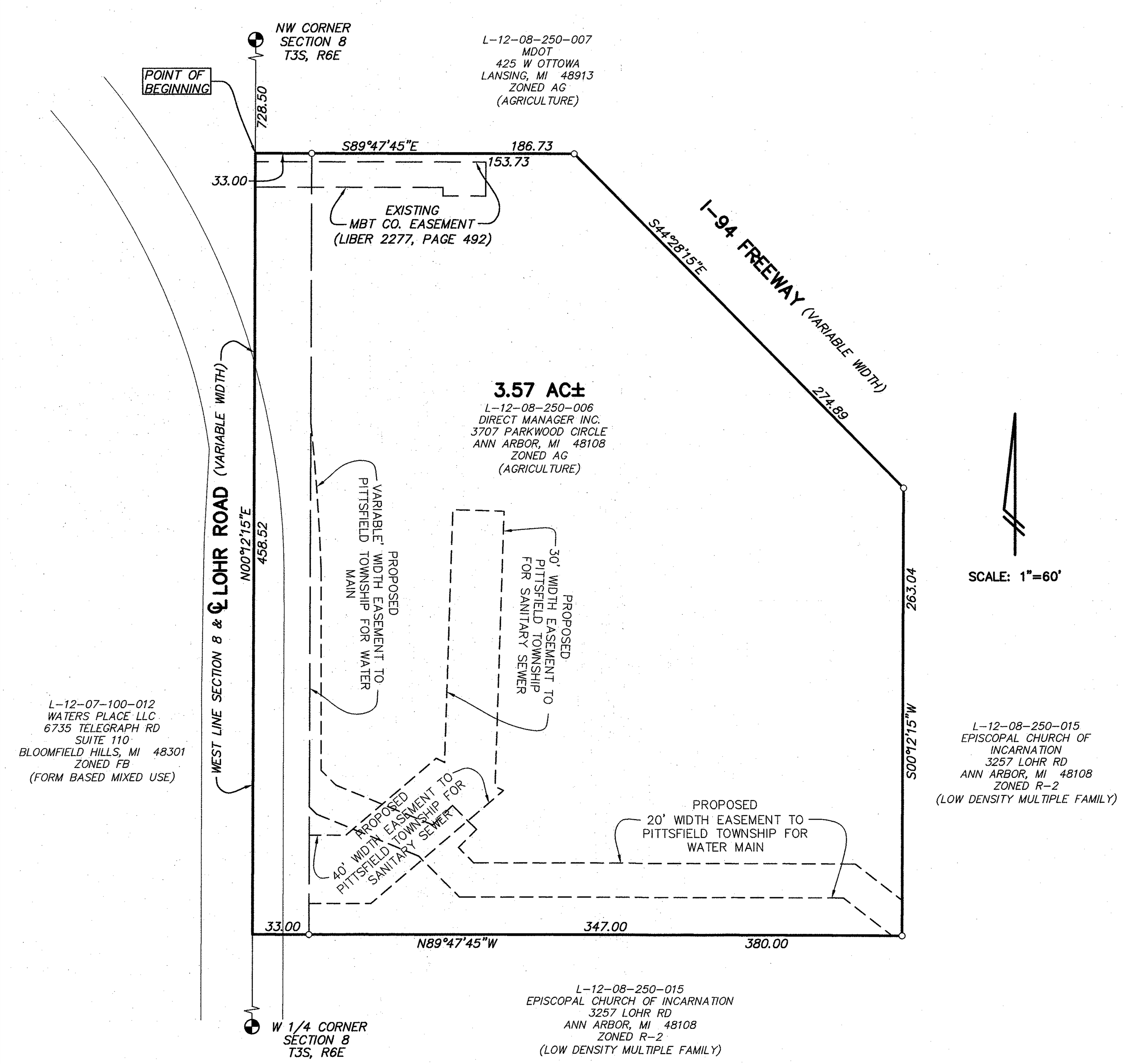
FOUNTAIN BLUE
FINAL SITE PLAN
A MULTI-FAMILY HOME DEVELOPMENT



3253 LOHR RD

TAX ID. L-12-08-250-006
A PART OF THE SOUTHWEST 1/4 OF SECTION 8, T3S, R6E, PITTSFIELD TOWNSHIP, WASHTENAW COUNTY, MICHIGAN

FOR:

DIRECT MANAGED INC.
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
PH: (734) 260-3395

JUNE 2017

SITE DATA

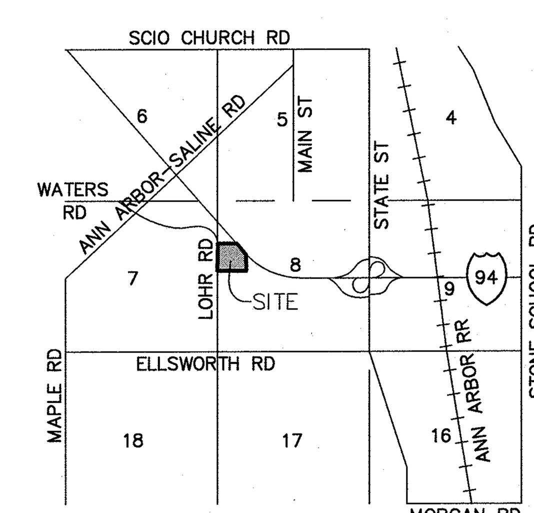
CATEGORY	EXISTING	PROPOSED	REQUIRED
ZONING[1]	CONDITIONAL R2[1]	R2	R2
PARCEL SIZE[2]	3.57 AC±	3.57 AC±	1.00 AC+[2]
PARCEL SIZE[2]	155,347 SQ. FT.	155,347 SQ. FT.	43,560 SQ. FT[2]
PARCEL AREA – WCRC R.O.W.	15,131.16 SQ. FT.	15,131.16 SQ. FT.	NONE
PARCEL AREA – MBT EASEMENT	1,655 SQ. FT.	1,655 SQ. FT.	NONE
PARCEL SIZE – NET	138,560.84 SQ. FT.	138,560.84 SQ. FT.	NONE
PARCEL SIZE – NET	3.18 AC±	3.18 AC±	NONE
LOT WIDTH	458.52'	458.52'	125' MIN.
LOT COVERAGE	(1.3%)	(10.2%)	50% MAX.
DWELLING UNITS	1	18/7,697.8 SQ. FT/DU	MAX 7,300 SQ. FT/DU
DWELLING UNITS	1	10@2BRM; 8@3BRM	18MAX
DWELLING UNITS 2 BDRM	0	1360SF EACH	NONE
DWELLING UNITS 3 BDRM (WITH OPTION FOR 4 BDRM)	0	1627SF EACH	NONE
IMPERVIOUS SURFACE RATIO	2,640SF(1.7%)	45,685SF(29.4%)	60% MAX.
GROUND FLOOR AREA	1,864 SF	14,179 SF	NONE
TOTAL FLOOR AREA	1,864 SF	35,265 SF	NONE
FLOOR AREA RATIO	1.3%	25.5%	NONE
BUILDING HEIGHT	18'	35'	35' MAX.
BUILDING HEIGHT (STORIES)	1	2	3 MAX.
BUILDING SETBACKS			
FRONT (LOHR ROAD)	153.63'	76.0'	10'
REAR (EAST)	195.93'	16.0'	15'
SIDE (NORTH)	376.02'	98.19'	10'
SIDE (SOUTH)	5.07'	52.0'	10'
MINIMUM DISTANCE BETWEEN BUILDINGS (BUILDINGS 35 FEET IN HEIGHT OR UNDER)			
INTERNAL DRIVE	N/A	26.9'	10'
BUILDING SIDE TO BUILDING SIDE	N/A	29.0'	20'
BUILDING SIDE TO BUILDING FRONT OR BUILDING REAR	N/A	N/A	30'
BUILDING FRONT TO BUILDING FRONT OR BUILDING REAR	N/A	N/A	40'
BUILDING REAR TO BUILDING REAR	N/A	65.35'	40'

NOTES:
1. CONDITIONAL ZONING WAS GRANTED BY PLANNING COMMISSION ON 1-25-2017.
2. MINIMUM TOTAL LOT AREA OF 1 ACRE FOR RESIDENTIAL USE WITH A MINIMUM LOT AREA OF 7,300 SQ. FT. PER DWELLING UNIT, AND A MINIMUM LOT AREA OF 3 ACRES FOR NON-RESIDENTIAL USES.
3. BUILDING A HAS 5 2 BEDROOM UNITS, BUILDING B HAS 5 2 BEDROOM UNITS, AND BUILDING C HAS 8 3 BEDROOM UNITS WITH OPTIONS FOR A 4TH BEDROOM.
4. ALL WORK TO BE DONE IN ONE PHASE.
5. APPLICANT IS WILLING TO WORK WITH PITTSFIELD TOWNSHIP TO COMPLETE PEDISTRIAN IMPROVEMENTS ALONG LOHR ROAD NEAR PROJECT SITE.

PARKING	EXISTING	ADDITIONAL	REQUIRED	TOTAL PARKING PROVIDED
MULTIPLE-FAMILY RESIDENTIAL – 18 UNITS	0	14+26[2]	34[1]	40
BARRIER FREE PARKING	0	2	2	2
TOTAL PARKING	0	42	36	42
BICYCLE PARKING	0	2	2	2

NOTES:
1. 1 SPACE PER EACH EFFICIENCY DWELLING UNIT; AND 2 SPACES PER EACH DWELLING UNIT WITH ONE OR MORE BEDROOMS.
2. 10 SPACE INCLUDED AS 1 PER UNIT IN GARAGE FOR 2 BEDROOM UNITS AND 16 SPACES INCLUDED AS 2 PER UNIT IN 3 BEDROOM UNITS OR OPTIONAL 4 BEDROOM UNITS.

ZONING REQUIREMENTS:
1. PARKING SPACES SHALL BE A MINIMUM OF 9.0' IN WIDTH AND 20' IN LENGTH.
2. THE MANUVERING AISLE SHALL BE A MINIMUM OF 22' IN WIDTH.
3. WHERE A PARKING SPACE ABUTS A SIDEWALK, THE MINIMUM WIDTH SHALL BE SEVEN (7) FEET. THE PARKING SPACE MAY BE DECREASED BY TWO (2) FEET IN LENGTH IF CURBING IS PROVIDED.
4. ALL RESIDENTIAL BUILDINGS OF MORE THAN TWO(2) DWELLING UNITS SHALL PROVIDE TRASH ENCLOSURES.
5. A RETAINING WALL SHALL BE REGULATED AS A FENCE IF THE WALL PROJECTS MORE THAN EIGHTEEN (18) INCHES ABOVE THE GRADE OF THE GROUND BEING RETAINED.
6. PROJECT WILL REQUEST 6 ADDITIONAL PARKING SPACES.
7. NO LOADING SPACES ARE PROPOSED FOR RESIDENTIAL PROJECT.
8. ALL WALKWAYS MUST BE ADA COMPLIANT.



VICINITY MAP
(NO SCALE)

Topic:
A requests for waiver to the required tree mitigation for the proposed Fountain Blue Site Development.

Conditions of Existing Vegetation:

Total Surveyed trees:	97 = 100%
Invasive trees:	26 = 27%
Dead trees:	15 = 15%
Saved Trees	9 = 9%

Trees to be Mitigated 47 - trees = 390"@ 3"= 130-trees

Invasive understory:

The undeveloped parcel, with exception of surveyed trees, is entire occupied by Frangula which is a genus of about 35 accepted species of shrubs or small trees, commonly known as buckthorns in the flowering plant family Rhamnaceae.

Common buckthorn (Frangula) is native to Eurasia and was introduced to North America in the 1880s as an ornamental plant. Its abundant fruit is dispersed by birds and it spreads rapidly, replacing native vegetation and lowering species diversity.

Site Development Issues

Impervious Surfaces – although minimal paved parking and efficient vehicle circulation patterns these areas occupy approximately, 45,685 SF.

Stormwater management – the site does not support stormwater infiltration and requires above ground detention with Rain-Gardens for storage, this facility covers 26,850 SF. Both the detention pond and the supporting Rain-Garden areas are planted with native grasses, sedges and forbs that require full sun exposer.

Total Site	= 138,560 SF (3.18 Acres)
Impervious Surfaces	= 45,685 SF.
Detention pond	= 26,850 SF
Natural Vegetation Area	= 16,000 SF

88,535 SF (2.03 Acres) Area available for Tree Mitigation, setbacks & other required landscaping.
Note: 1 Tree approximately requires a minimum of 400 SF

The Fountain Blue Project requests a waiver to the required tree mitigation for the following reasons:

a.) Site Development Requirement conflict with the ability to place all required mitigation trees on site.
b.) The Petitioner is not allowed to utilize the 16,000 SF Natural Vegetation Area for Tree plantings.
c.) Applicant seeks a modification from the planning commission to allow the remaining 34 mitigation trees to be paid in equilibrate funds to the township tree fund.

CONSTRUCTION NOTES:

1.) IT IS ESSENTIAL THAT THE CONTRACTOR FAMILIARIZE HIMSELF WITH THE SITE PRIOR TO SUBMITTING PROPOSAL.

2.) THE AREA WITHIN THE CONSTRUCTION LIMITS SHALL BE STRIPPED OF ORGANIC SOILS PRIOR TO COMMENCING GENERAL EXCAVATION. THIS MATERIAL SHALL BE STOCKPILED ON THE PROPERTY OR AS DIRECTED BY THE ENGINEER OR THE OWNER.

3.) ALL DISTURBED AREAS, DITCH BOTTOMS AND SLOPES UNLESS NOTED OTHERWISE, SHALL BE SEEDED AND MULCHED PER M.D.O.T. SPECIFICATION 6.53 INCLUDING PLACEMENT OF 4 INCH TOPSOIL BED. DITCH BOTTOMS SHALL BE SEEDED WITH A MULCH BLANKET WHERE DITCH GRADE EXCEEDS 3.00%.

4.) THE CONTRACTOR MUST CONTACT MISS DIG PRIOR TO BEGINNING CONSTRUCTION.

5.) CONTRACTOR SHALL BE RESPONSIBLE FOR INSTALLATION, MAINTENANCE AND REMOVAL OF ALL TEMPORARY EROSION CONTROL MEASURES PER THIS APPROVED PLAN.

6.) CONTRACTOR MUST OBTAIN AN EROSION CONTROL PERMIT FROM PITTSFIELD TWP. PRIOR TO BEGINNING EARTH MOVING. CONTRACTOR WILL BE RESPONSIBLE FOR OBTAINING ALL NECESSARY PERMITS PRIOR TO BEGINNING CONSTRUCTION.

7) ANY CONDITIONS EXISTING ON THE SITE THAT ARE NOT CONSISTENT WITH THE PLANS OR SOIL EROSION SEDIMENTATION PERMIT WILL RESULT IN A STOP WORK ORDER AND REVOCATION OF THE SOIL EROSION SEDIMENTATION CONTROL PERMIT.

8) CONTRACTOR WILL BE RESPONSIBLE FOR REPLACEMENT OF ANY AND ALL SOIL EROSION MEASURES DAMAGED AS A RESULT OF THEIR WORK. REPLACEMENT SHALL BE INCIDENTAL TO THE COST OF WORK PROVIDED.

PERMITS FOR CONSTRUCTION
- WCWRC – NO PERMIT – APPROVAL GRANTED ON (FEBRUARY 2, 2018)
- WCRC – PERMIT NO: ______________________________
- PITTSFIELD UTILITY CONSTRUCTION PERMIT – ________________
- SESC PERMIT –______________________________________
- MDEQ WTERMAIN PERMIT – ____________________________
- MDEQ SANITARY SEWER PERMIT – ______________________
- MDOT PERMIT – 81062-047412-17-061417

DESCRIPTION

Commencing at the Northwest corner of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence S00°12'15"W 728.50 feet along the West line of said Section and the centerline of Lohr Road and the Northerly extension thereof to the POINT OF BEGINNING; thence S89°47'45"E 186.73 feet; thence S44°28'15"E 274.89 feet along the Southwesterly right-of-way line of the I-94 Freeway; thence S00°12'15"W 263.04 feet; thence N89°47'45"W 380.00 feet; thence N00°12'15"E 458.52 feet along the West line of said Section and the centerline of Lohr Road to the Point of Beginning. Being a part of the Northwest 1/4 of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan and containing 3.57 acres of land, more or less. Being subject to the rights of the public over the Easterly 33 feet of Lohr Road. Also being subject to easements and restrictions of record, if any.

PROPERTY OWNER/APPLICANT:
DIRECT MANAGED INC
MUFID FARHA
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
PH: (734) 260-3395

WASHTENAW ENGINEERING
CIVIL ENGINEERS * PLANNERS
SURVEYORS * LANDSCAPE ARCHITECTS
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TEL. 734-761-8800 FAX. 734-761-9530
E-MAIL: weco@wengco.com
washtenawengineering.com

STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

PREPARED BY ____________________
JOSEPH K. MAYNARD P.E., MICH No. 52559

SHEET TITLE — SHEET NO.

SHEET TITLE	SHEET NO.	
COVER SHEET	1	
BOUNDARY & TOPOGRAPHICAL SURVEY	2	
NATURAL FEATURES	3	
REMOVAL PLAN	4	
SITE PLAN	5	
GRADING PLAN	6	
GRADING DETAILS	7	
SOIL EROSION & SEDIMENTATION CONTROL PLAN	8	
UTILITY PLAN	9	
STORM SEWER PROFILES	10	
WATER MAIN PLAN/PROFILES	11	
SANITARY SEWER PLAN/PROFILES	12	
STORM WATER MANAGEMENT DRAINAGE AREA PLAN	13	
STORM WATER MANAGEMENT CALCULATIONS	14	
DETAILS	15	
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ENTRANCE SITE DISTANCE PLAN & PROFILE	17	
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FIRE PROTECTION PLAN	19	
PHOTOMETRIC PLAN	20	
SIDEWALK PHOTOMETRIC PLAN	21	
PHOTOMETRIC DETAILS	22	
ARCHITECT SHEETS		
BUILDING A – ELEVATION PLAN	23	A1.0
BUILDING A – FLOOR PLAN	24	A2.0
BUILDING B – ELEVATION PLAN	25	A3.0
BUILDING B – FLOOR PLAN	26	A4.0
BUILDING C – ELEVATION PLAN	27	A5.0
BUILDING C – FLOOR PLAN	28	A6.0
PITTSFIELD TOWNSHIP DETAILS AND SPECIFICATIONS	29–36	

CSPA 17-17
Lohr Road Townhomes
Rec'd 09-19-2018

REVISED FINAL ENGINEERING PLAN:	07-03-18
FINAL ENGINEERING PLAN:	05-07-18
REVISED FINAL SITE PLAN:	03-29-18
FINAL SITE PLAN:	03-15-18
REVISED:	02-21-18
REVISED:	01-17-18
REVISED:	12-05-17
REVISED:	10-18-17
ORIGINAL:	06-01-17

FOUNTAIN BLUE – FORMERLY (LOHR ROAD TOWNHOMES) C.S.P.A.#17-17

FOUNTAIN BLUE

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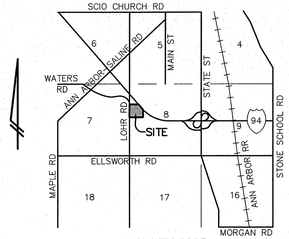
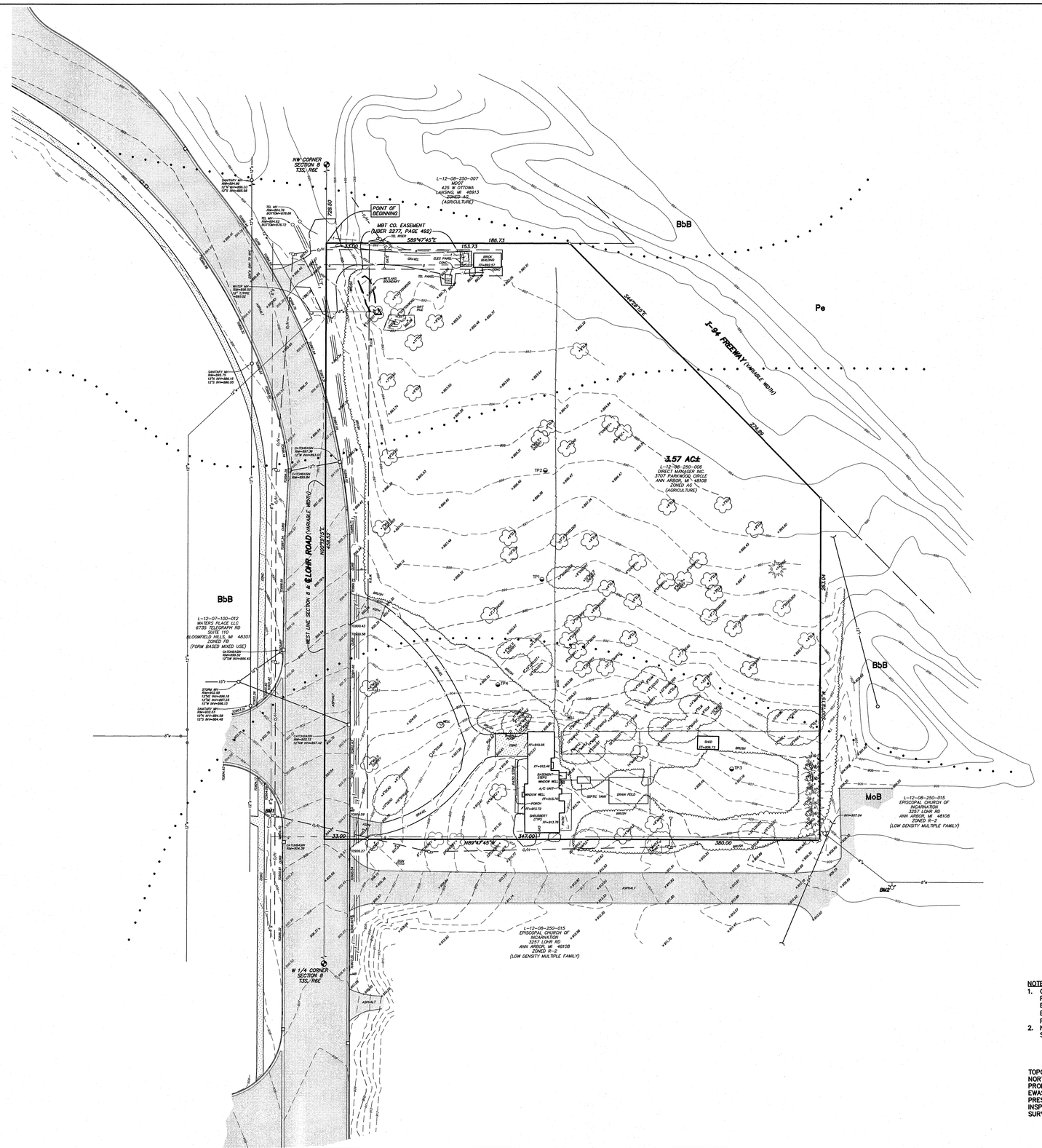


VICINITY MAP
(NO SCALE)



THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING RECORDS. THE SURVEYOR MAKES NO GUARANTEE THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER SURVEYED OR UNSURVEYED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

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DESCRIPTION

THE PROPERTY HAS ONE EXISTING EASEMENT LOCATED AT THE NORTH WEST END OF THE PROPERTY THAT IS FOR MBT CO.

