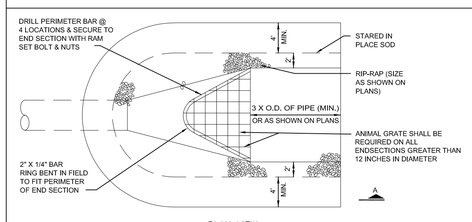
NOTES:
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. REMOVE CONE, ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE
4. ADD MANHOLE STEPS AS NECESSARY
5. ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT

MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL



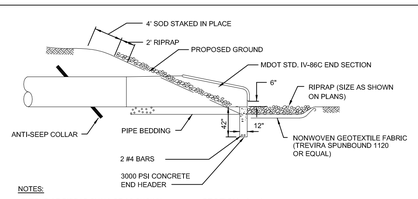
PIPE SIZE	MANHOLE DIAMETER
12"-24"	4'-0" MIN.
30"-36"	5'-0" MIN.
42"-48"	6'-0" MIN

STORM SEWER MANHOLE



PLAN VIEW

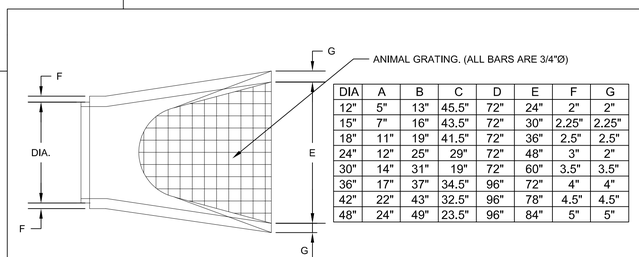
1. RIPRAP THICKNESS AS SHOWN ON PLANS.



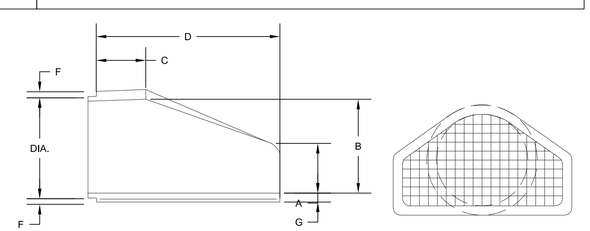
NOTES:
EXTENT OF RIPRAP SHALL BE AS SHOWN HERE OR AS SHOWN ON PLANS, WHICHEVER IS GREATEST.

SECTION A–A

END SECTION AND RIPRAP DETAIL



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"



NOTE:
FLARED END SECTIONS SHALL BE MANUFACTURED TO THE CLASS SPECIFICATIONS AS THE PIPE ITSELF.

STANDARD END SECTIONS FOR PRECAST CONCRETE

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.	YY.MM.DD
File Name: ST–01	TTN	DRW	07.10.01
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