DESCRIPTION

Commencing at the Northwest corner of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence S00°12'15"W 728.50 feet along the West line of said Section and the centerline of Lohr Road and the Northerly extension thereof to the POINT OF BEGINNING; thence S89°47'45"E 186.73 feet; thence S44°28'15"E 274.89 feet along the Southwesterly right-of-way line of the I-94 Freeway; thence S00°12'15"W 263.04 feet; thence N89°47'45"W 380.00 feet; thence N00°12'15"E 458.52 feet along the West line of said Section and the centerline of Lohr Road to the Point of Beginning. Being a part of the Northwest 1/4 of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan and containing 3.57 acres of land, more or less. Being subject to the rights of the public over the Easterly 33 feet of Lohr Road. Also being subject to easements and restrictions of record, if any.

EWASHTENAW.ORG CONTOURS
——830—— = EXISTING 5 FT. CONTOUR
——829—— = EXISTING 1 FT. CONTOUR

FIELDWORK GENERATED CONTOURS COMPLETED 2-24-17
— — —835— — — = EXISTING 5 FT. CONTOUR
— — —834— — — = EXISTING 1 FT. CONTOUR

TP3 = BORING LOCATION (FEB. 2017)

WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

THE OWNER SHALL NOT USE OR AUTHORIZE ANY OTHER PERSON TO USE THE DRAWINGS, SPECIFICATIONS, ELECTRONIC DATA AND OTHER INSTRUMENTS OF SERVICE ON OTHER PROJECTS, FOR ADDITIONS TO THIS PROJECT OR FOR COMPLETION OF THE PROJECT BY OTHERS, UNLESS AS SPECIFIED OR ENDORSED IN WRITING BY WECO. ANY REUSE WITHOUT WRITTEN VERIFICATION OR ADAPTATION BY WECO FOR THE SPECIFIC PURPOSE INTENDED WILL BE AT THE OWNER'S SOLE RISK AND WITHOUT LIABILITY TO WECO. THE OWNER SHALL INDEMNIFY AND HOLD HARMLESS WECO, WECO'S CONSULTANTS AND AGENTS AND EMPLOYEES OF ANY OF THEM FROM ANY AND ALL CLAIMS, DAMAGES, LOSSES AND EXPENSES, INCLUDING BUT NOT LIMITED TO ATTORNEY'S FEES, ARISING OUT OF UNAUTHORIZED REUSE OF DRAWINGS, SPECIFICATIONS, ELECTRONIC DATA OR OTHER INSTRUMENTS OF SERVICE.

LEGEND

- = LIGHT POLE
- = UTILITY POLE
- = GUY ANCHOR
- = HYDRANT
- 951.23 = SPOT ELEV.
- = POST
- = GATE VALVE
- = SIGN
- TC = TOP OF CURB
- TW = TOP OF WALL
- = MANHOLE
- = CATCHBASIN
- = END SECTION
- = GRAVEL
- = FENCE
- = CONCRETE
- = ASPHALT
- —— t —— = EXISTING STORM
- —— s —— = EXISTING SANITARY
- —— w —— = EXISTING WATER
- —— g —— = EXISTING GAS
- —— e —— = EXISTING ELECTRIC
- —— t —— = EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.

BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.

(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 20 40 80
SCALE: 1"=40'

PREPARED BY Thomas L. Sutherland
THOMAS L. SUTHERLAND P.S., MICH No. 24620

STATE OF MICHIGAN
THOMAS L. SUTHERLAND
PROFESSIONAL SURVEYOR
NO. 24620
LICENSED PROFESSIONAL SURVEYOR

NOTES:
1. ONLY ONE (1) EASEMENT EXISTS ON THE PROPERTY. THIS IS A MBT CO. EASEMENT LOCATED IN THE NORTHERN END OF THE PROPERTY (LIBER 2277, PAGE 492).
2. NEW EASEMENTS ARE PROPOSED AND SHOWN ON THE COVER SHEET.

TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

WETLANDS DELINEATED BY:
BWA CONSULTING,
DATED NOV. 2016

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

CIVIL ENGINEERS
PLANNERS • SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
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SHEET
BOUNDARY & TOPOGRAPHICAL SURVEY

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE	6-01-17
JOB NO.	32226
DWG NO.	226-topo
FIELD BOOK	NONE
FILE NO.	10301
SHEET	2

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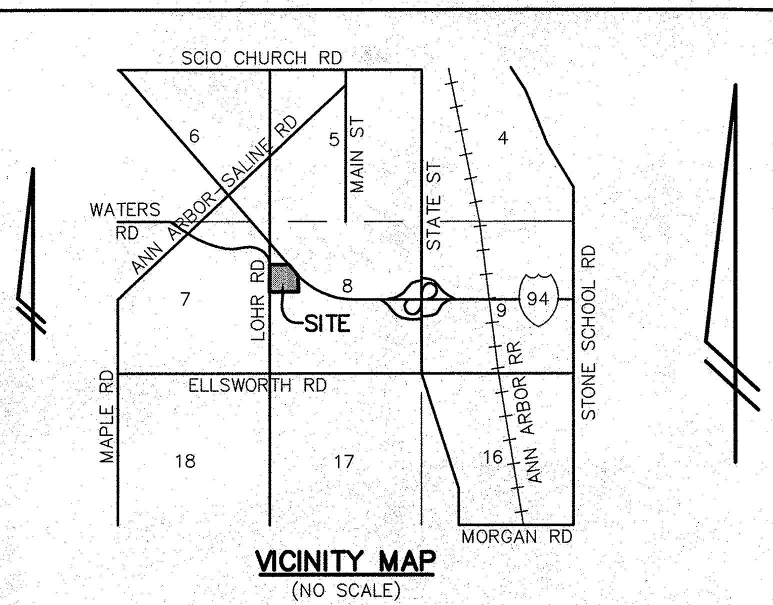

VICINITY MAP
(NO SCALE)

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Natural Features Statement

Site is 3.57-acres located on Lohr Road and adjacent to the I-94 R.O.W. within Pittsfield Township

Historic aerial imagery indicate the parcel's land use was agricultural cropland occupied with a single family residence since 1940.

Wetland, one small wetland (approximately 280 s.f. exists in the north- west corner of the site, the wetland is isolated and not regulated or permitted.

Soils, are of three types, Blount Loam, a somewhat poorly drained soil type. Morley Loam, with moderate available water capacity and Pewamo clay loam, a very poorly drained soil. All soils associations are contributors for the brushy plant environment existing on the site.

Gradients, the site consists of a uniform gentle slope in a northeast direction with the high point at Lohr Road and the lowest gradient along the I-94 R.O.W.

Vegetation, few trees existed on site other than those planted by the land owner and several wet tolerant species that volunteered over the years when the site was seasonally too wet to keep mowed.

Trees, existing on site fall into two categories, domestic landscape trees, such as, Austrian Pine, Colorado blue spruce and Norway maple, an invasive species. The other tree category consists of native/volunteer species such as American elm, Boxelder, and Chokecherry. These species typically tolerate wet soil conditions. Most of the elms (12) are dead from Dutch elm disease, Boxelders are in poor condition, poorly shaped and prone to aphid infestations.

Shrubs, existing shrubbery consists primarily of common Buckthorn. Buckthorn is one of the most invasive non-native species in the area and has crowded out most other plants and shaded the ground so there is no vegetative cover under the areas it occupies.

Herbaceous plants, are limited to open areas where Buckthorn has not crowded out all available light, herbaceous species observed were teasel and fragmints both plants are Invasive non-native species.

In conclusion,

The subject site has been used and occupied as agricultural or sub-urban land use since the 1940's.

Woodland, under the Townships definition the site, contained portion of a woodland around the existing residence. This area was mostly comprised of maples which are invasive species.

There are no Heritage Trees on the site. The remaining trees will be saved or their removal will be mitigated by the petitioner.

There exists no significant natural features on or adjacent to the site. All adjacent lands have been developed as parking lots, roadways and/or commercial or office structures. There is one adjacent home on the south of this site.

The proposed development plan for the property is to landscape any remaining open space with the appropriate number of landscape screening plants.

DESCRIPTION

Commencing at the Northwest corner of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence S00°12'15"W 728.50 feet along the West line of said Section and the centerline of Lohr Road and the Northerly extension thereof to the POINT OF BEGINNING; thence S89°47'45"E 186.73 feet; thence S44°28'15"E 274.89 feet along the Southwesterly right-of-way line of the I-94 Freeway; thence S00°12'15"W 263.04 feet; thence N89°47'45"W 380.00 feet; thence N00°12'15"E 458.52 feet along the West line of said Section and the centerline of Lohr Road to the Point of Beginning. Being a part of the Northwest 1/4 of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan and containing 3.57 acres of land, more or less. Being subject to the rights of the public over the Easterly 33 feet of Lohr Road. Also being subject to easements and restrictions of record, if any.

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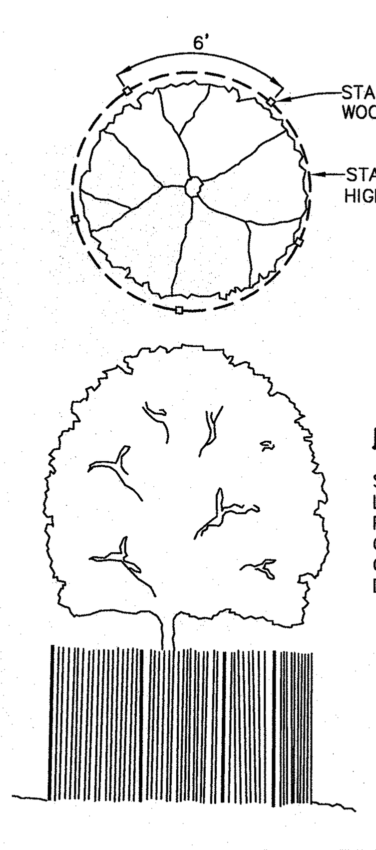
WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • • • • – SOILS BOUNDARY

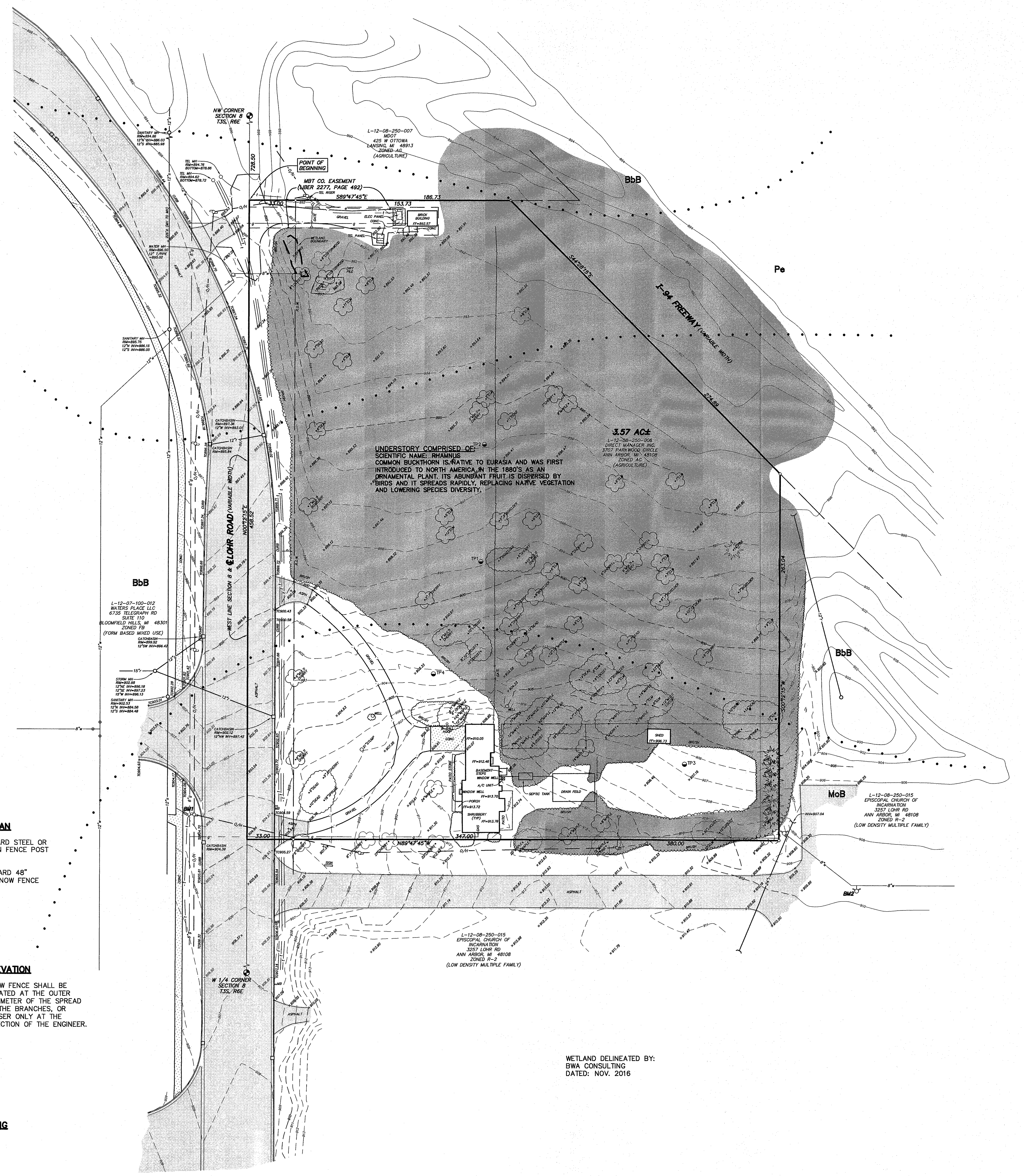
SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.



ELEVATION

SNOW FENCE SHALL BE LOCATED AT THE OUTER PERIMETER OF THE SPREAD OF THE BRANCHES, OR CLOSER ONLY AT THE DIRECTION OF THE ENGINEER.

TREE PROTECTION FENCING
NOT TO SCALE



LEGEND

= EXSITING DECIDUOUS TREES
= EXSITING EVERGREEN TREES
= EXSITING (COMMON BUCKTHORN) UNDERSTORY
= EXSITING NON REGULATED WETLAND

DBH	MULTI STEM	TYPE	CONDITION	COMMENTS
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6	Multi	Cherry	Fair	
6	Multi	Cherry	Fair	
6		Cherry	Good	
6		Cherry	Poor	
6	Multi	Cherry	Poor	
6	Multi	Cherry	Poor	
7		Cherry	Fair	
7		Cherry	Fair	
7	Multi	Cherry	Fair	
8	Multi	Cherry	Fair	
8		Cherry	Fair	
8		Cherry	Fair	
10	Multi	Cherry	Poor	
6		Elm	Fair	
6		Elm	Fair	
6		Elm	Fair	
6		Elm	Fair	
6		Elm	Poor	
6		Elm	Poor	
7		Elm	Fair	
7		Elm	Fair	
7		Elm	Fair	
7		Elm	Fair	
7		Elm	Fair	
8		Elm	Fair	Saved
8		Elm	Fair	
8		Elm	Fair	
8		Elm	Poor	
9		Elm	Fair	Saved
9		Elm	Fair	
10		Elm	Fair	Saved
11	Multi	Elm	Poor	
12		Elm	Fair	
12		Elm	Fair	
6		Locust	Fair	
6		Locust	Good	
8		Locust	Good	
10		Locust	Fair	
10	Multi	Locust	Poor	
12		Locust	Fair	
15	Multi	Locust	Poor	Saved
30		Locust	Fair	Saved
11		Pear	Poor	Saved
10		Pine	Good	Saved
11		Pine	Poor	
13		Pine	Good	
14		Pine	Good	Saved
14		Pine	Good	
18		Pine	Poor	
16		Spruce	Good	
390 TOTAL INCHES REQUIRED MITIGATION				
SEE LANDSCAPE PLAN FOR MITIGATION CALCULATIONS				

TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

WETLANDS DELINEATED BY:
BWA CONSULTING,
DATED NOV. 2016

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

LEGEND

☼ = LIGHT POLE
= UTILITY POLE
= GUY ANCHOR
= HYDRANT
x901.23 = SPOT ELEV.
= POST
⊗ = GATE VALVE
= SIGN
TC = TOP OF CURB
TW = TOP OF WALL
O = MANHOLE
□ = CATCHBASIN
= END SECTION
= GRAVEL
= FENCE
= CONCRETE
= ASPHALT
—r— = EXISTING STORM
—s— = EXISTING SANITARY
—w— = EXISTING WATER
—g— = EXISTING GAS
—e— = EXISTING ELECTRIC
—t— = EXISTING TELEPHONE

BENCHMARK *BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.*

BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.

(DATUM=NAVD 88)

REVISIONS *2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW*

SCALE
0 20 40 80
SCALE: 1"=40'

PREPARED BY
GERALD J. SOSNOWSKI RLA, MICH No. 982

STATE OF MICHIGAN
GERALD J. SOSNOWSKI
LANDSCAPE ARCHITECT
NO. 982
REGISTERED LANDSCAPE ARCHITECT

CIVIL ENGINEERS
PLANNERS * SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
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ANN ARBOR, MI 48103
TEL. 734-761-8800
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WASHTENAWENGINEERING.COM

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DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET
NATURAL FEATURES

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN

DATE	*6-01-17*
JOB NO.	*32226*
DWG NO.	*226-topo*
FIELD BOOK	*NONE*
FILE NO.	*10301*
SHEET	3

DBH	TYPE	CONDITION
7	Boxelder	Poor
8	Elm	Fair
9	Elm	Fair
10	Elm	Fair
15	Locust	Good
30	Locust	Good
10	Pine	Good
11	Pine	Good
14	Pine	Good
9	Walnut	Good

EXSITING TREE SURVEY

RNA - LOHR ROAD
Trees for Removal

DBH	MULTI ?	TYPE	CONDITION	INVASIVE
7	Multi	Boxelder	Poor	Invasive
7		Boxelder	Poor	Invasive
7	Multi	Boxelder	Poor	Invasive
8		Boxelder	Poor	Invasive
9	Multi	Boxelder	Poor	Invasive
23		Boxelder	Poor	Invasive
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6		Cherry	Fair	
6	Multi	Cherry	Fair	
6	Multi	Cherry	Fair	
6		Cherry	Good	
6		Cherry	Poor	
6	Multi	Cherry	Poor	
6	Multi	Cherry	Poor	
7		Cherry	Fair	
7		Cherry	Fair	
7	Multi	Cherry	Fair	
8	Multi	Cherry	Fair	
8		Cherry	Fair	
8		Cherry	Fair	
10	Multi	Cherry	Poor	
8		Cottonwood	Fair	Invasive
7		Dead	Dead	
7	Multi	Dead	Dead	
7	Multi	Dead	Dead	
8		Dead	Dead	
9		Dead	Dead	
10		Dead	Dead	
10		Dead	Dead	
10	Multi	Dead	Dead	
12		Dead	Dead	
12	Multi	Dead	Dead	
12	Multi	Dead	Dead	
12	Multi	Dead	Dead	
14		Dead	Dead	
14		Dead	Dead	
23		Dead	Dead	
6		Elm	Fair	
6		Elm	Fair	
6		Elm	Fair	
6		Elm	Fair	
6		Elm	Poor	
6		Elm	Poor	
7		Elm	Fair	
7		Elm	Fair	
7		Elm	Fair	
7		Elm	Fair	
7		Elm	Fair	
8		Elm	Fair	
8		Elm	Fair	
8		Elm	Fair	
8		Elm	Poor	
9		Elm	Fair	
9		Elm	Fair	
11		Elm	Fair	
11	Multi	Elm	Poor	
12		Elm	Fair	
12		Elm	Fair	
6		Locust	Fair	
6		Locust	Good	
8		Locust	Good	
10		Locust	Fair	
10	Multi	Locust	Poor	
12		Locust	Fair	
12	Multi	Locust	Poor	
18		Locust	Fair	
7		Norway Maple	Fair	Invasive
8		Norway Maple	Fair	Invasive
10	Multi	Norway Maple	Fair	Invasive
10		Norway Maple	Good	Invasive
10		Norway Maple	Good	Invasive
11		Norway Maple	Fair	Invasive
11		Norway Maple	Good	Invasive
11		Norway Maple	Good	Invasive
11		Norway Maple	Good	Invasive
12		Norway Maple	Good	Invasive
12		Norway Maple	Good	Invasive
12		Norway Maple	Good	Invasive
12		Norway Maple	Good	Invasive
13	Multi	Norway Maple	Poor	Invasive
14		Norway Maple	Good	Invasive
14		Norway Maple	Good	Invasive
14		Norway Maple	Good	Invasive
24		Norway Maple	Good	Invasive
24		Norway Maple	Good	Invasive
11		Pear	Poor	
11		Pine	Good	
11		Pine	Poor	
13		Pine	Good	
14		Pine	Good	
14		Pine	Good	
18		Pine	Poor	
16		Spruce	Good	
	167 DBH - Dead Trees			
	793 DBH - Mitigate Trees			

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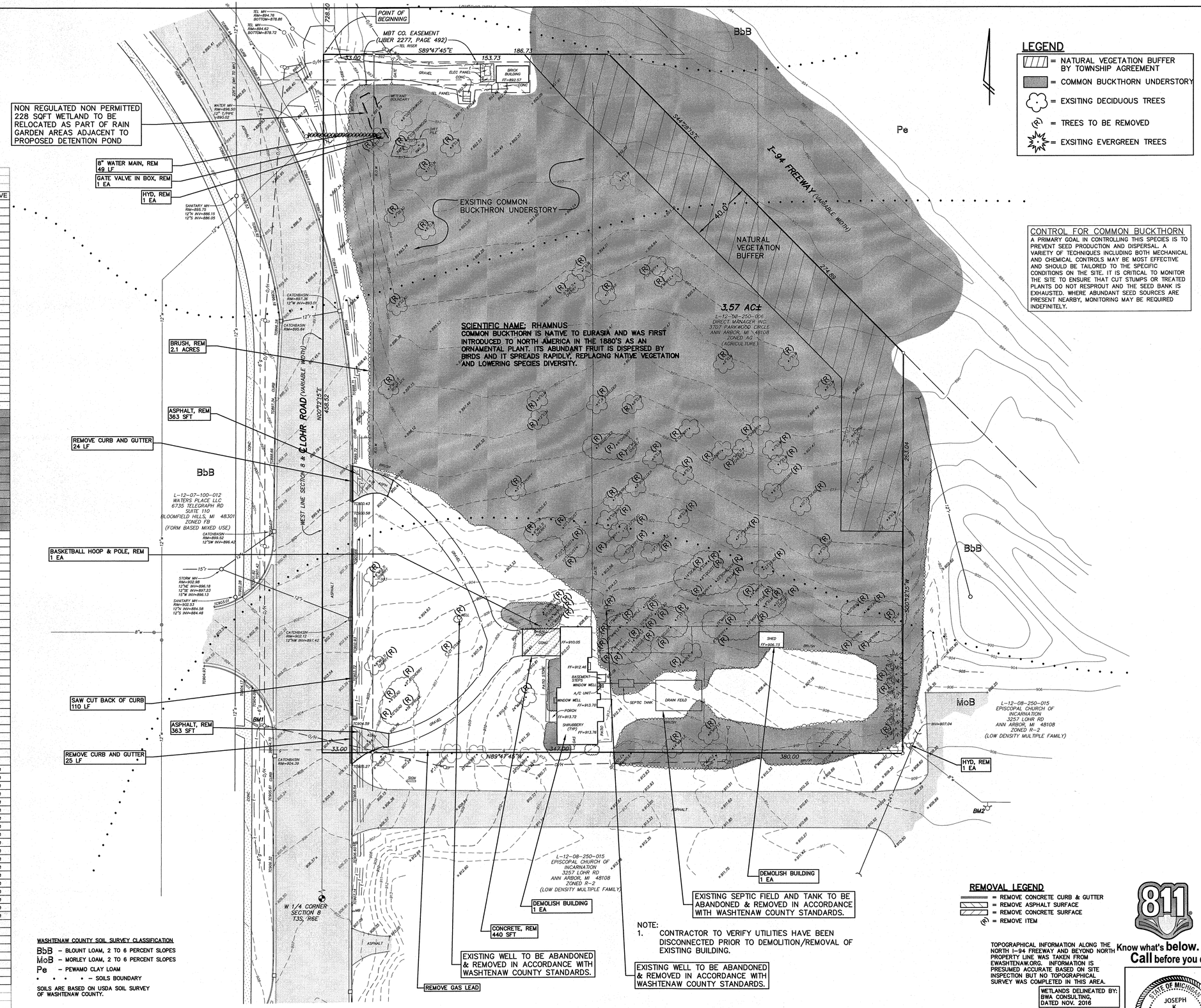

CONTROL FOR COMMON BUCKTHORN

A PRIMARY GOAL IN CONTROLLING THIS SPECIES IS TO PREVENT SEED PRODUCTION AND DISPERSAL. A VARIETY OF TECHNIQUES INCLUDING BOTH MECHANICAL AND CHEMICAL CONTROLS MAY BE MOST EFFECTIVE AND SHOULD BE TAILORED TO THE SPECIFIC CONDITIONS ON THE SITE. IT IS CRITICAL TO MONITOR THE SITE TO ENSURE THAT CUT STUMPS OR TREATED PLANTS DO NOT RESPROUT AND THE SEED BANK IS EXHAUSTED. WHERE ABUNDANT SEED SOURCES ARE PRESENT NEARBY, MONITORING MAY BE REQUIRED INDEFINITELY.