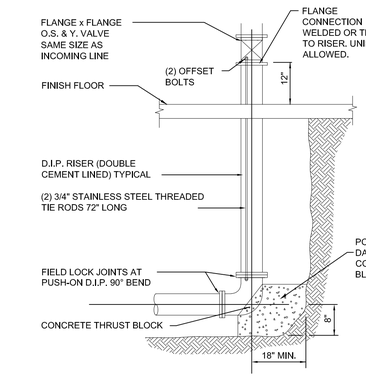
Pittsfield Township, Michigan

Title
STORM SEWER DETAILS AND SPECIFICATIONS

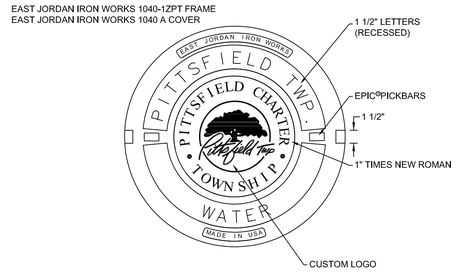
Project No.
2075001300

Scale
NOT TO SCALE

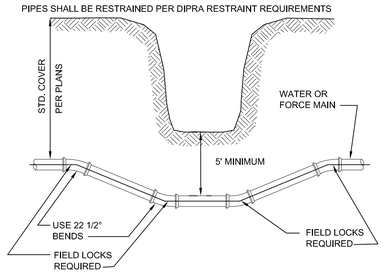
Revision



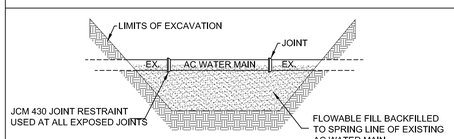
FIRE PROTECTION RISER DETAIL



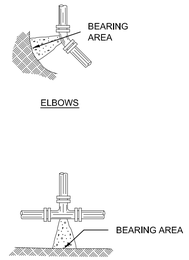
COVER DETAIL



DITCH & STREAM CROSSING



ASBESTOS CEMENT (AC) WATER MAIN



ELBOWS					
PIPE DIA. INCHES		BEARING AREA SQUARE FEET			
		90°	45°	22 1/2°	11 1/4°
4		2.1	1.1	0.6	0.3
6		4.1	2.2	1.1	0.6
8		6.8	3.7	1.9	0.9
10		10.1	5.5	2.8	1.4
12		14.1	7.6	3.9	2.0
16		24.2	13.0	6.7	3.3
18		30.0	16.3	8.3	4.2
20		36.8	19.9	10.1	5.1

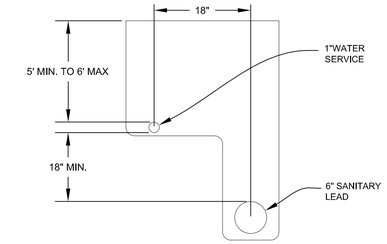
TEES, CROSSES & HYDRANTS		
PIPE DIA. INCHES		BEARING AREA SQUARE FEET
4		1.5
6		2.9
8		4.8
10		7.1
12		10.0
16		17.1
18		21.0
20		26.0

NOTES:
1. CONCRETE FOR ALL THRUST BLOCKS SHALL BE 3000 PSI, 28 DAY STRENGTH MIN.
2. ALL THRUST BLOCKS SHALL BE POURED AGAINST UNDISTURBED EARTH
3. BOLTS, FITTINGS & JOINTS SHALL BE KEPT CLEAR OF CONCRETE
4. A BEARING CAPACITY OF 2000# PER FOOT WAS USED IN DETERMINING THE MINIMUM "BEARING AREAS" IN THE ABOVE TABLE
5. THE CROSS SECTION OF THE THRUST BLOCKS SHALL BE SQUARE
6. IN ADDITION TO THRUST BLOCKS, ALL PIPE JOINTS SHALL BE RESTRAINED WITH LOCKING GASKETS PER DIPRA'S STANDARDS.

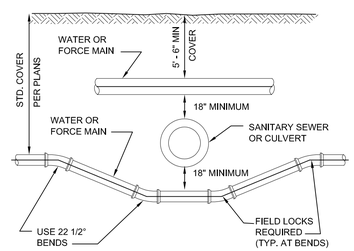
SOIL CHARACTERISTICS	FACTOR
(A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY	0.33
(B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY	0.50
(C) LOOSE FINE SAND; FIRM INORGANIC SILT	0.67
(D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT SOFT CLAY	1.00