NOTE:
1. CONTRACTOR TO VERIFY UTILITIES HAVE BEEN DISCONNECTED PRIOR TO DEMOLITION/REMOVAL OF EXISTING BUILDING.

REMOVAL LEGEND

= REMOVE CONCRETE CURB & GUTTER
= REMOVE ASPHALT SURFACE
= REMOVE CONCRETE SURFACE
= REMOVE ITEM

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SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

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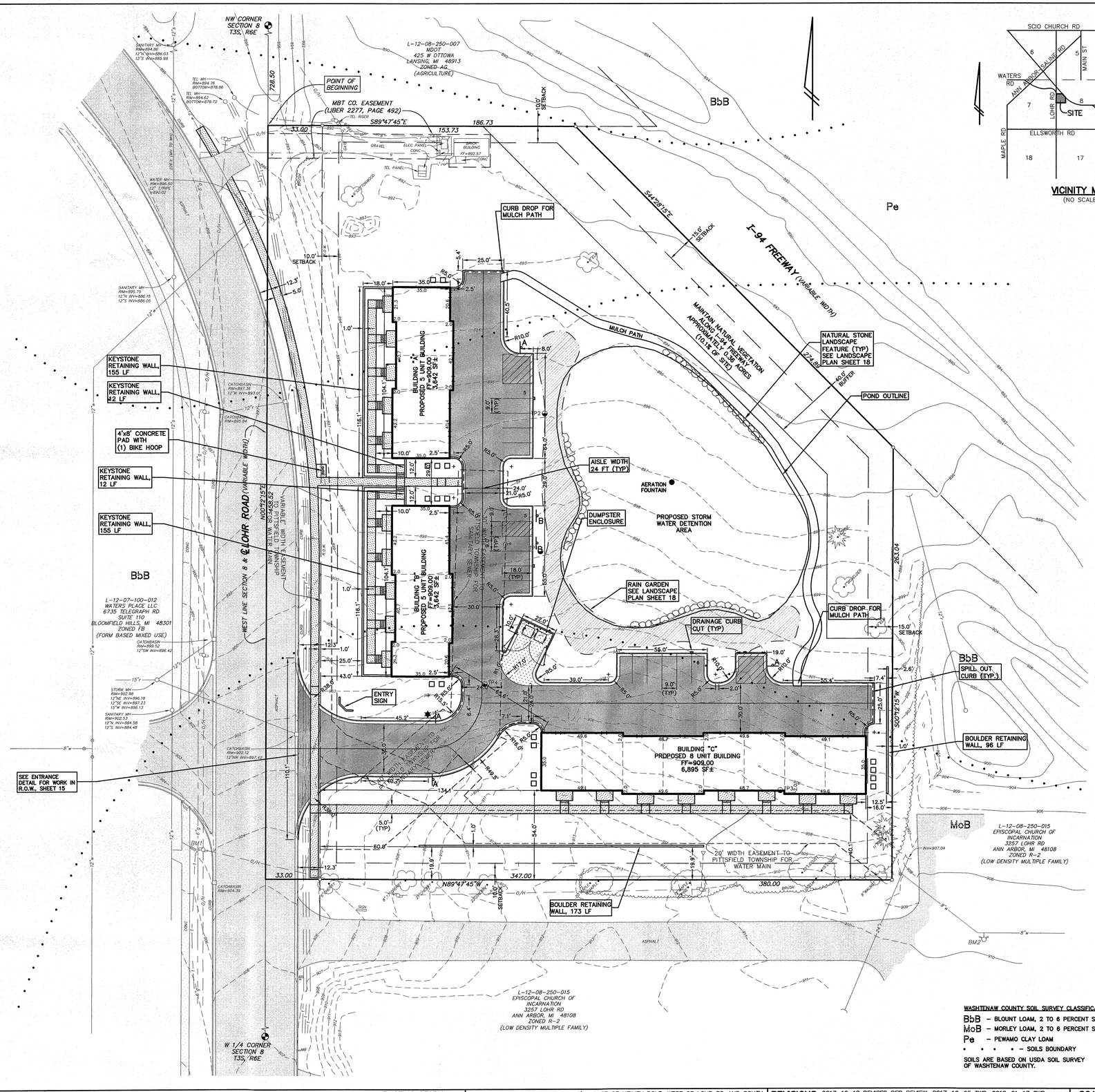
REMOVAL PLAN

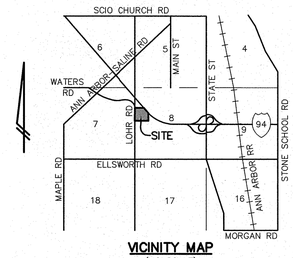
PROJECT
FOUNTAIN BLUE

SHEET

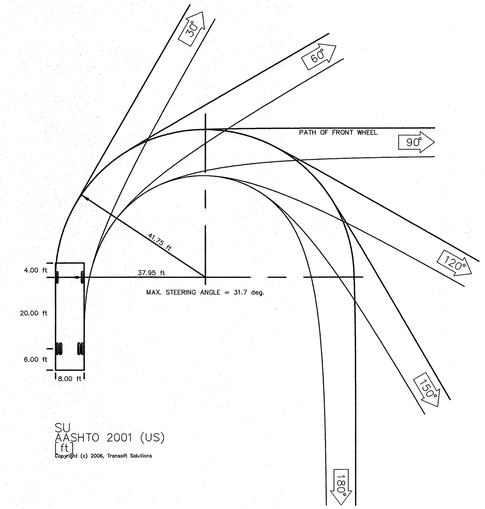
SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17
JOB NO. 32226
DWG NO. 226-rem
FIELD BOOK NONE
FILE NO. 10301
SHEET 4

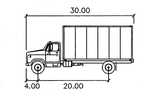
H:\SOSDwg\32226\dwg\226-rem.dwg, 7/5/2018 11:07:24 AM, 1:1





VICINITY MAP
(NO SCALE)





SU	feet
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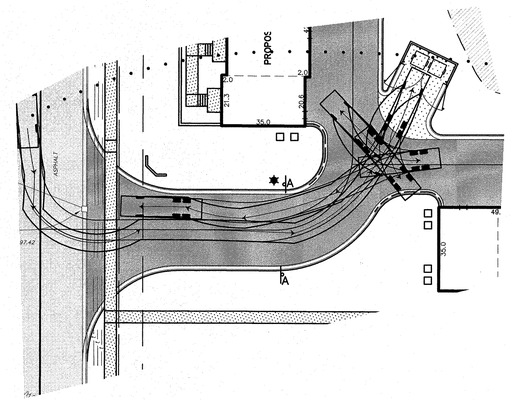
Track	: 8.00
Lock to Lock Time	: 6.00
Steering Angle	: 31.80



NOTES:

1. PER THE NATIONAL FLOOD INSURANCE PROGRAM, FIRM PANEL 382 OF 585, MAP NUMBER 26161C0382E, DATED APRIL 3, 2012 THIS PROPERTY IS NOT WITHIN A 100 YEAR FLOOD PLAIN. THERE IS NO FLOOD PLAIN OR WATER BODY WITHIN 500 FEET OF THE PROPERTY.
2. AN ENCLOSED COUNTY DRAIN, THE WATERS PLACE SHOPPING CENTER, WHOSE CLOSEST POINT IS LOCATED APPROXIMATELY 43 FT WEST OF THE PROPERTY, IS PRESENT ACROSS LOHR RD. IT APPEARS TO DISCHARGE TO DETENTION BASINS THAT OUTLET TO THE I-94 RIGHT OF WAY APPROXIMATELY 91 FEET NORTH OF THE PROJECT SITE.
3. SEE DETAIL SHEET FOR PHOTOMETRIC DETAILS.

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= REGULAR CURB
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= CONCRETE SURFACE
= NO PARKING FIRE LANE SIGN
= ADA VAN ACCESSIBLE SIGN

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STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

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SP 801.23 = SPOT ELEV.
= POST
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SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

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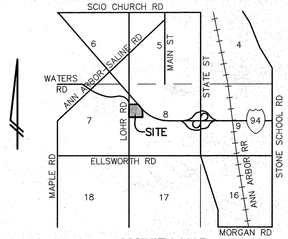
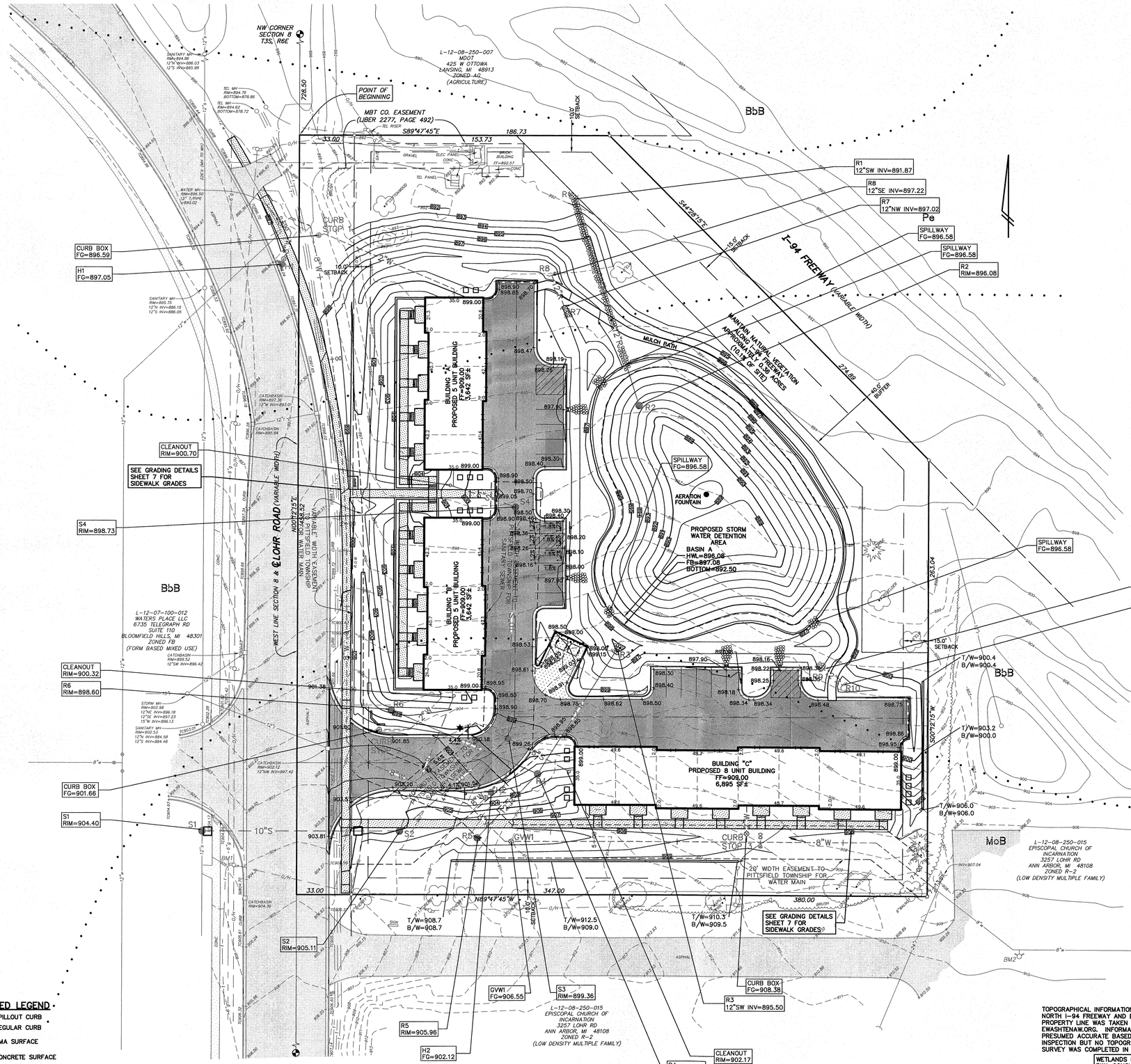
SHEET
SITE PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17 JOB NO. 32226
DWG NO. 226-site
FIELD BOOK NONE
FILE NO. 10301
SHEET 5



VICINITY MAP
(NO SCALE)



NOTES:
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- = GATE VALVE
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- = ASPHALT
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(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

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CIVIL ENGINEERS
PLANNERS • SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
ANN ARBOR, MI 48103
TEL 734-761-8800
FAX 734-761-9530
WASHTENAWENGINEERING.COM

WASHTENAW ENGINEERING

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET
GRADING PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17 JOB NO. 32226
DWG NO. 226-grd
FIELD BOOK NONE
FILE NO. 10301
SHEET 6

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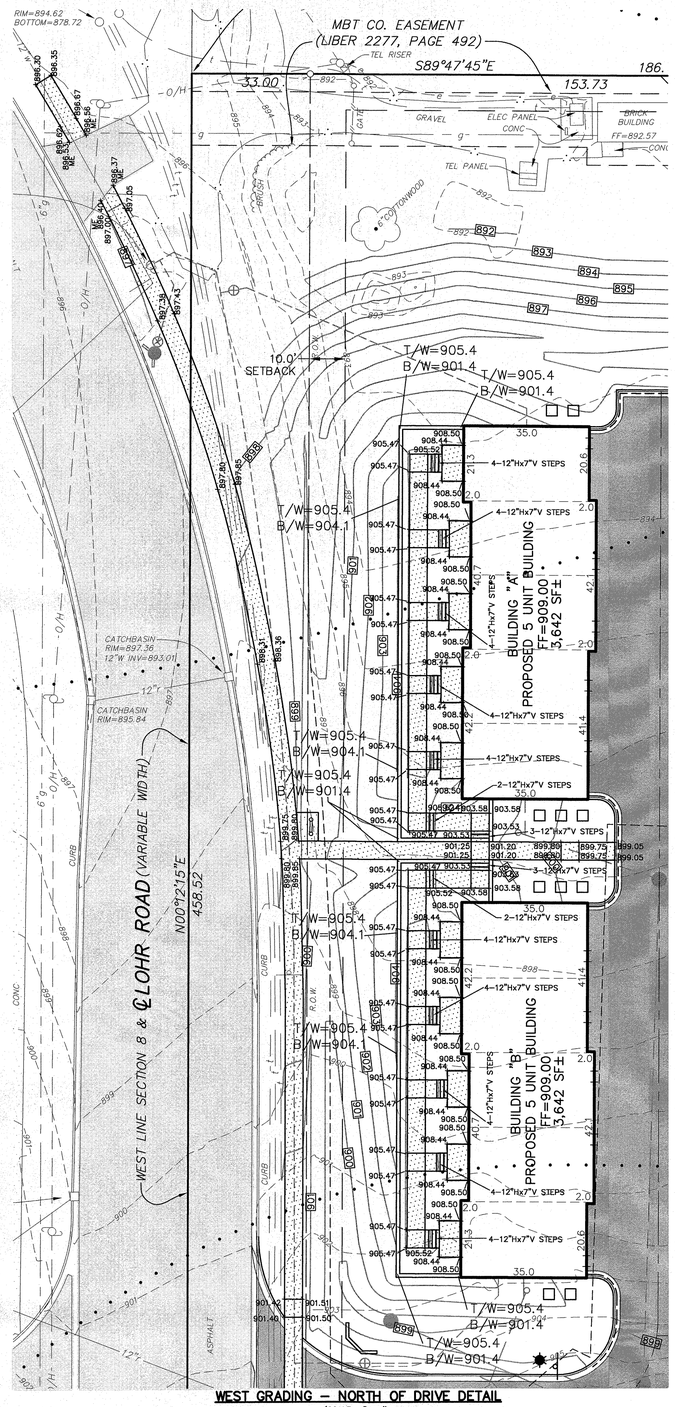
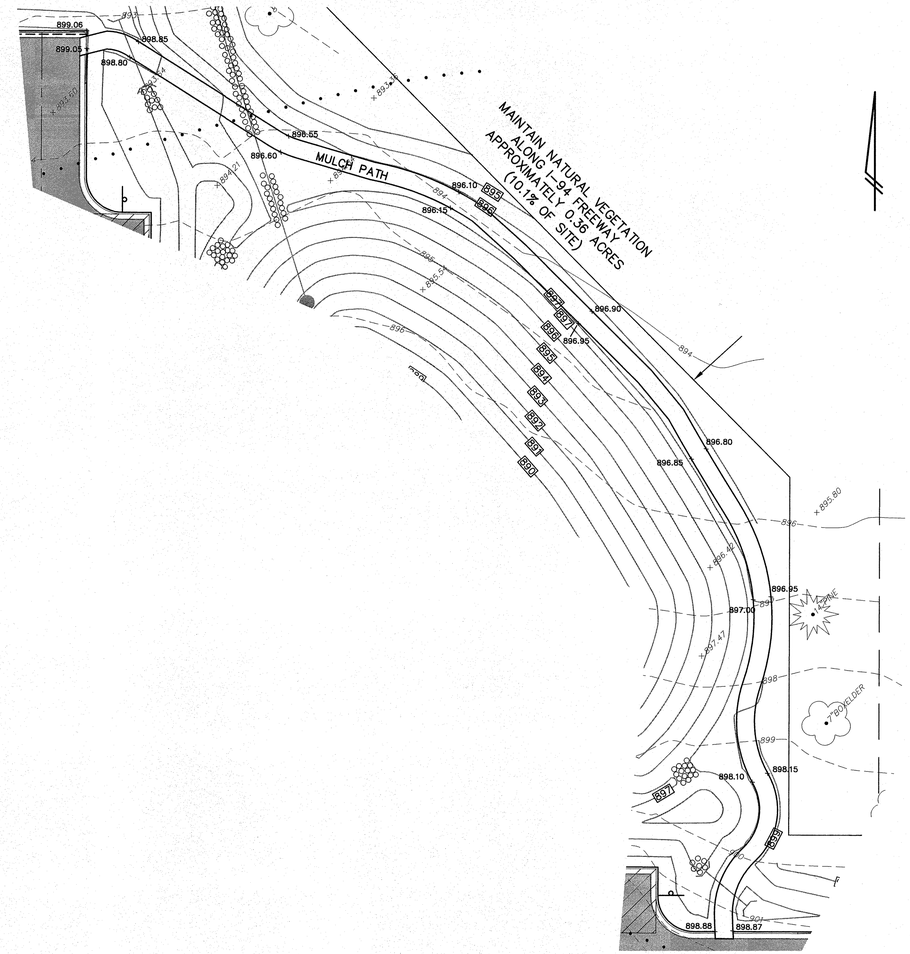


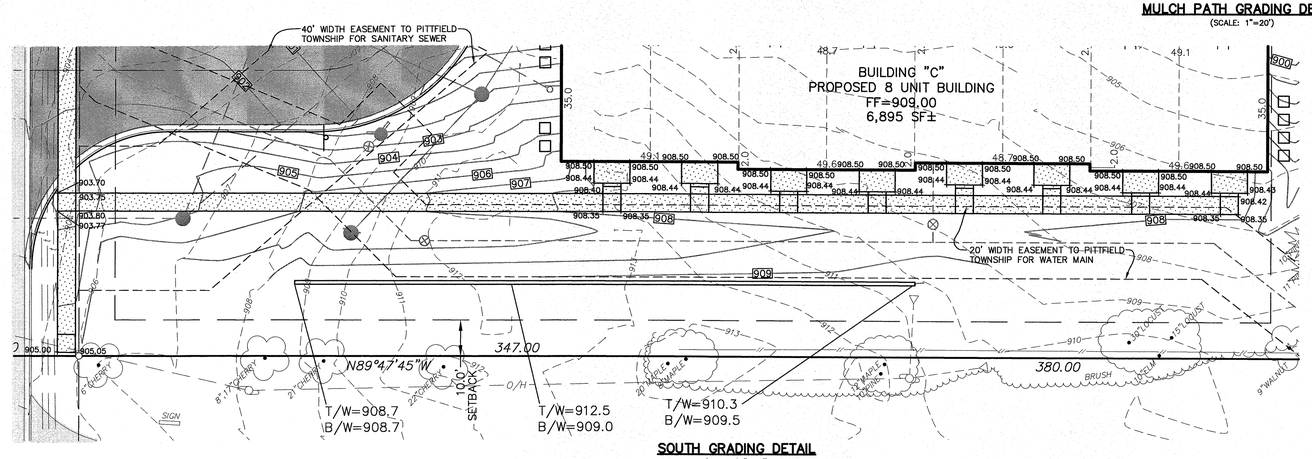
WEST GRADING – NORTH OF DRIVE DETAIL

(SCALE: 1"=20')



MULCH PATH GRADING DETAIL

(SCALE: 1"=20')



SOUTH GRADING DETAIL

(SCALE: 1"=20')

NOTES:
1. ALL SIDEWALK TO BE ADA COMPLIANT.
2. MULCH PATH TO MAINTAIN MAXIMUM 2% CROSS SLOPE THROUGHOUT.

WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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

STATE OF MICHIGAN
JOSEPH K. MAYNARD
ENGINEER No. 52559
LICENSED PROFESSIONAL ENGINEER

LEGEND

LIGHT POLE
UTILITY POLE
GUY ANCHOR
HYDRANT
SPOT ELEV.
POST
GATE VALVE
SIGN
TC = TOP OF CURB
TW = TOP OF WALL
MANHOLE
CATCHBASIN
END SECTION
GRAVEL
FENCE
CONCRETE
ASPHALT
EXISTING STORM
EXISTING SANITARY
EXISTING WATER
EXISTING GAS
EXISTING ELECTRIC
EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.

BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.

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SCALE 0 10 20 40

SCALE: 1"=20'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

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GRADING DETAILS

SHEET

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE	6-01-17
JOB NO.	322226
DWG NO.	226-grd detail
FIELD BOOK	NONE
FILE NO.	10301
SHEET	7

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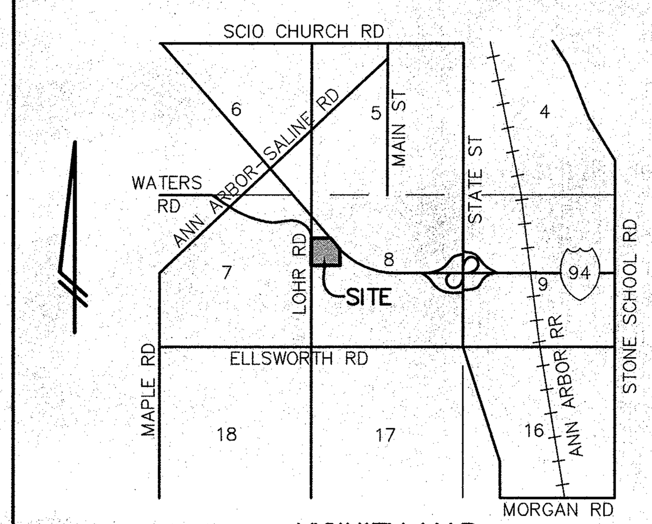

VICINITY MAP
(NO SCALE)

MICHIGAN OFFICE OF MANAGEMENT & BUDGET KEYING SYSTEM

E8	PERMANENT SEEDING		Stabilization method utilized on sites where earth change has been completed (final grading attained).
E12	RIPRAP		Use along shorelines, waterways, or where concentrated flows occur. Slows velocity, reduces sediment load, and reduces erosion.
S51	SILT FENCE		Use adjacent to critical areas, to prevent sediment laden sheet flow from entering these areas.
S53	STABILIZED CONSTRUCTION ACCESS		Used at every point where construction traffic enters or leaves a construction site.
S58	INLET PROTECTION FABRIC DROP		Use at stormwater inlets, especially at construction sites.

(t) TEMPORARY EROSION CONTROL MEASURE
(p) PERMANENT EROSION CONTROL MEASURE

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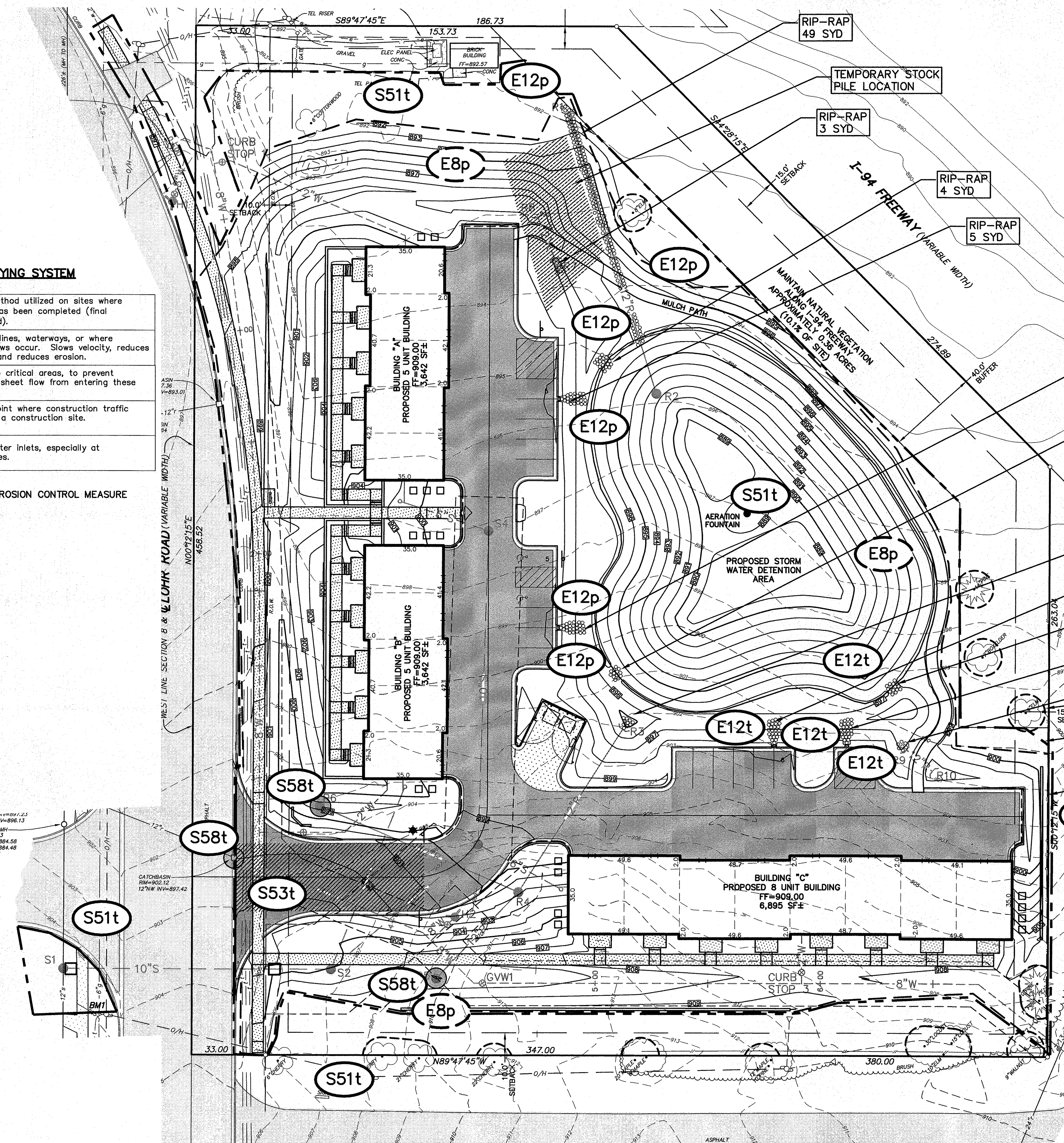

PROPOSED LEGEND

= SPILLOUT CURB
= REGULAR CURB
= HMA SURFACE
= CONCRETE SURFACE
A = NO PARKING FIRE LANE SIGN
B = ADA VAN ACCESSABLE SIGN

DESCRIPTION

Commencing at the Northwest corner of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan; thence S00°12'15"W 728.50 feet along the West line of said Section and the centerline of Lohr Road and the Northerly extension thereof to the POINT OF BEGINNING; thence S89°47'45"E 186.73 feet; thence S44°28'15"E 274.89 feet along the Southwesterly right-of-way line of the I-94 Freeway; thence S00°12'15"W 263.04 feet; thence N89°47'45"W 380.00 feet; thence N00°12'15"E 458.52 feet along the West line of said Section and the centerline of Lohr Road to the Point of Beginning. Being a part of the Northwest 1/4 of Section 8, T3S, R6E, Pittsfield Township, Washtenaw County, Michigan and containing 3.57 acres of land, more or less. Being subject to the rights of the public over the Easterly 33 feet of Lohr Road. Also being subject to easements and restrictions of record, if any.

Tasks	Collection System		Storm Water Management Basins		Scheduled Frequency
	Ditches/ Swales	Catch Basin Inlets	Sedimentation Basins	Storm Detention Basins	
Inspect for Sediment Accumulation	X	X	X	X	Weekly
Removal of Sediment Accumulation	X	X	X	X	As Needed[1] & prior to Acceptance
Inspect for floatables and debris	X	X	X	X	Quarterly
Removal of floatables and debris	X	X	X	X	As Needed & prior to Acceptance
Inspect for erosion	X		X	X	Weekly
Re-establish permanent vegetation on eroded slopes	X		X	X	As Needed & prior to Acceptance
Replacement of stone	X			X	As Needed & prior to Acceptance
Inspect during wet weather & after major storms	X	X	X	X	As Needed
Repair Storm Damage to System and Erosion Control	X	X	X	X	As Needed

During construction, it is the developer's responsibility to perform the maintenance.
[1] As Needed means when sediment has accumulated to a maximum of one foot.
Immediately following construction, the developer will have the storm water management system inspected by an engineer to verify grades of the detention and filtration areas and make recommendations for any necessary sediment removal.

Tasks	Collection System		Storm Water Management Basin			Scheduled Frequency
	Ditches & Swales	Catch Basin Inlets	Sedimentation Basins	15 FT Buffer Area[1]	Detention Basins	
Inspect for Sediment Accumulation	X	X	X		X	Annually[2]
Removal of Sediment Accumulation	X	X	X		X	Every 2 Years As Needed[2]
Inspect for floatables and debris	X	X	X		X	Annually
Removal of floatables and debris	X	X	X		X	As Needed[1]
Inspect for erosion	X	X	X		X	Annually
Re-establish permanent vegetation on eroded slopes	X	X	X		X	As Needed
Replacement of stone	X				X	Every 3-5 years as Needed
Mowing				X		Up to twice per year
Inspection stormwater system components during wet weather and comparing to as-built plans by professional engineer	X	X	X		X	Annually
Repair Storm Damage to System and Permanent Erosion Control	X	X	X		X	As Needed
Keep records on site of all maintenance inspections, actions and costs	X	X	X	X	X	As Needed

Following construction, it will be the responsibility of Direct Managed to perform the maintenance.
[1] No lawn care chemicals may be applied within the buffer area with one exception. Invasive species may be treated with chemicals by a certified applicator.
[2] As Needed means when sediment has accumulated to a maximum of one foot.
The Direct Managed is required to pay for all maintenance activities on a continuing basis.

WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

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MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

Item No.	Description	Annual Cost
1	Annual Inspection for sediment accumulation	$100.00
2	Removal of sediment accumulation every 2 years as needed	$500.00
3	Inspect for floatable & debris annually and after major storms	$100.00
4	Removal of floatables and debris annually and after major storms	$150.00
5	Inspect for erosion annually and after major storms	$150.00
6	Re-establish permanent vegetation on eroded slopes as needed	$350.00
7	Replacement of stone as needed	$500.00
8	Mowing 0-2 times per year	$400.00
9	Inspect structural elements during wet weather and compare to as-built plans every 2 years	$150.00
10	Make structureal adjustments or replacements as determined by inspection as needed	$400.00
11	Have a professional engineer carry out emergency inspections upon identification of severe problems	$200.00
12	Records Maintenance	$100.00
	Estimated Annual Maintenance Cost	$3,100.00

RUSLE - an online soil erosion assessment tool — Page 1 of 1

> Home
> About RUSLE
> Erosion Factors
> Calculate Erosion
> Resources
> Contact Us
> Acknowledgement

Calculated Soil Loss

The following are calculated soil loss for the construction site.

Site Information:

County:	Washtenaw
Site:	3253 Lohr Rd
Site ID:	32226
Soil:	Blount (BbB)
Slope:	2%
Slope Length:	100 ft.
Mulch Type:	Straw/hay
Mulch Rate:	1.0 (tons/acre)
Acreage:	3 acre(s)

Calculated Soil Loss:

Erosion Factors:	R = 100, K = 0.43, LS = 0.28, C = 0.20, P = 1
Tolerable Soil Loss:	T = 3 (tons/acre/year)
Calculated Soil Loss:	A = 2.41 (tons/acre/year)
Potential soil loss (total):	7.22 (tons/year)

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http://35.8.121.89/cgi-bin/rusle_constr.cgi — 5/31/2017

CONSTRUCTION SEQUENCE

5/18	TEMPORARY CONTROL MEASURES INSTALLED.
5/18	GRAVEL CONSTRUCTION ACCESS INSTALLED.
5/18	LAND CLEARING.
5/18	DETENTION/RETENTION/SEDIMENT POND INSTALLED AND STABILIZATION.
6/18	UTILITY INSTALLATION.
11/18	ROAD/PAVEMENT CONSTRUCTION.
12/18	FINAL GRADE/SEED.
2/19	CATCHBASINS/SEDIMENT TRAP CLEANED.
2/19	PERMANENT CONTROL MEASURES INSTALLED AND FUNCTIONING.
2/19	REMOVE TEMPORARY CONTROL MEASURES.

CLIENT RNA Facilities Management
LOCATION Pittsfield Township
FOR 3253 Lohr Rd
SESC Cost Estimate

ENGINEER'S OPINION OF PROBABLE COSTS
DATE: 05-07-2018
JOB # 32226
Prepared By: Seth Garner

ITEM No.	ITEM DESCRIPTION	ESTIMATED QUANTITIES	UNIT USED	UNIT PRICE	AMOUNT
	Soil Erosion Controls				
1	Inlet Filters	16	EA	$300.00	$4,800.00
2	Silt Fence	1400	LF	$2.50	$3,500.00
3	Stabilized Construction Access	1	LS	$2,500.00	$2,500.00
4	Dust Emission Control (Sweeping)	1	LS	$2,500.00	$2,500.00
5	Permanent Seeding	1.07	Acres	$500.00	$535.00
6	Rip-rap, plain	90	SYD	$40.00	$3,600.00
				Total Cost	$17,435.00
	Protection of all exposed soil surfaces from erosion should work discontinue				
1	Restoration - includes mulch & seed ($2000 Minimum)	3	Acres	$500.00	$2,000.00
				Total Cost	$2,000.00

SOIL EROSION CONTROL NOTES:

1. SIZE OF EARTH DISRUPTION 114,179 SFT, OR 3 ACRES (ROUNDED UP TO THE NEAREST ACRE).
2. COST FOR SOIL EROSION CONTROLS APPROXIMATELY $17,435.
3. IT IS 1,747 LF FROM SITE TO THE MALLETS CREEK DRAIN.
4. THE PROJECT IS A COMMERCIAL DEVELOPMENT.
5. ALL PERMANENT EROSION CONTROL DEVICES AND STORM WATER MANAGEMENT SYSTEM IS TO BE MAINTAINED BY THE OWNER, DIRECT MANAGED.
6. FOR TOPSOIL STOCKPILE AREAS, SILT FENCE SHALL BE INSTALLED AND MAINTAINED AROUND THE PERIMETER OF SUCH STOCKPILE, IF THE STOCKPILE WILL BE LARGE AND IS EXPECTED TO BE ON-SITE FOR A PERIOD OF TIME.
7. STABILIZATION MUST BE STARTED WITHIN FIVE(5) DAYS OF FINAL GRADE. USE 4-INCHES OF TOPSOIL, MINIMUM.
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 BACK FILL MATERIAL.
9. SEED MIX SHALL BE MDOT TUF SEED MIX EXCEPT AS NOTED ON THE LANDSCAPE PLAN.
10. IN AREAS WHERE THE SLOPE IS STEEPER THAN 1 VERTICAL ON 4 HORIZONTAL, SOIL EROSION CONTROL BLANKETS SHALL BE USED.
11. EXCESS MATERIAL SHALL BE HAULED OFF-SITE.
12. NO DEWATERING IS EXPECTED AS PART OF THIS PROJECT.
13. USE PITTSFIELD TOWNSHIP STANDARD DETAILS

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WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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

LEGEND

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= UTILITY POLE
= GUY ANCHOR
= HYDRANT
x901.23 = SPOT ELEV.
= POST
⊗ = GATE VALVE
= SIGN
TC = TOP OF CURB
TW = TOP OF WALL
○ = MANHOLE
□ = CATCHBASIN
= END SECTION
= GRAVEL
= FENCE
= CONCRETE
= ASPHALT
r = EXISTING STORM
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BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.
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(DATUM=NAVD 88)

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PREPARED BY [signature]
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SHEET
SOIL EROSION & SEDIMENTATION CONTROL PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17
JOB NO. 32226
DWG NO. 226-sesc
FIELD BOOK NONE
FILE NO. 10301
SHEET 8

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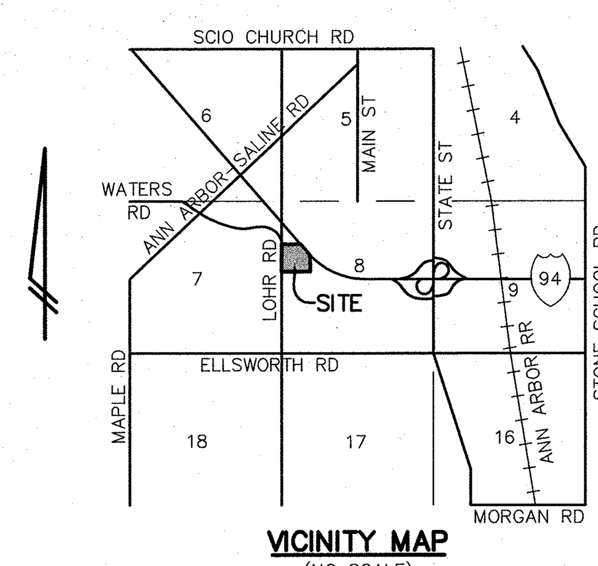

VICINITY MAP
(NO SCALE)

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SANITARY SEWER STRUCTURE SCHEDULE

STRUCTURE	RIM ELEV.	SIZE, DIRECTION & INVERT
S1	904.40	10"E INV=890.18 10"E DROP INV=884.38 ex. 12"N INV=884.11 ex. 12"S INV=884.11 5FT DIA. MANHOLE
S2	905.11	10"W INV=890.65 10"NE INV=890.75 6"N INV=892.18 4FT DIA. MANHOLE
S3	899.36	10"SW INV=891.10 10"N INV=891.20 6"SE INV=892.10 4FT DIA. MANHOLE
S4	898.73	10"S INV=892.60 6"NW INV=893.00 4FT DIA. MANHOLE

WATER MAIN STRUCTURE SCHEDULE

STRUCTURE	FINISH GRADE	DESCRIPTION
H1	897.05	EJIW 5BR 250
H2	902.12	EJIW 5BR 250
CURB STOP 1	896.59	CURB STOP BALL VALVE TYPE. NO LEAD BRASS. CURB BOX BIBLY SCREW STLYE V010 W/S169 TOP, V201 BOTTOM, V223 EXTENSTION, V240 WAER COVER COATED INSIDE AND OUT WITH TAR BASED ENAMEL
CURB STOP 2	901.66	CURB STOP BALL VALVE TYPE. NO LEAD BRASS. CURB BOX BIBLY SCREW STLYE V010 W/S169 TOP, V201 BOTTOM, V223 EXTENSTION, V240 WAER COVER COATED INSIDE AND OUT WITH TAR BASED ENAMEL
CURB STOP 3	908.38	CURB STOP BALL VALVE TYPE. NO LEAD BRASS. CURB BOX BIBLY SCREW STLYE V010 W/S169 TOP, V201 BOTTOM, V223 EXTENSTION, V240 WAER COVER COATED INSIDE AND OUT WITH TAR BASED ENAMEL
GATE VAVLE IN WELL 1	906.55	RESILIENT SEATED GATE VALVES SHALL BE MANUFACTURED BY AMERICAN FLOW CONTROL OR CLOW. THEY SHALL CONFORM TO ANSI/AWWA C515.