"BEARING AREA" x FACTOR = ACTUAL BEARING AREA
2.1 x .5 = 1.05 SQ. FT.
BASED UPON 150# TEST PRESSURE

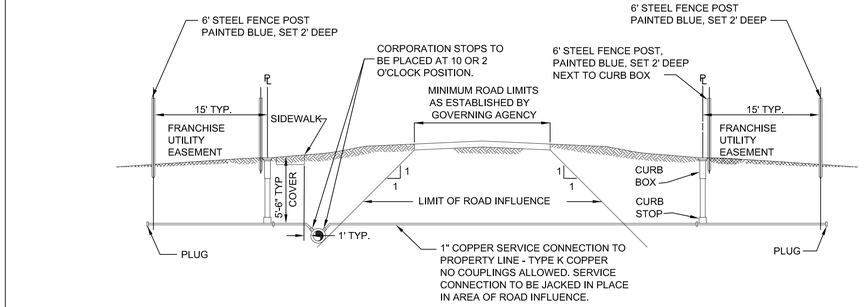
THRUST BLOCK



TYPICAL L TRENCH DETAIL HOUSE LEADS

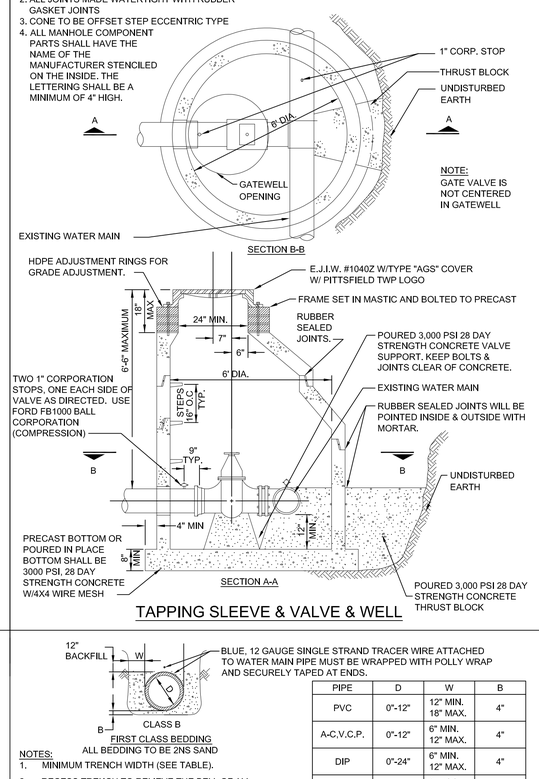


SEWER OR CULVERT CROSSING



WATER MAIN CONNECTION

PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP 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" HIGH.



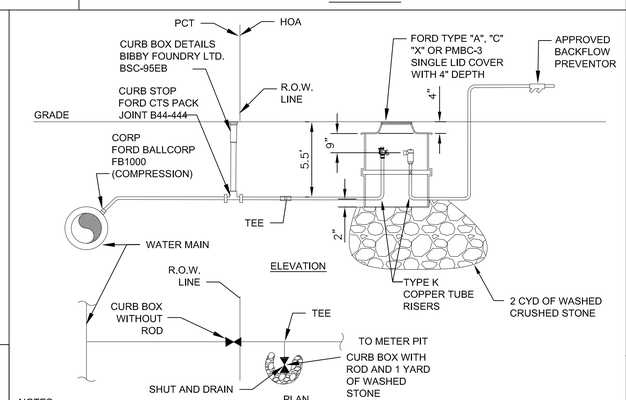
TAPPING SLEEVE & VALVE & WELL

ALL BEDDING TO BE 2NS SAND

NOTES:
1. MINIMUM TRENCH WIDTH (SEE TABLE).
2. RECESS TRENCH TO RELIEVE THE BELL OF ALL LOAD. PIPE HAUNCHES SHALL BE COMPACTED.
3. 2NS BACKFILL TO DEPTH OF ONE FOOT ABOVE PIPE. TAMPED LAYERS NOT TO EXCEED 6" IN DEPTH. PLATE COMPACT ABOVE PIPE (ON 1st LIFT)
4. ALL PIPE TO BE PLACED AND JOINTED IN A DRY TRENCH AND LAID ACCURATELY TO LINE AND GRADE WITH BELLS UPHILL.
5. ALL CONCRETE ENCASEMENT AND CRADLING TO BE CLASS "A" CONCRETE.

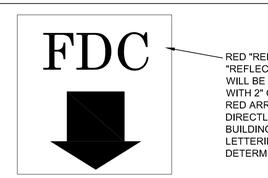
PIPE	D	W	B
PVC	0"-12"	12" MIN. 18" MAX.	4"
A-C,V.C.P.	0"-12"	6" MIN. 12" MAX.	4"
DIP	0"-24"	6" MIN. 12" MAX.	4"
A-C,CONC.	0"-24"	6" MIN. 12" MAX.	4"
CONC. DIP	24" +	6" MIN. 12" MAX.	4"

BEDDING



NOTES:
1. SADDLE MAY BE REQUIRED ON MAIN BASED ON LEAD SIZE, MAIN SIZE, AND MAIN PRESSURE
2. ALL WATER MAIN TAPS AND COMPONENT PARTS SHALL BE APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT PRIOR TO INSTALLATION.
3. INSTALLATION SHALL BE INSPECTED AND APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT.