UTILITY QUANTITIES

QTY.	UNIT	TYPE
		STORM SEWER
401	LF	12" C76 CLIV RCP PIPE
1	EA	4FT DIA MANHOLE
2	EA	TYPE 02 COVERS
1	EA	EJIW 1040Z TYPE B COVER
1	EA	4FT DIA OUTLET STRUCTURE
6	EA	12" END SECTION
1	EA	4FT CATCH BASIN
1	EA	2FT INLET
		WATER MAIN
757	LF	8" CL54 D.I.P.
6	EA	8" CL54 D.I.P. 45° BEND
2	EA	8" CL54 D.I.P. 45° V BEND
2	EA	8" CL54 D.I.P. 22.5° BEND
2	EA	HYDRANT ASSEMBLY
2	EA	8"X8"X8" TEE
3	EA	2" CURB STOP
3	EA	2" CORPORATION
188	LF	2" "K" COPPER
1	EA	8" GATE VALVE IN WELL
		SANITARY SEWER
3	EA	6" SDR 26 PVC CLEANOUT
186	LF	6" SDR 26 PVC
1	EA	DROP CONNECTION
344	LF	10" SDR 26 PVC
3	EA	4 FT DIA SANITARY MANHOLE
1	EA	5 FT DIA SANITARY MANHOLE
4	EA	EJIW 1040Z WITH "AGS" COVER
83	LF	18" DIA. STEEL CASING PIPE

STORM SEWER STRUCTURE SCHEDULE

STRUCTURE	STRUCTURE SIZE	CASTING TYPE	RIM ELEVATION		INVERTS	PIPE LABEL	PIPE SIZE	STRUCTURE DEPTH	COMMENTS
R1		FLARED							
		END		IN=	891.87	R2R1	12 inch		
		SECTION							
R2	4' DIA	SEE OUTLET	896.08	OUT=	892.50	R2R1	12 inch	5.58	2' SUMP
		DETAIL							
R3		FLARED							
		END		IN=	895.50	R4R3	12 inch		
		SECTION							
R4	4' DIA	EJIW 1040Z FRAME	901.84	OUT=	895.92	R4R3	12 inch	7.92	2' SUMP
		TYPE B COVER		IN=	897.84	R5R4	12 inch		
		MANHOLE		IN=	896.02	R6R4	12 inch		
R5	4' DIA	EJIW 1040Z FRAME	905.96	OUT=	899.96	R5R4	12 inch	8.00	2' SUMP
		TYPE O2							
		BEEHIVE COVER							
		CATCH BASIN							
R6	2' DIA	EJIW 1040Z FRAME	898.60	OUT=	896.49	R6R4	12 inch	2.11	
		TYPE O2							
		BEEHIVE COVER							
		2FT DIA INLET							
		CATCH BASIN							
R7		FLARED							
		END		IN=	897.02	R8R7	12 inch		
		SECTION							
R8		FLARED		OUT=	897.22	R8R7	12 inch		
		END							
		SECTION							
R9		FLARED							
		END		IN=	897.22	R10R9	12 inch		
		SECTION							
R10		FLARED		OUT=	897.37	R10R9	12 inch		
		END							
		SECTION							

STORM SEWER CALCULATIONS

Label	Upstream Node	Downstream Node	Upstream Inlet Area (Acres)	Composite Rational (C)	Section Size	Pipe Type	Mannings (n)	Length (ft)	Constructed Slope (%)	System Flow Time (min)	System Intensity (in/hr)	Total System Flow (cfs)	Full Capacity (cfs)	Upstream Invert Elevation (ft)	Downstream Invert Elevation (ft)	Rim Elevation (ft)	Hydraulic Grade Line In (ft)	Hydraulic Grade Line Out (ft)	Hydraulic Slope (%)	Sump Elevation (ft)	Flowing Full Velocity (ft/s)
R10										10	5	0.58					897.69	897.69		897.37	
R10R9	R10	R9	0.25	0.46	12 inch	C76 CL IV RCP	0.013	15	1.00%	10	5	0.58	3.56	897.37	897.22		897.69	897.49	1.29%		4.53
R9										10.07	4.99	0.58					897.22	897.22		897.22	
R8										10	5	0.61					897.55	897.55		897.22	
R8R7	R8	R7	0.23	0.53	12 inch	C76 CL IV RCP	0.013	20	1.00%	10	5	0.61	3.56	897.22	897.02		897.55	897.30	1.23%		4.53
R7										10.1	4.99	0.61					897.02	897.02		897.02	
R6										10	5	0.6				898.60	896.82	896.82		896.49	
R6R4	R6	R4	0.22	0.54	12 inch	C76 CL IV RCP	0.013	96	0.49%	10	5	0.6	2.49	896.49	896.02		896.82	896.37	0.47%		3.17
R5										10	5	0.45				905.96	900.24	900.24		897.96	
R5R4	R5	R4	0.17	0.53	12 inch	C76 CL IV RCP	0.013	53	4.00%	10	5	0.45	7.13	899.96	897.84		900.24	898.01	4.20%		9.08
R4										10.61	4.91	1.03				901.84	896.37	896.37		893.92	
R4R3	R4	R3	N/A	0	12 inch	C76 CL IV RCP	0.013	86	0.49%	10.61	4.91	1.03	2.49	895.92	895.50		896.37	895.93	0.51%		3.17
R3										11.09	4.85	1.02					895.50	895.50		895.50	
R2										176.4	0.87	1.5				896.08	893.06	893.06		890.50	
R2R1	R2	R1	2.9	0.59	12 inch	C76 CL IV RCP	0.013	131	0.48%	176.4	0.87	1.5	2.47	892.50	891.87		893.06	892.39	0.51%		3.14
R1										177.06	0.87	1.49					891.87	891.87		891.87	

WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

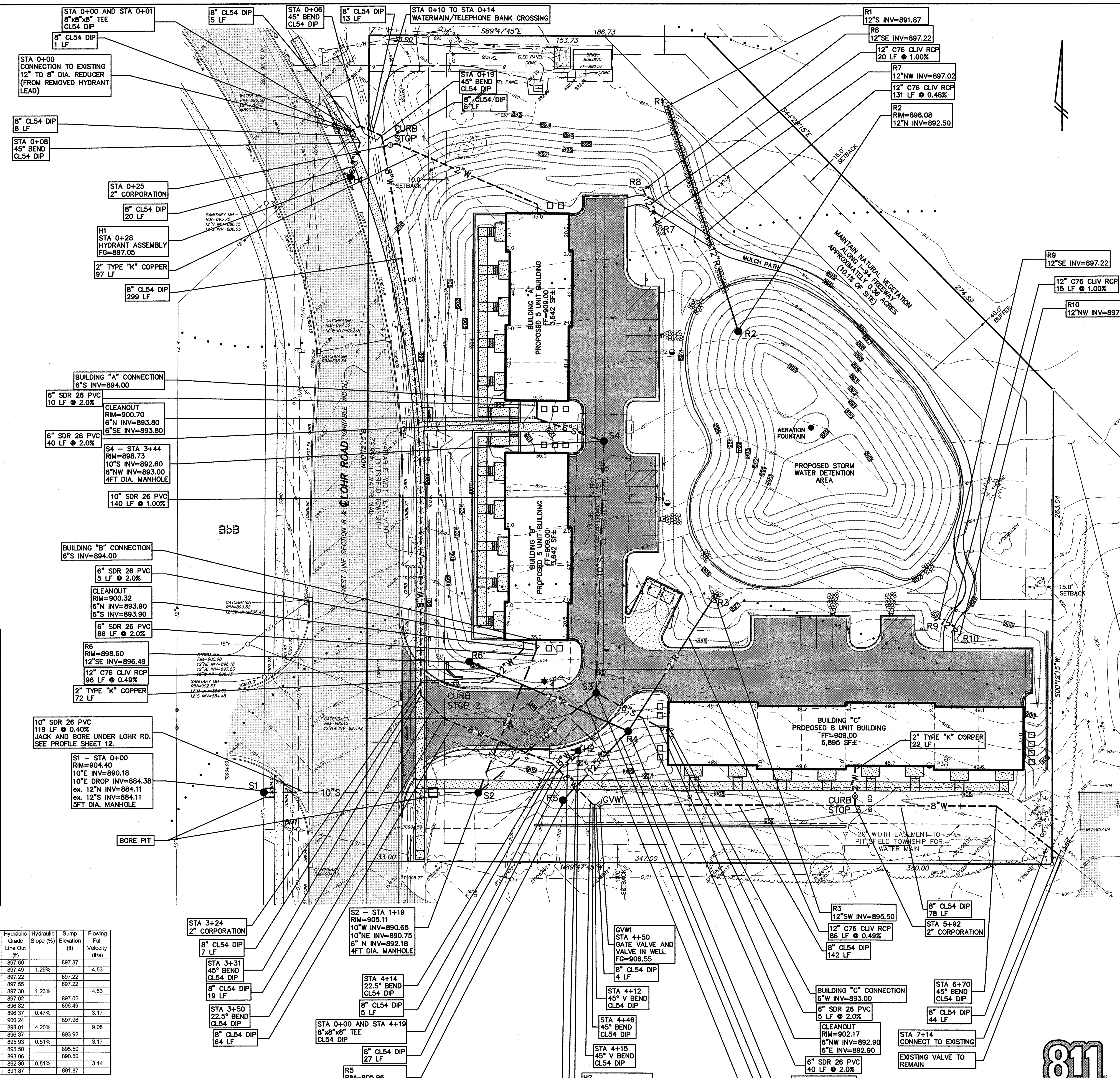
BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

PROPOSED LEGEND

= SPILLOUT CURB
= REGULAR CURB
= HMA SURFACE
= CONCRETE SURFACE
A = NO PARKING FIRE LANE SIGN
B = ADA VAN ACCESSABLE SIGN

NOTES:
1. ALL WATER MAIN PIPE SHALL BE CLASS 54 OR PC-350 DUCTILE IRON, DOUBLE CEMENT LINED.
2. ALL WATER MAIN JOINTS SHALL BE 'PUSH-ON' FOR ALL PIPE APPURTENANCES.
3. WATER MAIN SHALL BE POLY WRAPPED AND INCLUDE TRACER WIRE CONSISTANT WITH TOWNSHIP STANDARDS.
4. SERVICE LEADS FOR 1 INCH, 1.5 INCH AND 2 INCH SHALL BE TYPE "K" COPPER.
5. SERVICE LEADS FOR 4 INCH, 6 INCH AND 8 INCH SHALL BE CLASS 54 OR PC-350 DUCTILE IRON, DOUBLE CEMENT LINED.
6. HYDRANTS SHALL BE EAST JACKSON 5BR 250 WITH 24 INCH BARREL SECTION. HYDRANTS SHALL HAVE TWO PUMPER CONNECTIONS. ONE OF WHICH SHALL BE EQUIPPED WITH A "STORZ" ADAPTER. HYDRANTS SHALL OPEN LEFT (COUNTER CLOCKWISE). ALL HYDRANTS SHALL BE PAINTED RED. THE "STORZ" FITTING SHALL BE PLACED ON THE LEFT NOZZLE WHEN FACING THE HYDRANT.
7. VALVES SHALL BE THE SAME SIZE AS THE WATER MAIN ON WHICH THEY ARE INSTALLED. SIZE 8"-12" VALVES SHALL BE RESILENT WEDGE TYPE.
8. TWO (2) 45° BENDS SHALL BE USED IN LIEU OF ONE (1) 90° BEND.
9. VALVE BOXES SHALL BE TYLER 6860 ITEM DD WITH NUMBER 6 BASE, OR EQUAL.
10. SANITARY SEWER PIPE SHALL BE SDR-26 PVC.
11. STORM SEWER PIPE 12" AND LARGER SHALL BE C76 CLIV RCP. STORM SEWER PIPE SMALLER THAN 12" SHALL BE HIGH DENSITY POLYETHYLENE PIPE (HDPE), SMOOTH LINED CORRUGATED PLASTIC PIPE (SLCPP) ADS N-12 OR EQUAL.



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WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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☼ = LIGHT POLE
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= HYDRANT
x901.23 = SPOT ELEV.
P = POST
⊗ = GATE VALVE
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O = MANHOLE
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(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP, REVIEW.

SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY [signature]
JOSEPH K. MAYNARD P.E., MICH No. 52559

STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

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TEL (734)-260-3395

SHEET
UTILITY PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN
JOB NO. 32226
DWG NO. 226-util
FIELD BOOK NONE
FILE NO. 10301
DATE 6-01-17

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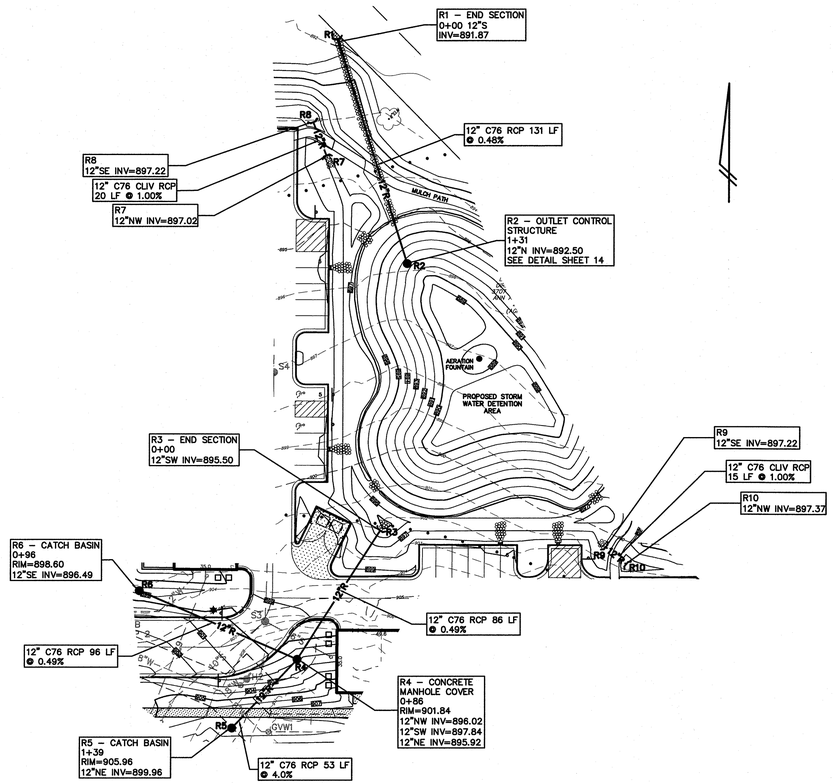

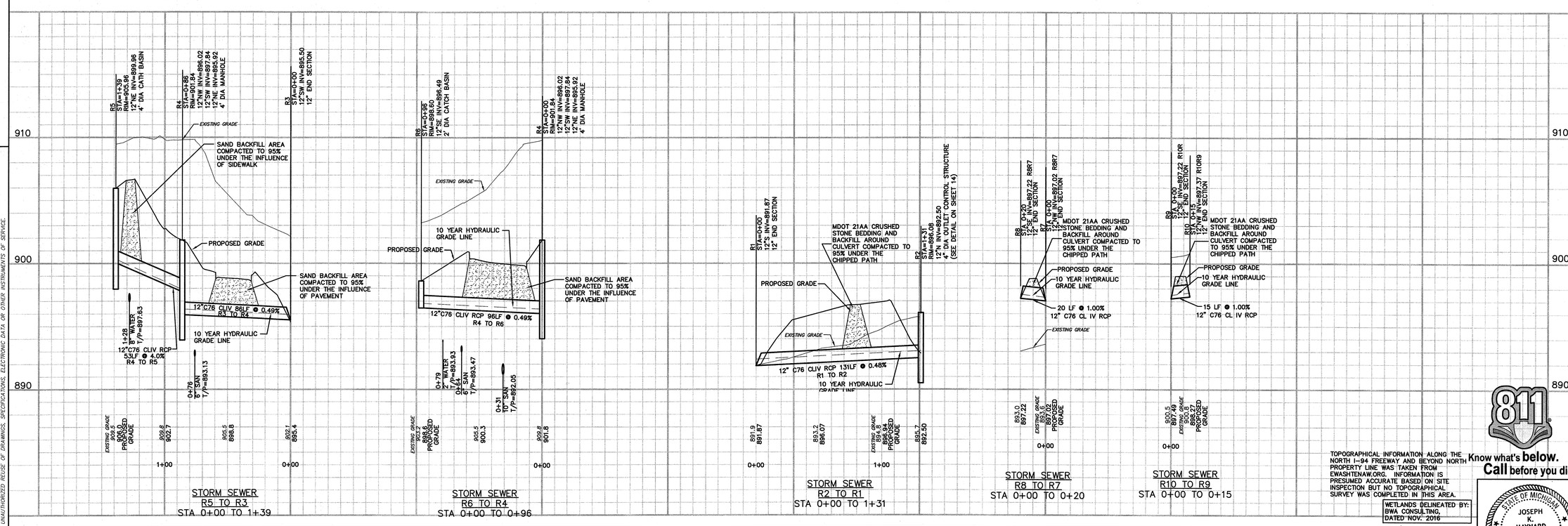

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SCALE 0 20 40 80
HORIZONTAL: 1 INCH = 40 FEET
VERTICAL: 1 INCH = 4 FEET

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

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WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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ENGINEER No. 52559
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SHEET
STORM SEWER PROFILES

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE 6-01-17
JOB NO. 32226
DWG NO. 226-stm-profiles
FIELD BOOK NONE
FILE NO. 10301

SHEET 10

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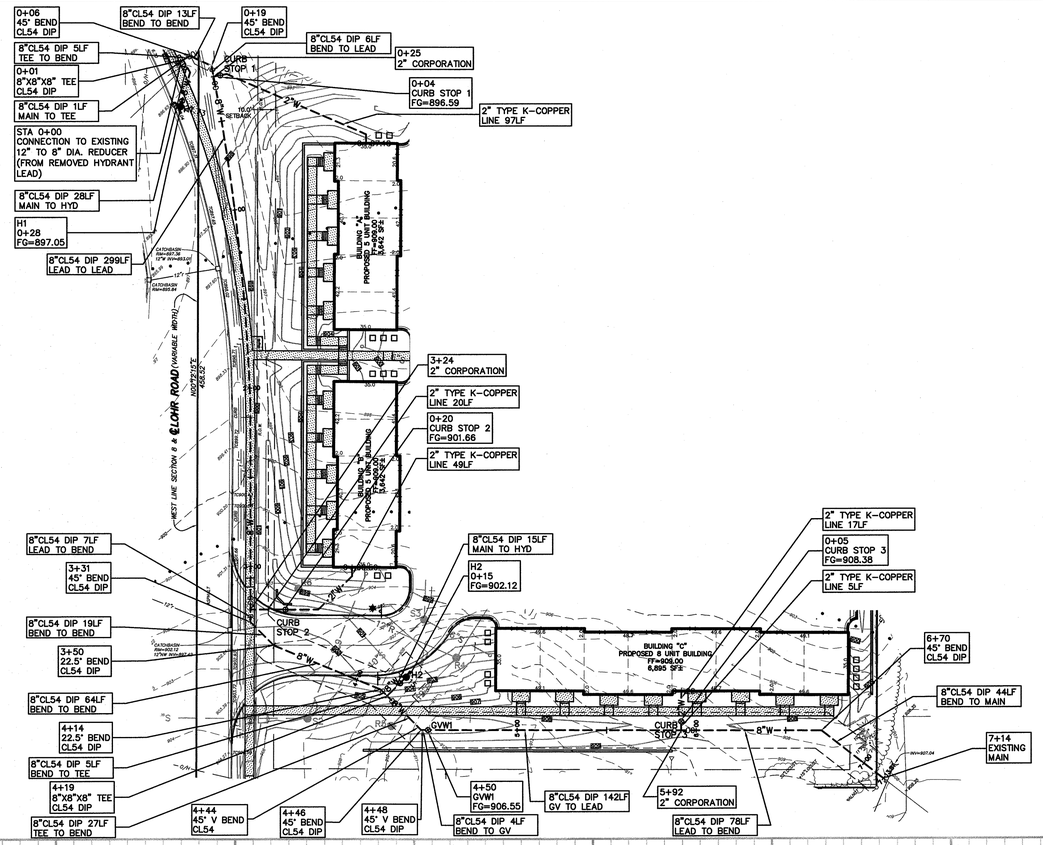
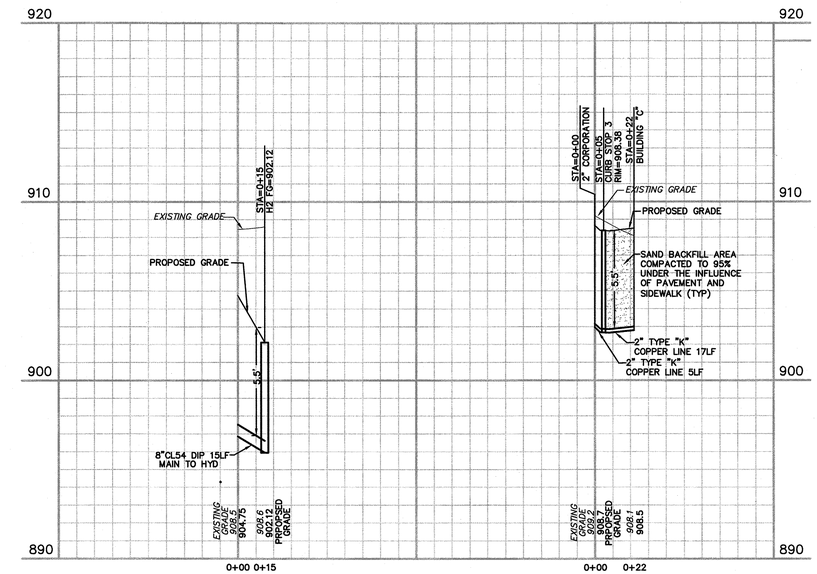
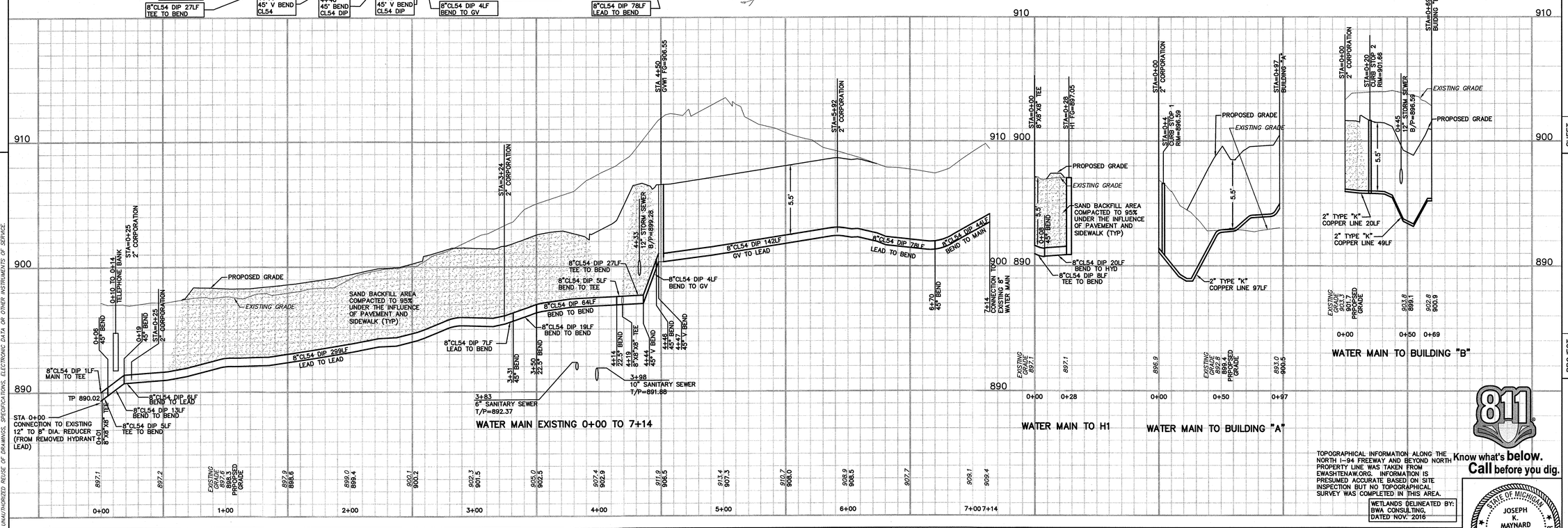




WATER MAIN TO H2

WATER MAIN TO BUILDING "C"



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WATER MAIN PLAN/PROFILE

PROJECT: FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE 6-01-17 | JOB NO. 32226 | DWG NO. 226-water-profiles | FIELD BOOK NONE | FILE NO. 10301