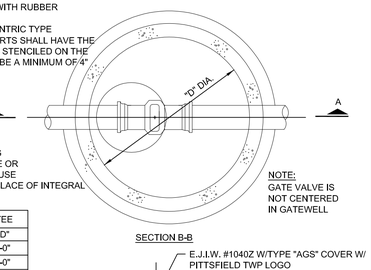
IRRIGATION METER PIT DETAIL



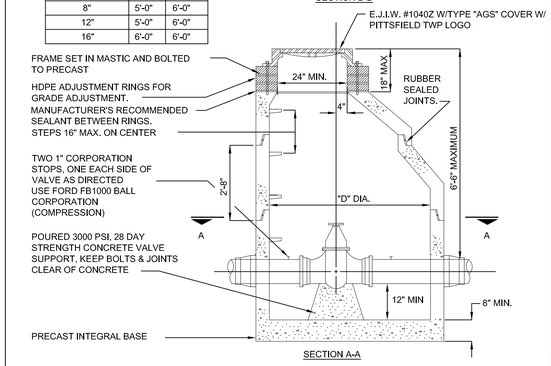
RED "REFLECTIVE" LETTERS WITH WHITE "REFLECTIVE" BACKGROUND. LETTERS WILL BE A MINIMUM OF 8" TALL BY 4" WIDE WITH 2" GIRTH, WITH AN 8" TALL 4" WIDE RED ARROW UNDER LETTERS POINTING DIRECTLY AT THE CONNECTION. TALLER BUILDINGS MAY REQUIRE LARGER LETTERING. SIGN SIZE AND LOCATION DETERMINED BY FIRE MARSHALL

FIRE DEPARTMENT CONNECTION LABEL DETAIL

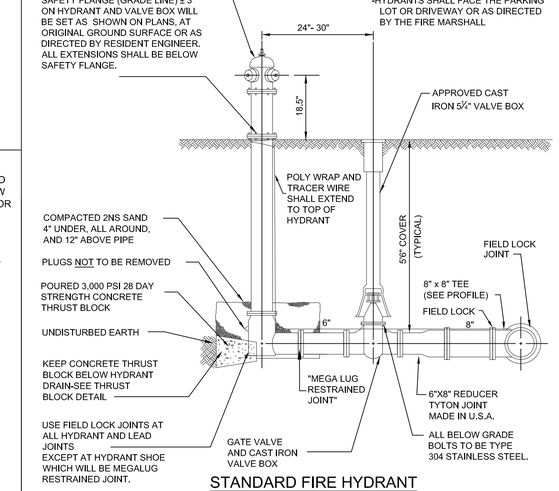
PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE.
6. KOR-N-SEAL BOOTS OR APPROVED EQUAL TO BE INSTALLED AT PIPE PENETRATIONS.
7. WHERE GATE WELLS ARE CONSTRUCTED OVER EXISTING WATERMAIN, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MY BE USED IN PLACE OF INTEGRAL BASE.



STRAIGHT THRU		TEE
VALVE SIZE	"D"	"D"
8"	5'-0"	6'-0"
12"	5'-0"	6'-0"
16"	6'-0"	6'-0"

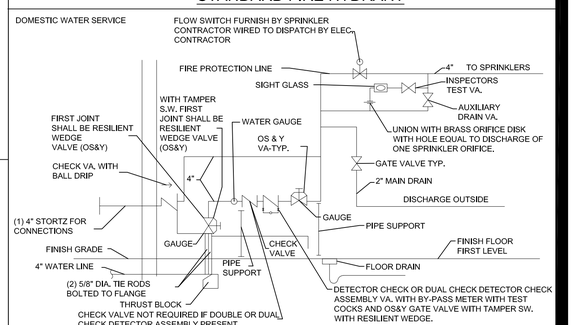


STANDARD GATE VALVE & WELL



NOTES:
-PROVIDE ONE 4-INCH STORZ CONNECTION ON EACH HYDRANT ON THE LEFT NOZZLE WHEN FACING THE HYDRANT
-HYDRANTS SHALL FACE THE PARKING LOT OR DRIVEWAY OR AS DIRECTED BY THE FIRE MARSHALL