SHEET 11

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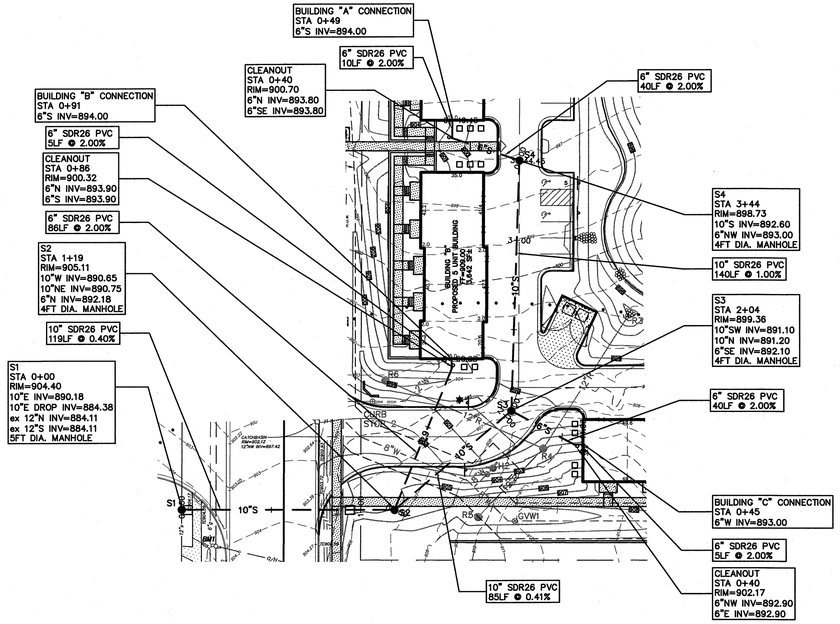
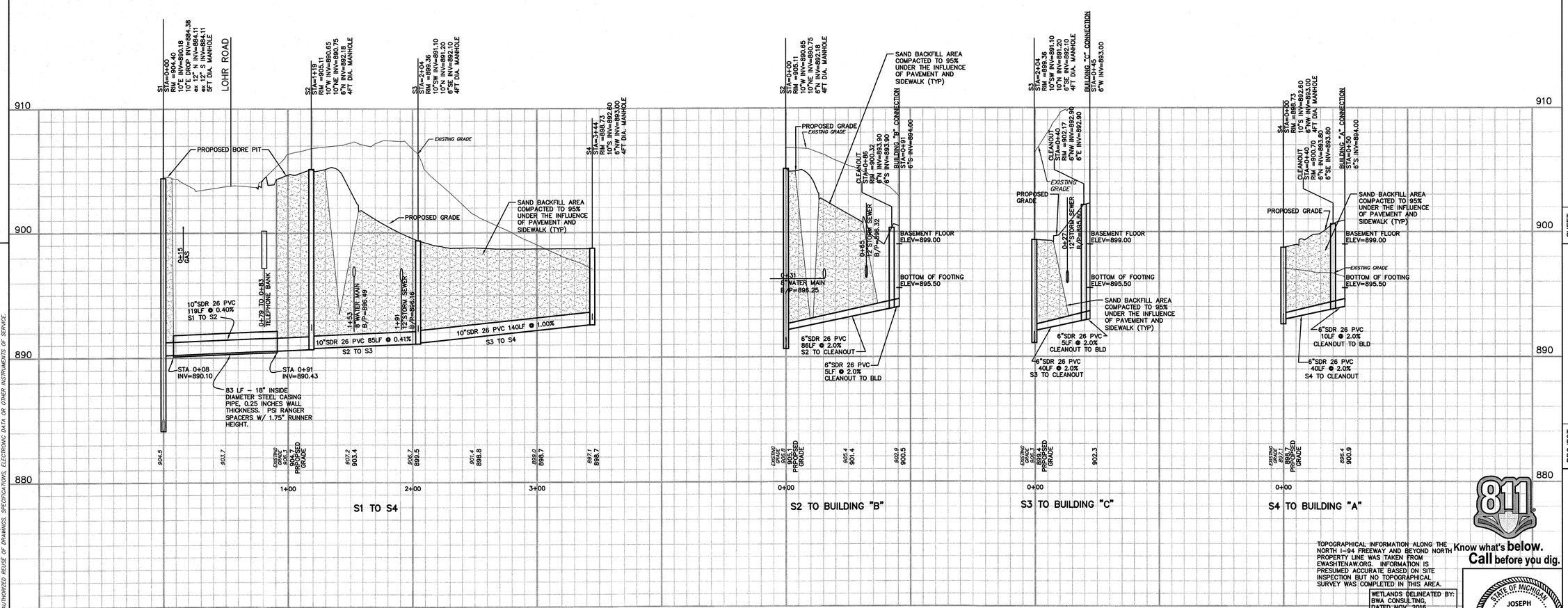


SANITARY SEWER DESIGN CALCULATIONS:
1. TOTAL NUMBER OF UNITS IS 18 UNITS.
2. DESIGN POPULATION FACTOR OF 3.4 PERSONS PER UNIT.
3. USAGE IS 100 GALLONS/DAY-PERSON
4. TOTAL USAGE FOR PROJECT IS 6,120 GALLONS PER DAY(GPD) OR 0.01 CUBIC FEET/SECOND(CFS).
5. USING A PEAK HOUR FACTOR OF 4 THE FLOW IS 24,480 GPD OR 0.04 CFS.
6. CAPACITY OF 10" DIAMETER SEWER WITH 0.40% MINIMUM SLOPE IS 0.14 CUBIC FEET/SECOND.



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WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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LEGEND

- LIGHT POLE
- UTILITY POLE
- GUY ANCHOR
- HYDRANT
- SPOT ELEV.
- POST
- GATE VALVE
- SIGN
- TC = TOP OF CURB
- TW = TOP OF WALL
- MANHOLE
- CATCHBASIN
- END SECTION
- GRAVEL
- FENCE
- CONCRETE
- ASPHALT
- EXISTING STORM
- EXISTING SANITARY
- EXISTING WATER
- EXISTING GAS
- EXISTING ELECTRIC
- EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.

BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.

(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 20 40 80
HORIZONTAL: 1 INCH = 40 FEET
VERTICAL: 1 INCH = 4 FEET

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

CIVIL ENGINEERS
PLANNERS • SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
ANN ARBOR, MI 48103
TEL 734-761-8800
FAX 734-761-9530
WASHTENAWENGINEERING.COM

WASHTENAW ENGINEERING

CLIENT: DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET: SANITARY SEWER PLAN/PROFILE

PROJECT: FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE 6-01-17 | JOB NO. 32226 | DWG NO. 226-san-profiles | FIELD BOOK NONE | FILE NO. 10301

SHEET 12

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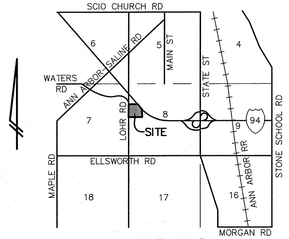
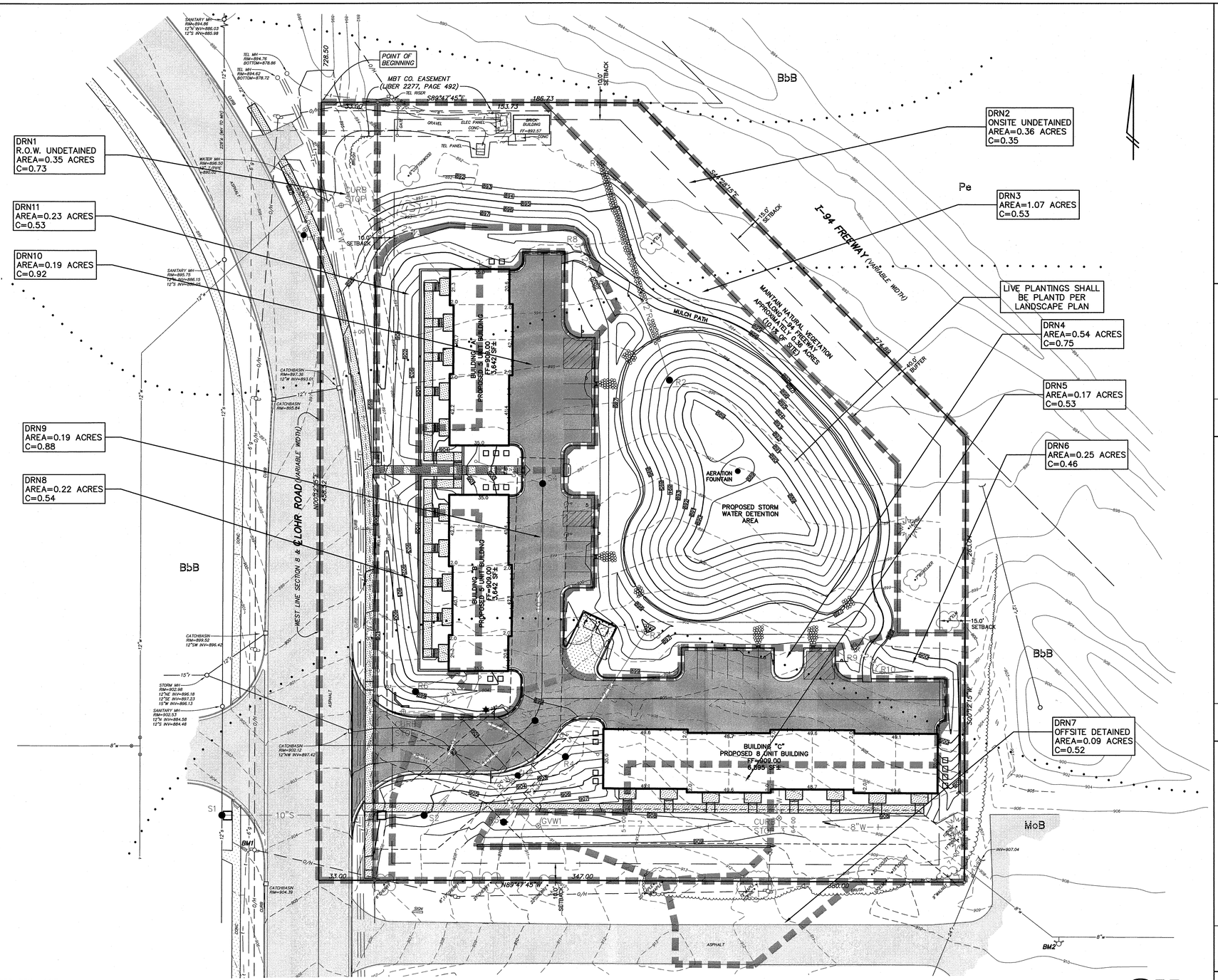


VICINITY MAP
(NO SCALE)



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PROPOSED DRAINAGE NAME	WATER SFT	WATER ACRE	C	IMPERVIOUS SFT	IMPERVIOUS ACRE	C	PERVIOUS C soils SFT	PERVIOUS C soils ACRE	C	PERVIOUS D soils SFT	PERVIOUS D soils ACRE	C	TOTAL AREA SFT	TOTAL AREA ACRE	WEIGHTED C
DRN1	0	0	1.00	9089	0.21	0.95	2110	0.05	0.30	3932	0.09	0.45	15131	0.35	0.73
DRN2	0	0	1.00	0	0.00	0.95	10238	0.23	0.30	5549	0.13	0.45	15787	0.36	0.35
DRN3	11117	0.25	1.00	2109	0.05	0.95	22759	0.52	0.30	10748	0.25	0.45	46733	1.07	0.53
DRN4	0	0	1.00	16289	0.37	0.95	7302	0.17	0.30	0	0.00	0.45	23591	0.54	0.75
DRN5	0	0	1.00	2382	0.06	0.95	4907	0.11	0.30	0	0.00	0.45	7289	0.17	0.53
DRN6	0	0	1.00	2377	0.06	0.95	8341	0.19	0.30	0	0.00	0.45	10718	0.25	0.46
DRN7	0	0	1.00	1431	0.03	0.95	2394	0.06	0.30	0	0.00	0.45	3825	0.09	0.52
DRN8	0	0	1.00	3439	0.08	0.95	6095	0.14	0.30	0	0.00	0.45	9534	0.22	0.54
DRN9	0	0	1.00	7446	0.17	0.95	997	0.02	0.30	0	0.00	0.45	8443	0.19	0.88
DRN10	0	0	1.00	7670	0.18	0.95	617	0.01	0.30	0	0.00	0.45	8287	0.19	0.92
DRN11	0	0	1.00	2542	0.06	0.95	2310	0.05	0.30	4982	0.11	0.45	9834	0.23	0.53

WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

PROPOSED LEGEND

= SPILLOUT CURB
= REGULAR CURB
= HMA SURFACE
= CONCRETE SURFACE
= NO PARKING FIRE LANE SIGN
= ADA VAN ACCESSABLE SIGN

TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

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SHEET
STORM WATER MANAGEMENT DRAINAGE AREA PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE	6-01-17
JOB NO.	322226
DWG NO.	226-stm-dm
FIELD BOOK	NONE
FILE NO.	10301
SHEET	13

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STORM WATER MANAGEMENT CALCULATIONS

Standard Method Runoff Volume Work Sheets						
	Project:	FOUNTAIN BLUE				
	Basin:	A				
	By:	Seth Garner, P.E.				
	Date:	5/7/2018				
W1	Determining Post-Development Cover types, Areas, Curve Numbers and Runoff					
	Total Site area =	3.57	Ac			
	Disturbed Site Area =	2.95	Ac			
	% Disturbed =	83	%			
	If less than 50% of the site over the last 10 years is being disturbed after initial approval by the WCWRC, only the disturbed area needs to be updated.					
	Total Site area Excluding "Self-Crediting" BMPS =			2.86	Ac	
	Rational Method Variables					
	Cover Type	Soil Type	Slope Letter	Area (ft2)	Area(acre)	Runoff Coefficient C	(C)(Area)
	Pervious	C	A	55722	1.28	0.3	0.38
	Pervious	D	A	15730	0.36	0.45	0.16
	Impervious			45685	1.05	0.95	1.00
	Water			11117	0.26	1	0.26
					Σ(C)(Area) =	1.80
					Σ(Area) =	2.95
					Weighted C = Σ(C)(Area)/Σ(Area) =	0.61
	NRCS Variables - Pervious Cover					
	Pervious Cover Type	Soil Type		Area (ft2)	Area(acre)	Curve Number	(CN)(Area)
	Open Space-Good	C		55722	1.28	74	94.72
	Open Space-Good	D		15730	0.36	80	28.80
					Σ(CN)(Area) =	123.52
					Σ(Area) =	1.64
					Weighted CN = Σ(C)(Area)/Σ(Area) =	75
	NRCS Variables - Impervious Cover					
	Impervious Cover Type	Soil Type		Area (ft2)	Area(acre)	Curve Number	(CN)(Area)
	Paved	D		45685	1.05	98	102.90
	Water	D		11117	0.26	98	25.48
					Σ(CN)(Area) =	102.90
					Σ(Area) =	1.05
					Weighted CN = Σ(C)(Area)/Σ(Area) =	98
W2	First Flush					
			Vff =	(1")(1'/12")(43560ft3/1ac)AC		
		Total Area	A =	2.86	Ac	
		Weighted C	C =	0.61		
			Vff =	6333	cft	
W3	Pre-development Bankfull Runoff Calculation (Vbf-pre)					
	Existing Cover Type =	Meadow				
	2year/24 hour storm event P =	2.35	inches			
	Weighted CN =	72				
	S = (1000/CN) - 10 =	3.888889	inches			
	$Q = (P-0.2S)^2/(P+0.8S)$ =	0.452634	inches			
	Total Site Area (SF) excluding "Self-Crediting" BMPs Area =	128254	square feet			
	Vbf-pre = Q(1/12)Area =	4838	ft^3			
W4	Pervious Cover Post-development Bankfull Runoff Calculation (Vbf-per-post)					
	2year/24 hour storm event P =	2.35	inches			
	Pervious Curve Number from W1 =	75				
	S = (1000/CN) - 10 =	3.333333	inches			
	$Q = (P-0.2S)^2/(P+0.8S)$ =	0.564839	inches			
	Pervious Cover Area from W1 =	71452	square feet			
	Vbf-per-post = Q(1/12)Area =	3363	ft^3			
W5	Impervious Cover Post-development Bankfull Runoff Calculation (Vbf-imp-post)					
	2year/24 hour storm event P =	2.35	inches			
	Impervious Curve Number from W1 =	98				
	S = (1000/CN) - 10 =	0.204082	inches			
	$Q = (P-0.2S)^2/(P+0.8S)$ =	2.121674	inches			
	Impervious Cover Area from W1 =	56802	square feet			
	Vbf-imp-post = Q(1/12)Area =	10043	ft^3			
W6	Pervious Cover Post-development 100-Year Storm Runoff Calculation ($V_{100\text{-per-post}}$)					
	100year/24 hour storm event P =	5.11	inches			
	Pervious Curve Number from W1 =	75				
	S = (1000/CN) - 10 =	3.333333	inches			
	$Q = (P-0.2S)^2/(P+0.8S)$ =	2.538776	inches			
	Pervious Cover Area from W1 =	71452	square feet			
	$VV_{100\text{-per-post}}$ = Q(1/12)Area =	15117	ft^3			
W7	Impervious Cover Post-development 100-Year Storm Runoff Calculation ($V_{100\text{-imp-post}}$)					
	100year/24 hour storm event P =	5.11	inches			
	Impervious Curve Number from W1 =	98				
	S = (1000/CN) - 10 =	0.204082	inches			
	$Q = (P-0.2S)^2/(P+0.8S)$ =	4.873	inches			
	Impervious Cover Area from W1 =	56802	square feet			
	$V_{100\text{-imp-post}}$ = Q(1/12)Area =	23066	ft^3			
W8	Determine Time of Concentration for Applicable Flow Types (Tc-hrs)					

Flow Type	K	Change in Elevation	Length (L)	Slope % (S*100)	$S^{0.5}$	$V=K*S^{0.5}$	Tc = L/(V*3600)
Sheet Flow*	0.48	9	180	5	2.24	1.08	0.05
Waterway	1.2	1	50	2	1.41	1.69	0.01
Small Trib.	2.1						
						Total Tc =	0.06

*Sheet flow cannot exceed 300 feet. Anything beyond this is considered waterway.

W9	Runoff Summary & Onsite Infiltration Requirement		
	First Flush Volume Vff =	6333	ft^3
	Pervious-Post Development Bankfull Runoff Volume Vbf-per-post =	3363	ft^3
	Impervious Cover Post-Development Bankfull Runoff Volume Vbf-imp-post =	10043	ft^3
	Total BF Volume Vbf-post =	13406	ft^3
	Pervious - Post Development 100-year Runoff Volume $V_{100\text{-per-post}}$ =	15117	ft^3
	Impervious Cover Post-Development 100-year Runoff Volume $V_{100\text{-imp-post}}$ =	23066	ft^3
	Total 100-year Volume V_{100} =	**38183**	ft^3
	Determine Onsite Infiltration Requirement		
	Subtract the Pre-Development Bankfull from the Post Development Bankfull Volume		
	Total Post-Development Bankfull Volume Vbf-post =	13406	ft^3
	Pre-Development Bankfull Runoff Volume Vbf-pre =	4838	ft^3
	Bankfull Volume Difference =	8568	ft^3
	Compare the Bankfull Volume Difference with the First Flush Volume.		
	The greater of the two is the Onsite Infiltration Requirement.		
	Onsite Infiltration Requirement V_{inf} =	**8568**	ft^3
W10	Detention/Retention Requirement		
	Detention		
	Peak of Unit Hydrograph $Qp=238.6Tc^{-0.82}$ =	2397	$cfs/in\text{-}mi^2$
	Total Site Area (ac) excluding "Self Crediting" BMPs Area =	2.86	ac
	$Q_{100} = Q_{100\text{-per}} + Q_{100\text{-imp}}$ =	7.4117758	in
	Peak Flow PF =Qp*Q100*Area/640 =	79.391931	cfs

STORM WATER MANAGEMENT CALCULATIONS (CONTINUED)

W12	Natural Features Inventory			
	Exististing Natural Resources	Mapped (yes,no, n/a)	Total Area (ac)	Protected/ Undisturbed Area (ac)
	Waterbodies			
	Floodplains			
	Riparian Areas			
	Wetlands			
	Woodlands			
	Natural Drainage Area		0.36	0.36
	Steep Slopes, 15%-25%			
	Steep Slopes, over 25%			
	Special Habitat Areas			
	Other		0.35	0.35
	Total Existing (ac)			0.71
W13	Summary			
	A. Storm Water Management Summary			
	Minimum Onsite Infiltration Requirement, Vinf =	8568	cft	
	Designed/Provided Infiltration Volume =	0	cft	
	% Minimum Required Infiltration Provided =	0	%	
	Total Calculated Detention Volume, Vdet =	37977	cft	
	Net Required Detention Volume (Vdet - Designed/Provided Infiltration Volume) =	37977	cft	
	B. Detention Volume Increase for sites where the required infiltration cannot be achieved.			
	% Required Infiltration NOT provided (100%-%Minimum Required Infiltration Provided)	100	%	
	Net % Penalty (20% x %Required Infiltration NOT Provided)	20	%	
	Total Required Detention Volume, including penalty [(100% + Net % Penalty) x Net Required Detention Volume)]	45572	cft	
	Additional Design Requirements			
	Minimum Area for Infiltration =	Impervious Area/8		
	=	5717	sf	
	=	Total Area/10		
	=	12825	sf	

STORM WATER BASIN CALCULATIONS

DETENTION BASIN CALCULATIONS

PROJECT NAME: Fountian Blue

Design By: Seth Garner, P.E. **Date:** 5/7/2018

100 YEAR FLOOD VOLUME STORAGE

V100 = 45572 cft

BANKFULL FLOOD VOLUME:

Vbf = 13406

FIRST FLUSH VOLUME

Vff = 6333 cf

STORAGE ANALYSIS

	Pond Area			Additional Pond Area			Cumulative
	Elevation	Area A	Vol A (cft)	Area B	Vol B (cft)	Vol A+B (cft)	Vol (cft)
	897.5	20600	9963	0	0	9963	72060
	897	19250	17957	0	0	17957	62098
	896	16663	15449	0	0	15449	44141
	895	14235	13100	0	0	13100	28692
	894	11965	10912	0	0	10912	15592
	893	9858	4681	0	0	4681	4681
Xbot	892.5	8865	0	0	0	0	0
					TOTAL VOLUME (A+B)	72060	CF

Storage Elev Calc: First Flush (Xff) — **Xff =** 893.15

Storage Elev Calc: Bankfull (Xbf) — **Xbf =** 893.83

Storage Elev Calc: 100 year — **X100 =** 896.08

OUTLET CONTROL STRUCTURE DESIGN

FIRST FLUSH:

Calculate Allowable Release Rate for First Flush Runoff (Vff)		
Qff =	Vff/[(24 hrs)*(3600 s/hr)]	
Qff =	0.073	cfs
Calculate Average Head for First Flush Runoff		
	*assume trapezoidal cross section	
H(average) =	2/3*(Xff-Xbot)	
H(average) =	0.44	ft
Calculate Orifice Area Required for First Flush Discharge		
Aff=	Qff/[0.62*(2*g*h)^.5]	
Aff =	0.0222	sft
Calculate # of Orifice Openings		
Orifice Diam.	1	inches
Area =	0.00545415	sft
# openings =	Aff/(Area of orifice)	
# openings =	4.08	
# openings required =	4.00	
Total Area of orifice =	0.02182	sft
Calculate Detention Time for Orifice Openings		
Qff(new) =	Aff(0.62)(2*g*Have)^.5	
Qff(new) =	0.072	cfs
Tff(new) =	Vff/Qff(new)	
Tff(new) =	87958.3333	sec
Tff(new) =	**24.43**	**hours**
	> 24 hour minimum time for discharge	
BANKFULL FLOOD		
Check FF Orifice to Determine Whether Adequate for BF Discharge in Allowable T(36<T<48		
Calculate Average Head for First Flush Runoff Orifice		
	*assume trapezoidal cross section	
H(average) =	2/3*(Xbf-Xbot)	
H(average) =	0.89	ft
Calculate Q Utilizing First Flush Orifice		
Qbf =	Aff(0.62)(2*g*Hbf)^.5	
Qbf =	0.102	cfs
Calculate Time for Bankfull Discharge (36 hrs< Tbf < 48 hrs)		
Tbf =	Vbf/Qbf	
Tbf =	131431.37	sec
Tbf =	36.5	hours
Determine Additional Orifice Required for Bankfull Discharge Within 48 hrs		
T(target) =	40	hrs
V(remaining)	Vbf - Vff	
V(remaining)	7073	cf
T(remaining)	T(target) - Tff	
T(remaining)	15.6	hrs
Calculate Q and V for Remaining Time		
Hbf =	2/3(Xbf-Xff)+(Xff-Xbot)	
Hbf =	1.11	ft
Qbf+ff =	0.62*Aff*(2*g*Hbf)^.5	
Qbf+ff =	0.1141	cfs
V =	T(remaining)*Qbf+ff	
V =	6396	cft
Calculate Discharge Volume for Bankfull Orifice		
Vbfo =	Vrem - V	
Vbfo =	677	cft
Qbfo =	Vbfo/Trem	
Qbfo =	0.01207	cfs
Hbf =	2/3(Xbf - Xff)	
Hbf =	0.45333	ft
Abf =	Qbf/[0.62*(2*g*h)^.5]	
Abf =	0.00360	sft
Calculate # of Orifice Openings		
Orifice Diam.	1	inches
Area of orifice =	0.00545	sft
Calculate # of Orifice Required		
# =	0.6608	
# openings required =	1.00	
Total Area of orifice =	0.00545	sft

STORM WATER BASIN CALCULATIONS (CONTINUED)

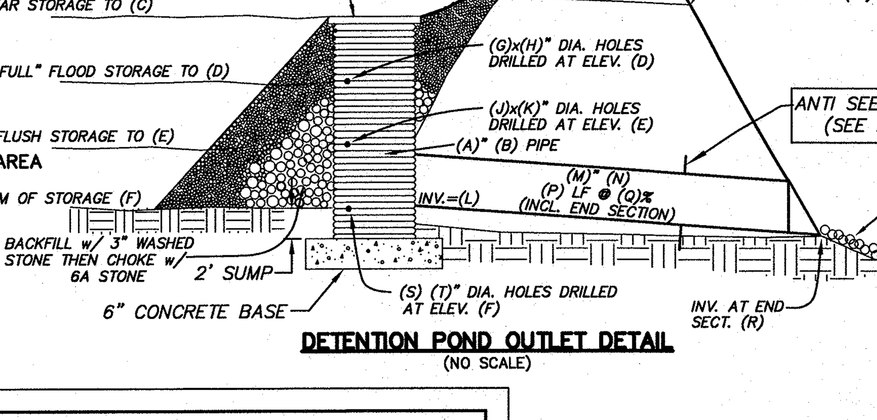
Check Time for Bankfull Discharge (36 hrs< Tbf < 48 hrs)		
Qbfo =	0.62*Aff*(2*g*Hbf)^.5	
Qbfo =	0.01827	cft
Tbf =	Tff(new)+Vrem/[(Qbf+ff + Qbfo)*(3600sec/1hr)]	
Tbf =	39.3	hrs
100 YEAR FLOOD		
Maximum Allowable Flow =	Qa	
Qa =	0.15 * Total Area Tributary to Basin(acres)	
Qa =	0.15 * 2.86	
Qa =	0.429	cfs
Calculate Q100 (flow not accomodated by FF or BF orifice under 100 year conditions)		
Hbf =	X100-Xff	
Hbf =	2.9	ft
Hff =	X100-Xbot	
Hff =	3.6	ft
Qff + Qbf =	(0.62)(Aff)(2gHff)^.5 + (0.62)(Abf)(2gHbf)^.5	
Qff + Qbf =	0.2518	cfs
Calculate Q100		
Q100 =	Qa - (Qff+Qbf)	
Q100 =	0.177	CFS
Calculate Orifice Area required to Discharge Q100		
H100 =	X100-Xbf	
H100 =	2.3	ft
Atot =	Q100/(0.62(2*g*H100)^.5)	
Atot =	0.02374	sft
Calculate # of Orifice Openings		
Orifice Diam.	1	inches
Area of orifice =	0.00545	sft
Calculate # of Orifices Needed		
# Orifice =	Atot/(Area of Orifice)	
# Orifice =	4.35	
# openings required =	4.00	
Check allowable flow rate is not exceeded.		
Qact =	Qff + Qbf + 0.62*#orifice*Aorifice*(2gH100)^0.5	
Qact =	0.415	cfs
Check Time for 100-year Storm Discharge (T100 < 72 hrs)		
Discharge through ff orifices		
Hall =	2/3(X100-Xbf)+(Xbf-Xbot)	
Hall =	2.83	ft
Qall =	(0.62)(#fforif)(Afforif)[2gHall)^0.5	
Qall =	0.183	cfs
Discharge through Bf orifices		
Hbf =	2/3(X100-Xbf)+(Xbf-Xff)	
Hbf =	2.18	ft
Qbf+100 =	(0.62)(#bforif)(Abforif)[2gHbf)^0.5	
Qbf+100 =	0.040	cfs
Discharge through 100yr orifices		
H100 =	2/3(X100-Xbf)	
H100 =	1.50	ft
Q100 =	(0.62)(#100orif)(A100orif)[2gH100)^0.5	
Q100 =	0.133	cfs
Time to Discharge		
Vrem =	V100-Vbf	
Vrem =	32166	cft
T100 =	Tbf + Vrem/[(Qall + Qbf+100 +Q100)*(3600sec/1hr)]	
T100 =	64.40	hrs

ORIFICE TABLE

CALCULATED ELEVATION	ORIFICE #	DIAM. (IN)
892.50	4	1
893.15	1	1
893.83	4	1

OUTLET STRUCTURE TABLE

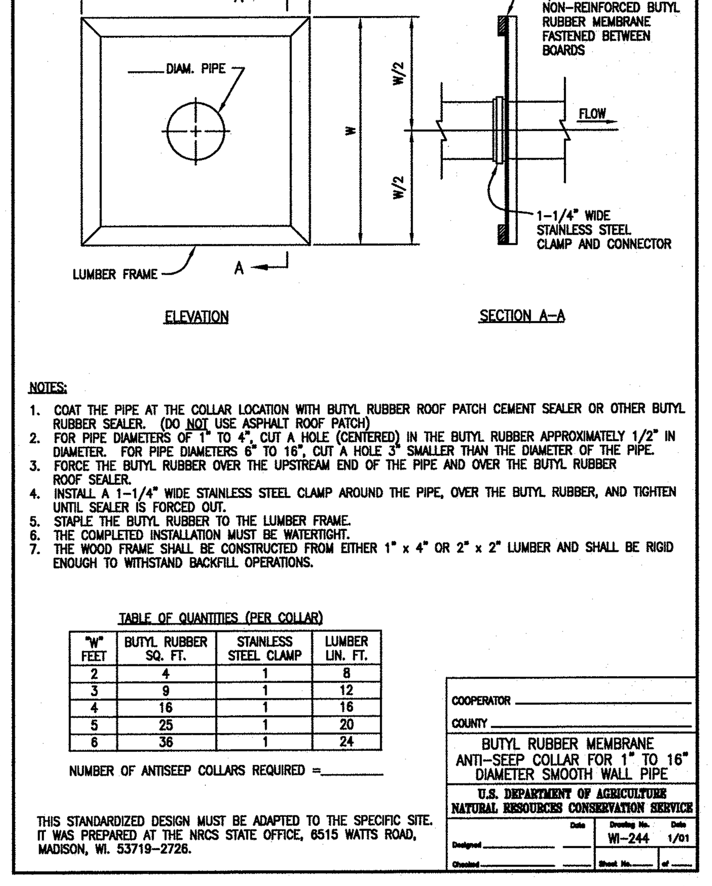
DIAMETER OF STANDPIPE	A	48 inch	INVERT OF OUTLET PIPE	L	892.50
MATERIAL OF STANDPIPE	B	CMP	DIAMETER OF OUTLET PIPE	M	12 inch
100 YEAR STORAGE TO	C	896.08	MATERIAL OF OUTLET PIPE	N	C76 CLIV RCP
BANK FULL FLOOD STORAGE TO	D	893.83	LENGTH OF OUTLET PIPE	P	131
FIRST FLUSH STORAGE TO	E	893.15	SLOPE OF OUTLET PIPE	Q	0.48%
BOTTOM OF BASIN	F	892.50	INVERT AT END OF OUTLET PIPE	R	891.87
NUMBER OF HOLE(S) AT BANK FULL	G	4	NUMBER OF HOLE(S) AT BOTTOM OF BASIN	S	4
DIAMETER OF HOLE(S) AT BANK FULL	H	1 inch	DIAMETER OF HOLE(S) AT BOTTOM OFBASIN	T	1 inch
NUMBER OF HOLE(S) AT FIRST FLUSH	J	1	PROPOSED FINISH GROUND ELEVATION	V	897.08
DIAMETER OF HOLE(S) AT FIRST FLUSH	K	1 inch	EMERGENCY OVERFLOW ELEVATION	W	896.58



LIVE PLANTINGS SHALL COVER ENTER AREA BELOW THE FIRST FLUSH ELEVATION

DETENTION POND OUTLET DETAIL

(NO SCALE)



NOTES:

1. COAT THE PIPE AT THE COLLAR LOCATION WITH BUTYL RUBBER ROOF PATCH CEMENT SEALER OR OTHER BUTYL RUBBER SEALER. (DO NOT USE ASPHALT ROOF PATCH)
2. FOR PIPE DIAMETERS OF 1" TO 4", CUT A HOLE (CENTERED) IN THE BUTYL RUBBER APPROXIMATELY 1/2" IN DIAMETER. FOR PIPE DIAMETERS 6" TO 16", CUT A HOLE 3" SMALLER THAN THE DIAMETER OF THE PIPE.
3. FORCE THE BUTYL RUBBER OVER THE UPSTREAM END OF THE PIPE AND OVER THE BUTYL RUBBER ROOF SEALER.
4. INSTALL A 1-1/4" WIDE STAINLESS STEEL CLAMP AROUND THE PIPE, OVER THE BUTYL RUBBER, AND TIGHTEN UNTIL SEALER IS FORCED OUT.
5. STAPLE THE BUTYL RUBBER TO THE LUMBER FRAME.
6. THE COMPLETED INSTALLATION MUST BE WATERTIGHT.
7. THE WOOD FRAME SHALL BE CONSTRUCTED FROM EITHER 1" x 4" OR 2" x 2" LUMBER AND SHALL BE RIGID ENOUGH TO WITHSTAND BACKFILL OPERATIONS.

TABLE OF QUANTITIES (PER COLLAR)

"W" FEET	BUTYL RUBBER SQ. FT.	STAINLESS STEEL CLAMP	LUMBER LIN. FT.
2	4	1	8
3	9	1	12
4	16	1	16
5	25	1	20
6	36	1	24

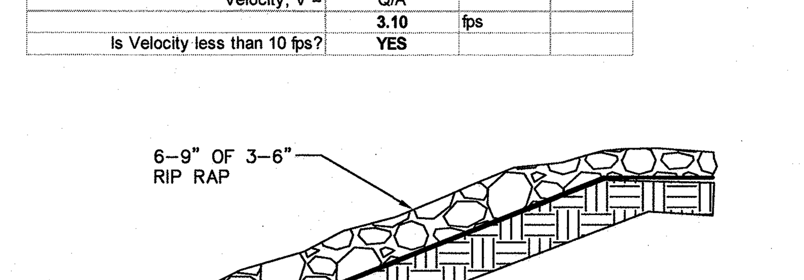
NUMBER OF ANTISEEP COLLARS REQUIRED = ________

THIS STANDARDIZED DESIGN MUST BE ADAPTED TO THE SPECIFIC SITE. IT WAS PREPARED AT THE NRCS STATE OFFICE, 6515 WATTS ROAD, MADISON, WI. 53719-2726.

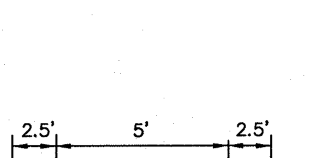
COOPERATOR ________
COUNTY ________
BUTYL RUBBER MEMBRANE ANTI-SEEP COLLAR FOR 1" TO 16" DIAMETER SMOOTH WALL PIPE
U.S. DEPARTMENT OF AGRICULTURE NATURAL RESOURCES CONSERVATION SERVICE
Designed ____ Checked ____ Date Drawing No. WI-244 Date 1/01 Sheet No. ____ of ____

EMERGENCY OVERFLOW DESIGN

Emergency Overflow Design		
Basin:	**Pond A**	
Design Requirements:		
Tc for 100 Year Flood Volume Storage Calculation		
Calculate Qo		
Qa =	0.15 cfs/acre * Acres	
Qa =	0.4425	cfs
Qo =	Qa/(A*C)	
Qo =	0.24590	cfs/(ac-imp)
Calculate Storage Time for 100 year storm event		
Tc =	-25 + (10312.5/Qo)^.5	
Tc =	179.79	min
Maximum Flow Rate		
Qmax =	C*I*A	
Tc =	177.06	
I_{10year}=	175/(Tc+25)	
Qmax =	**1.56**	cfs
Minimum Velocity =	2	fps
Maximum Velocity =	6	fps
Minimum Slope =	1.5	%
Side Slope No Steeper Than =	1V : 3H	
Calculations:		
Channel Bottom Width (B) =	5.000	feet
Channel Depth(d) =	0.5	feet
Channel Side Slope 1V : H =	5	
Flow Area =	B*d + 2*(1/2)*(d*(H*d))	
	3.750	square feet
Wetted Perimeter =	B+2*(d^2+(d*H)^2)^.5	
	10.099	feet
Hydraulic radius =	Area/Wetted Perimeter	
	0.371	
Mannings Formula:		
n =	0.035	
slope, s =	2	percent
Full Flow, Q =	1.486/n*A*(A/P)^(2/3)*(s/100)^(1/2)	
	11.632	cfs
Is Full Flow greater than Qmax?	**YES**	
Velocity, V =	Q/A	
	3.10	fps
Is Velocity less than 10 fps?	**YES**	



LONGITUDINAL SECTION OF SPILLWAY



CROSS SECTION OF SPILLWAY

EMERGENCY OVERFLOW DETAIL

NOT TO SCALE

STORM WATER MANAGEMENT NARRATIVE

EXISTING CONDITIONS
THE PROJECT SITE IS LOCATED AT 3253 LOHR ROAD, PITTSFIELD TOWNSHIP, WASHTENAW COUNTY. THE SITE HAS AN EXISTING MICHIGAN BELL TELEPHONE SERVICE STATION AT THE NORTH WEST CORNER OF THE PROPERTY. THIS SITE HAS AREAS OF WOODLAND AND NATURAL DRAINAGE AREAS THAT ARE NOT TO BE DISTURBED AS PART OF THIS DEVELOPMENT. THERE IS AN EXISTING WETLAND AREA AT THE NORTH WEST END OF THE SITE. THE SITE CURRENTLY DISCHARGES TO THE NORTH EAST TOWARD THE I-94 FREEWAY. THERE IS CURRENTLY NO FLOODING IN THE I-94 RIGHT-OF-WAY AND THERE IS NOT A 100-YEAR FLOOD PLAIN WITHIN 500 FEET OF THE SITE.

PROPOSED IMPROVEMENTS
THE PROPERTY IS BEING DEVELOPED FOR USE OF RESIDENTIAL TOWNHOUSES. THIS INCLUDES THREE BUILDINGS AND A PARKING AREA AND ASSOCIATED UTILITY IMPROVEMENTS. THE STORM WATER IS TO BE TREATED AND DETAINED PRIOR TO RELEASE TO THE NORTH EAST. APPROVAL FROM THE MICHIGAN DEPARTMENT OF TRANSPORTATION WILL BE REQUIRED FOR THIS DISCHARGE.

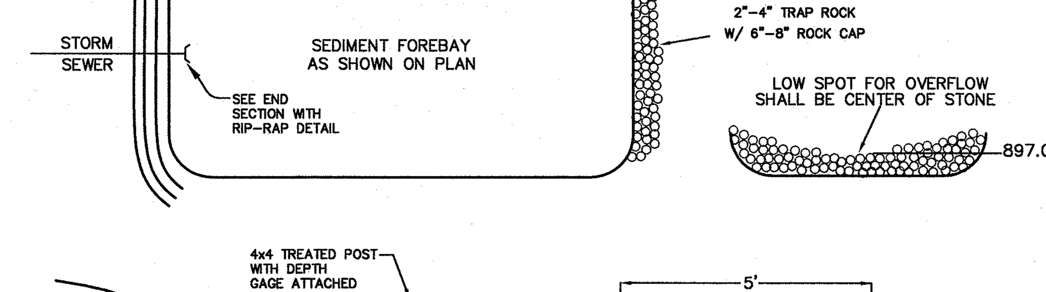
STORM WATER MANAGEMENT DESIGN
YARD AND ROOF WATER IS BEING COLLECTED AND DIRECTED TO A SEDIMENT FOREBAY/RAIN GARDEN LOCATED TO THE SOUTH AND WEST OF THE BASIN. FROM THE SEDIMENT BASIN/RAIN GARDEN IT WILL OVER TOP THE BERM AND ENTER THE DETENTION BASIN. AN OUTLET STRUCTURE WITH ORIFICE CONTROL WILL BE USED TO CONTROL THE DISCHARGE FROM THE SITE. NO INFILTRATION IS AVAILABLE ON THIS SITE. A PORTION OF THE SITE HAS NATURAL TREE COVER TO THE NORTH AND EAST. THIS AREA IS NOT BEING DISTURBED, DETAINED OR TREATED. ALL ROOF WATER IS BEING DIRECTED INTO THE PROPOSED STORM WATER MANAGEMENT SYSTEM. THE SOILS WERE TESTED FOR INFILTRATION BY APPLIED GEOTECHNICAL SERVICES, INC. ON 2-24-2017. THEIR INFILTRATION BASIN EXPLORATION REPORT DATED MARCH 6, 2017 SHOWS THE SOILS TO HAVE A DESIGN INFILTRATION RATE OF LESS THAN 1/16" PER HOUR. THE SUBSURFACE SOILS ARE NOT SUITABLE FOR STORM WATER INFILTRATION DEVICES.

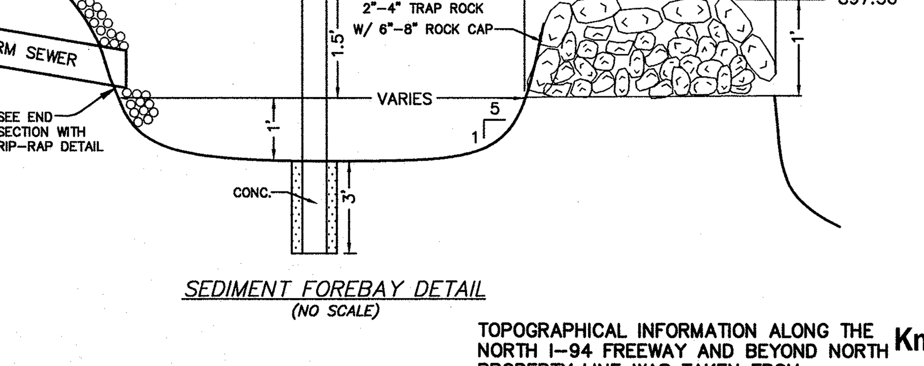
EMERGENCY OVERFLOW
THE EMERGENCY OVERFLOW AND OUTLET IS TO THE I-94 RIGHT-OF-WAY. FROM THERE IT TRAVELS SOUTH EAST TO THE MALLETTS CREEK DRAIN. THE EXISTING FLOW FOR A 10 YEAR, 24 HOUR EVENT OUTLETS AT 0.45 x 3.26 INCHES x 3.56 ACRES IS 5.22 CFS. THE POST DEVELOPMENT EMERGENCY OUTLET RATE IS 1.48 CFS. THERE IS NO INCREASE IN POTENTIAL RUNOFF FROM THE SITE.

AERATION FOUNTAIN
POND TO BE EQUIPPED WITH A FOUNTAIN TO KEEP PERMANENT WATER POOL BELOW THE BOTTOM OF THE OUTLET STRUCTURE FROM BECOMING STAGNANT.