STANDARD FIRE HYDRANT



METER ROOM 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
FDC UPDATE	BWA	DRW	11.09.13
TWP REV	BWA	DRW	11.04.27
HYDRANT, MANHOLE UPDATE	BWA	DRW	10.10.25
UPDATES	TTN	DRW	10.01.20

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

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
WATER MAIN DETAILS

Project No. 2075001300

Scale NOT TO SCALE

Revision

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

1. The CONTRACTOR shall furnish all equip\-ment 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.

2. 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.

3. All sewer lines shall be televised while running enough water through the line to be visible at the next downstream manhole.

4. All sewer lines shall be checked for alignment.

5. All manholes shall be tested for leakage. All PVC lines shall be tested for deflection.

6. 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.

7. 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

1. Section 33-95 (pg 30-6) 2004-Ten State Standards.

2. 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.

3. 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.

4. 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 (not ounces) and this 0-10 portion shall cover 90% of the complete dial range.

5. 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.

6. The portion of line being tested shall be accepted if the portion under test meets the following conditions.

a. DI, and RCP Pipes

(1) 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	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

(2) 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

(1) The time requirement for the pressure to decrease from 3.5 to 3.O 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:

(inches) Pipe Size	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

(2) 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

1. 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.

2. 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

1. 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.

2. 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.

3. 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

1. All manholes shall be tested for leakage by using plugs on inleting-outleting sewers, and filling the manholes with water to the top of the man\-hole. 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

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.

G. Test for Deflection of PVC Pipe

1. 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.

2. 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

3. 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

1. 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

A. 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.

B. Pipe for service leads 4 though 8 inches in diameter shall be polyvinyl chloride (PVC).

C. 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\-posal.

D. 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.

E. If the sewer pipe is greater than 15 feet deep PVC pipe shall be SDR 21.

F. Truss pipe shall meet or exceed all of the requirements of the current ASTM D2680.

G. Ductile iron pipe shall meet or exceed all the requirements of ANSI A21.50 with a cement lining.

2.02 SEWER PIPE FITTINGS

A. 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.

B. Wye and tee fittings for PVC pipe shall be reviewed by the ENGINEER before purchasing.

C. 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

A. 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.

B. Concrete pipe for use with rubber joints shall be smooth and precisely formed to provide a uniform annular space for joint materials.

C. PVC pipe shall be jointed with ring gusseted bell ends. (ASTM-D3212) Jointing 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

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 C990-96. Cone sections shall be straight side type, with an offset step configuration.

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.

C. 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.

D. 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

A. 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.

B. 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.

C. 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

A. 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.

B. 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.

C. Sewer pipe over 24 inches to manhole connections shall be in accordance with details shown on the Plan.

2.09 SANITARY MANHOLE ADJUSTMENTS

A. 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 plastic as identified in ASTM Designation D 1248.

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 ¼ inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet ASTM specification C-990.

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 concrete anchors or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

2.10 MANHOLE DROPS

A. Manhole drop connections shall be interior drops using the drop bowl as produced by Reliner-Duran Inc. or approved equal.

B. 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.

C. The force line hood shall be attached on models A-4" and A-6" when the incoming line is from a force main or the slope is 3 percent or greater.

D. The drop pipe shall be secured to the manhole wall with Reliner-Duran, Inc. stainless steel adjustable clamping brackets or approved equal.

E. The drop bowl and each clamping bracket shall be attached to the manhole wall with 3/8-inch x 3 3/4-inch bolts.

F. The incoming pipe shall be trimmed such that it protrudes 2 inches into the manhole .

G. 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

A. Reference Section 33.83a of 10 State Standards.

B. Reference Section 33.83b of 10 State Standards.

C. 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.

D. PVC 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 conforming to Class B bedding as shown on the Plans. Where shown on the Plans, or where the pipe passes under a road with less than 4 ft of cover, the pipes shall be encased.

E. For all pipes, compacted granular material shall be placed at the sides of the pipe and cover not less than 12 inches above the crown of the pipe.

F. "Granular Material" shall be class 2NS sand, pea gravel or crushed stone conforming to ASTM C33 Size No. 67 placed in not more than 6-inch layers and com\-pacted to not less than 95% standard density for PVC and 90% standard density for reinforced concrete.

G. Pea gravel or crushed stone used for bedding shall be separated from the sand backfill with a non-woven geotextile fabric. The fabric shall be Amoco 4551, or approved equal.

3.03 PIPE INSTALLATION

A. Installation of PVC pipe shall be in confor\-mance with ASTM D2321-89.

B. 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.

C. 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.

D. 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.

E. 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.

F. 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.

G. 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.

H. 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.

I. After cutting bell and spigot or socket pipe, a stop mark shall be made with a pencil or crayon using dimensions as shown by the manufacturer's instructions or by using another pipe in the field as a guide.

J. 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 AND OTHER RIGID STRUCTURES

A. When a sewer is connected to an existing manhole, a hole adequate to receive the new pipe shall be cut 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. A Kor-N-Seal boot or engineer approved equal shall be clamped into the cored hole and used to make the connection.

D. 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

A. 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.

B. The CONTRACTOR shall utilize such con\-struction 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.

C. After the crossing is made, heavy riprap and sodding shall be placed to protect the banks from corrosion as shown on the Plans.

PCT July 2008

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TWP REV	BWA	DRW	11.04.27
UPDATES	BWA	DRW	10.10.25
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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

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:

	Minimum Wall Thickness (inches)	
Nominal Diameter (Inches)	Coated or Cathodically Protected	Uncoated & Unprotected
Under 14	0.180	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 properly with the 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, and 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 splitting 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 precede 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, which 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 bell 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 polyester 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. Walers and bracing shall be supplied and installed as required to complete the sheeting system. Walers and braces shall be of adequate strength for the load imposed. Splices in walers 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 racing will not be permitted. The use of a travelling 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 tamps 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. After a period of about 60 days or less, if the backfill compaction is satisfactory to the ENGINEER, to provide for any slight settlement, the CONTRACTOR shall retrim 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 begin, the base shall be made firm and cleared of topsoil, sod 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 maintained in a smooth and compacted condition until 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 uncompactable 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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Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
EARTHWORK SPECIFICATIONS

Project No.
2075001300

Scale
NOT TO SCALE

Revision
1

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 Pig. 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 expel 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 satisfactorily 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 manufacturers 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 gasket and 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 or 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 6860 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 F-6120. All valves shall open left.

3. Post indicators and their corresponding valves must be made by the same manufacturer.

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

5. Bollards 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. Bollards 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 D4976. 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 compositive 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 EJIW 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 (HIHS) adaptor. The HIHS shall meet the requirements of AWWA C502 regarding material and pressure testing. Stortz 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 adapter 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 adapter 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 checklist posted on the Township website.

C. Curb Boxes

1. Curb boxes shall be the Bibby Screw Style V010 with S169 top, V201 bottom, V223 extention, 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 checklist 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-sweat 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-sweat connection using lead free Silfos. 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 cleanness 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 tongs. 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 undistributed 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 subsoil 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 plumb 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 burlap 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 only 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 rapidly as possible, and the time of, 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. Wherever 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

A. Ductile iron pipes shall be fully enclosed in polywrap and laid on a compacted sand cushion, 4 inches thick. Sand shall conform to fine aggregate 2NS as defined in 2003 MDOT, Section 902.

B. 2NS sand bedding material shall be placed around and above the main to a height of 12 inches above the main.

C. Sand shall be compacted on top of the 12-inches of sand above the pipe to not less than 95 percent of the maximum unit density as determined at optimum moisture content.

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SPEC. UPDATES	MRH	DRW	14.01.24
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Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
WATER MAIN SPECIFICATIONS

Project No.
2075001300

Scale

Revision