STORM WATER MANAGEMENT SEDIMENT TREATEMENT CALCULATIONS

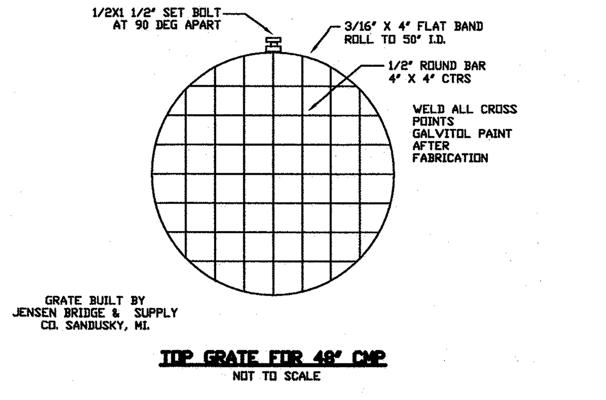
Basin:	Sediment forebay	
Level	Area (sf)	
897.5	4938	2,051
897	3265	1,879
896	493	249
895	5	1
894.75	-	-
		4,180
Volume required:		1899
Volume overage/(shortfall)		2,281.00





SEDIMENT FOREBAY DETAIL

(NO SCALE)



TOP GRATE FOR 48" CMP

NOT TO SCALE

TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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

STATE OF MICHIGAN — JOSEPH K. MAYNARD ENGINEER No. 52559 — LICENSED PROFESSIONAL ENGINEER

LEGEND

☼ = LIGHT POLE	x901.23 = SPOT ELEV.	TC = TOP OF CURB	= GRAVEL	—r— = EXISTING STORM
= UTILITY POLE	= POST	TW = TOP OF WALL	= FENCE	—s— = EXISTING SANITARY
= GUY ANCHOR	⊗ = GATE VALVE	O = MANHOLE	= CONCRETE	—w— = EXISTING WATER
= HYDRANT	= SIGN	□ = CATCHBASIN	= ASPHALT	—g— = EXISTING GAS
		= END SECTION		—e— = EXISTING ELECTRIC
				—t— = EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.
BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.
(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 20 40 80 — SCALE: 1"=40'

PREPARED BY ________ JOSEPH K. MAYNARD P.E., MICH No. 52559

CIVIL ENGINEERS
PLANNERS * SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
ANN ARBOR, MI 48103
TEL. 734-761-8800
FAX. 734-761-9530
WASHTENAWENGINEERING.COM

WASHTENAW ENGINEERING

CLIENT: **DIRECT MANAGED INC** 3707 PARKWOOD CIRCLE ANN ARBOR, MI 48108 TEL (734)-260-3395

SHEET: **STORM WATER MANAGEMENT CALCULATIONS**

PROJECT: **FOUNTAIN BLUE**

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN
DATE 6-01-17 | JOB NO. 32226 | DWG NO. 226-stm-calc | FIELD BOOK NONE | FILE NO. 10301

SHEET 14

H:\ldd3\eng\32226\dwg\226-stm-calc.dwg, stm-calc, 7/3/2018 10:40:59 AM

THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING RECORDS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

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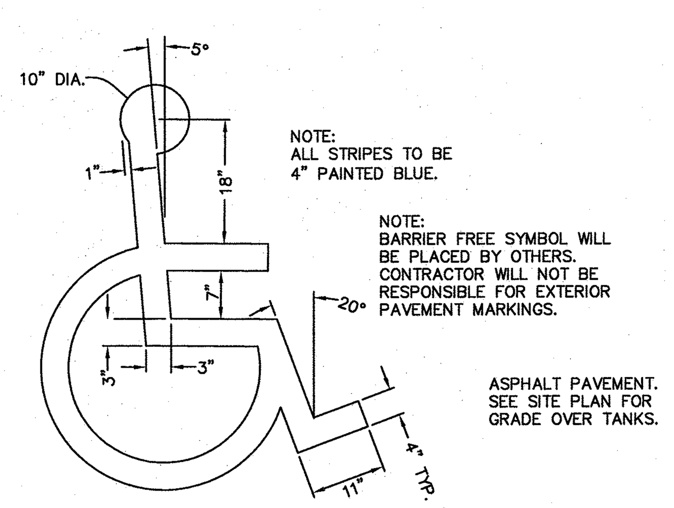
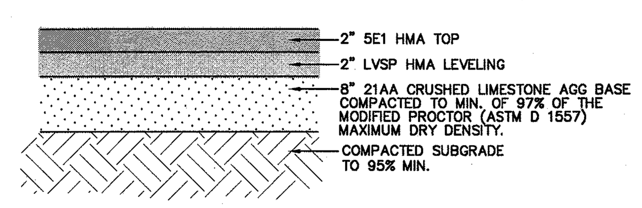
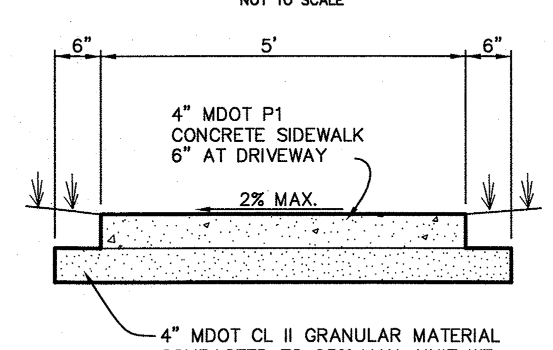


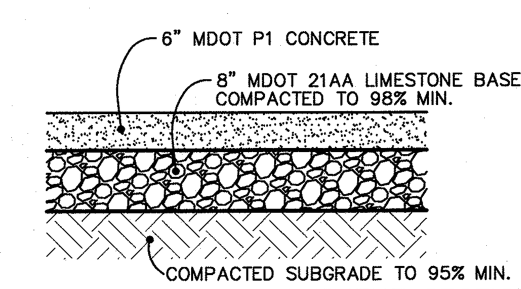
BARRIER FREE SYMBOL
NOT TO SCALE



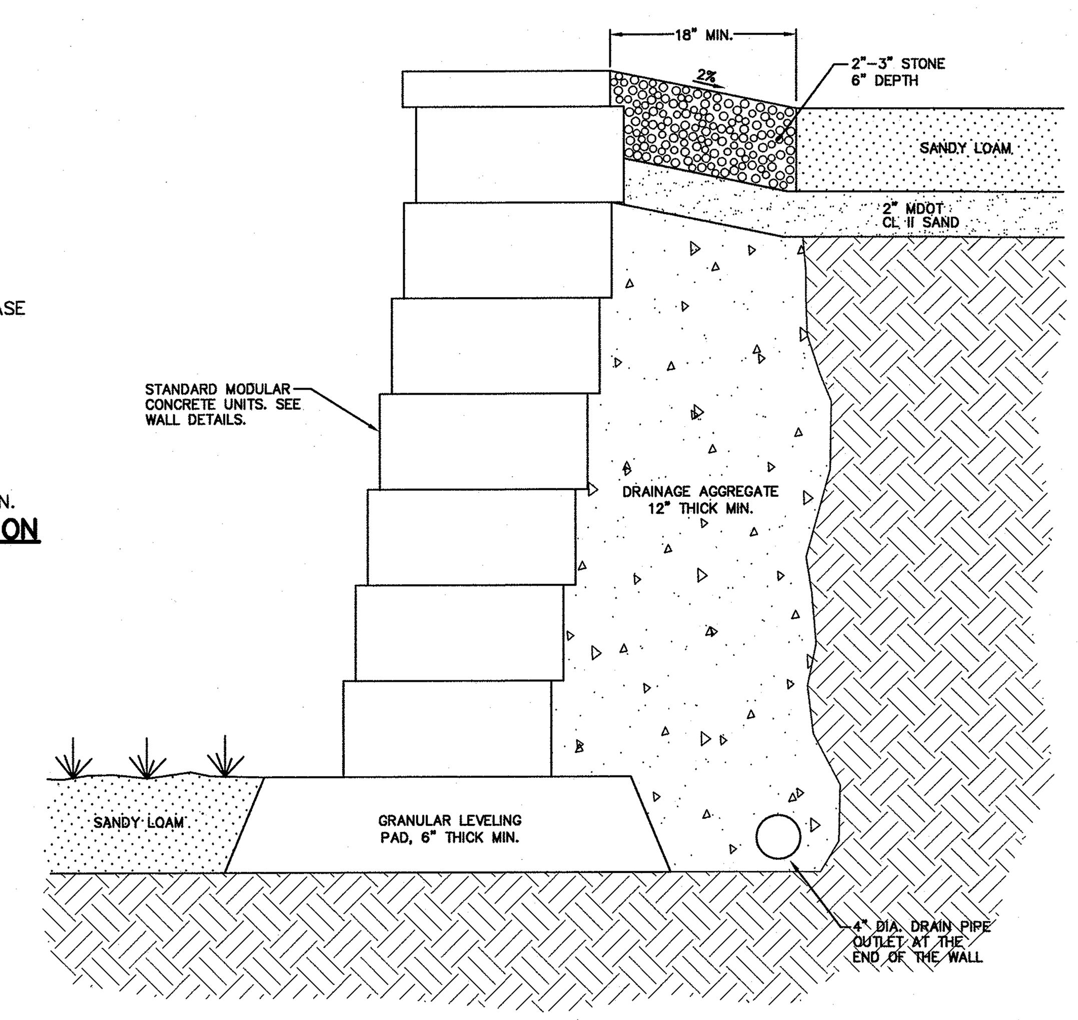
HMA TYPICAL CROSS SECTION PARKING AREA
NOT TO SCALE



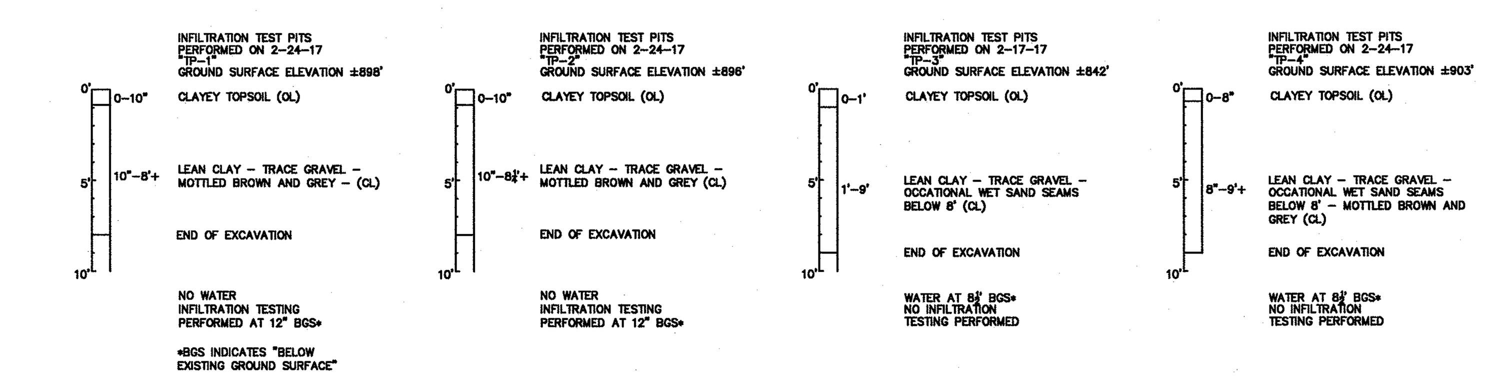
TYPICAL SIDEWALK SECTION
NOT TO SCALE

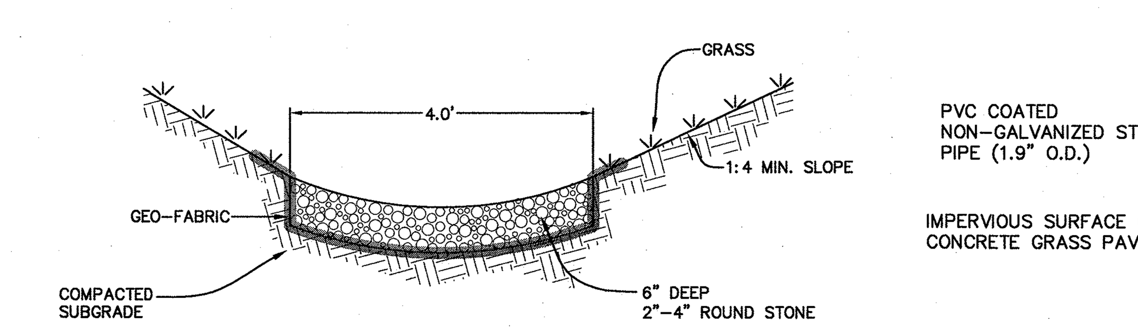


CONCRETE DUMPSTER PAVEMENT SECTION
NO SCALE

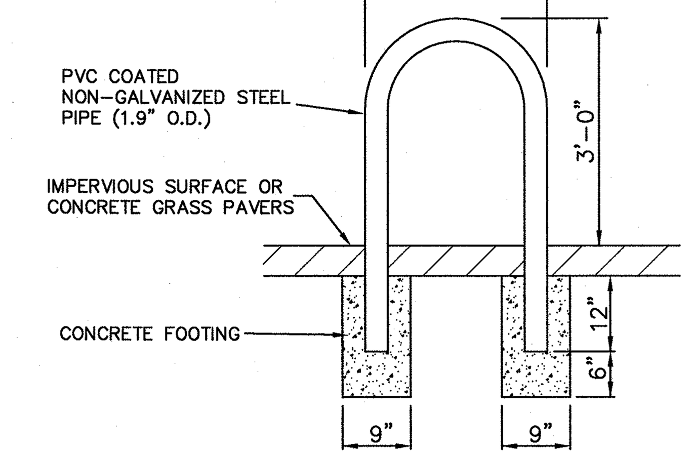


SINGLE FACE RETAINING WALL WITH CAP
NOT TO SCALE

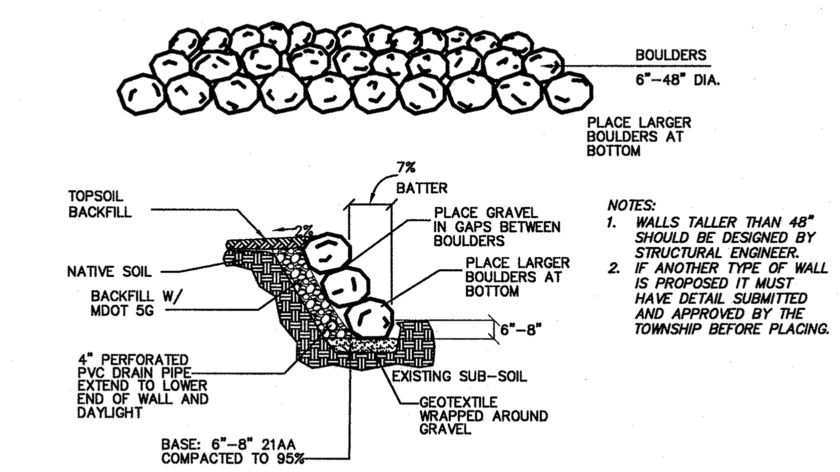




RIP-RAP SWALE DETAIL
NOT TO SCALE

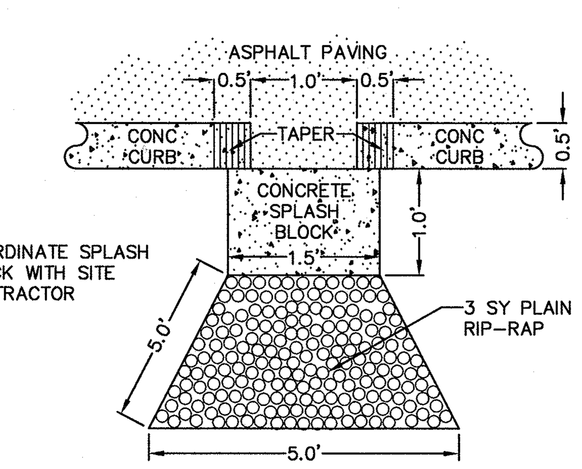


HOOPSTYLE RACK
NOT TO SCALE



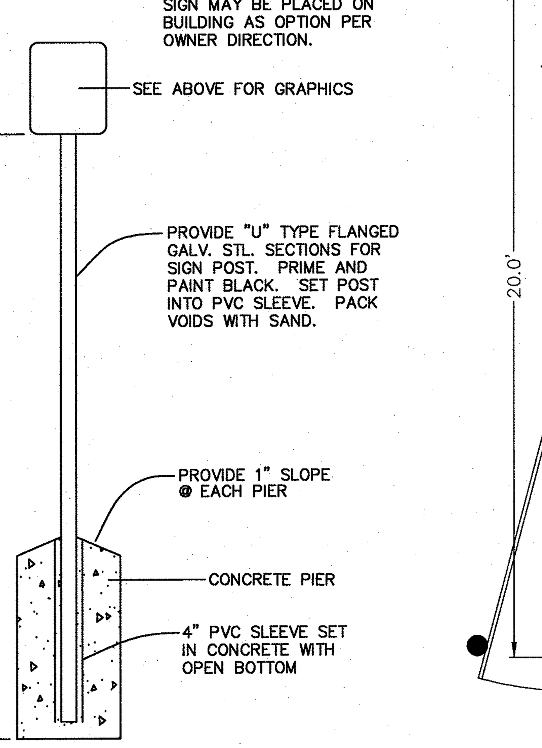
NOTES:
1. *WALLS TALLER THAN 48" SHOULD BE DESIGNED BY STRUCTURAL ENGINEER.*
2. *IF ANOTHER TYPE OF WALL IS PROPOSED IT MUST HAVE DETAIL SUBMITTED AND APPROVED BY THE TOWNSHIP BEFORE PLACING.*

BOULDER WALL DETAIL
NOT TO SCALE

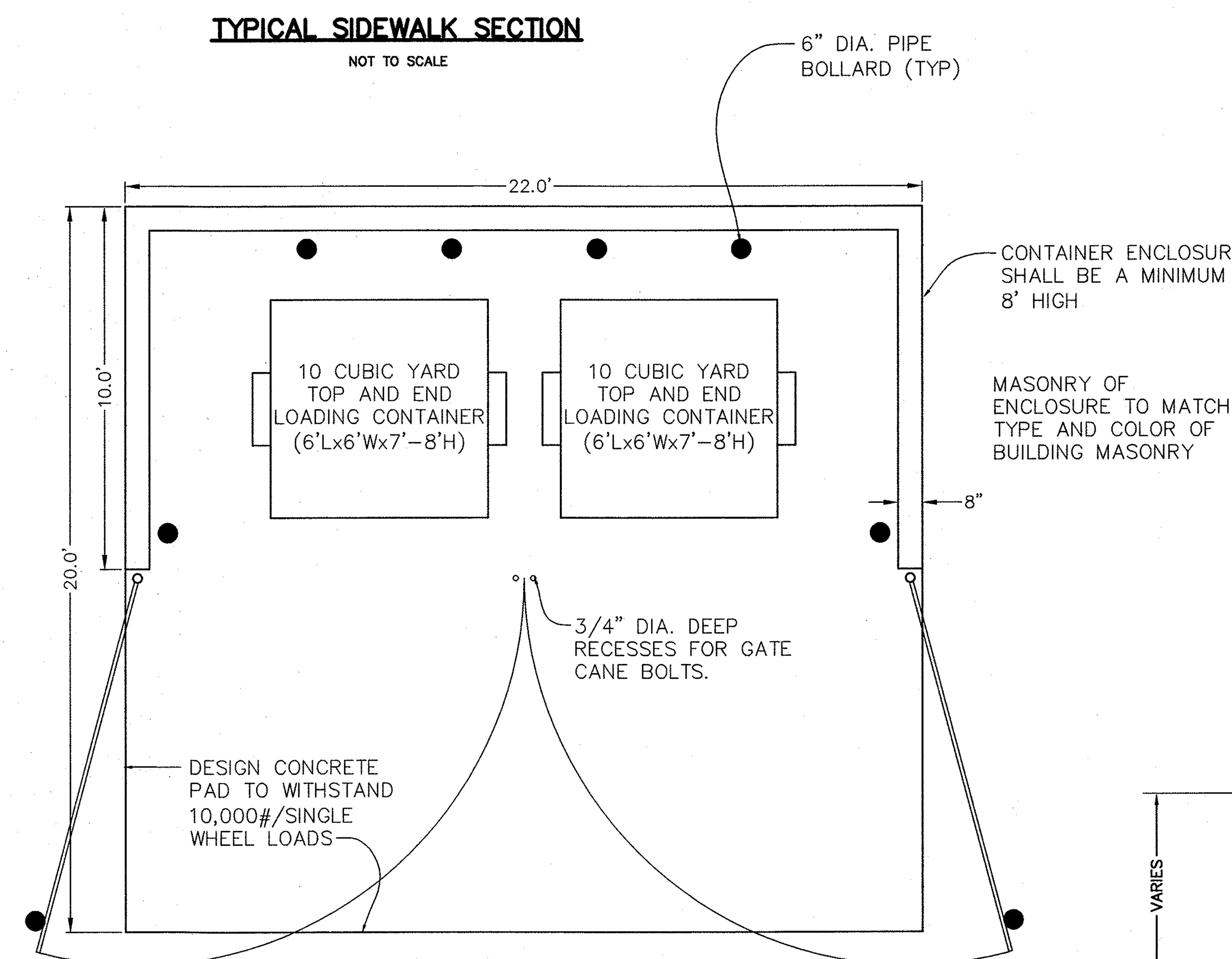


NOTE:
COORDINATE SPLASH BLOCK WITH SITE CONTRACTOR

DRAINAGE CURB CUT
NOT TO SCALE

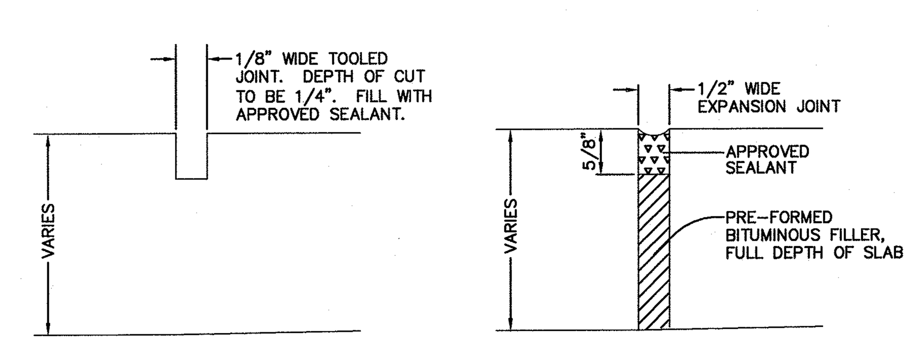


BARRIER FREE PARKING SIGN
NOT TO SCALE

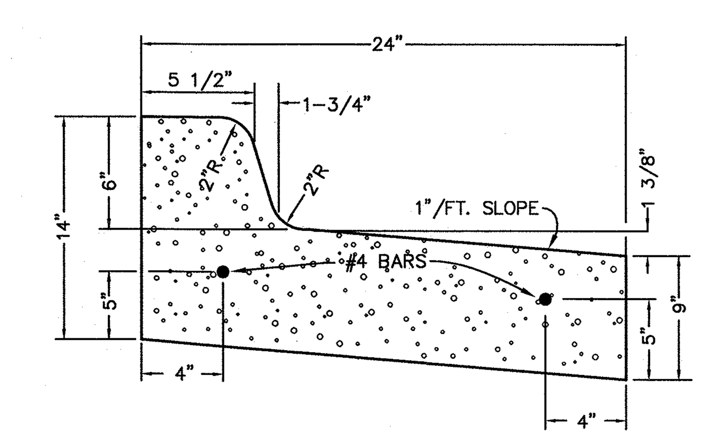


CONTAINER ENCLOSURE DETAIL
(NOT TO SCALE)

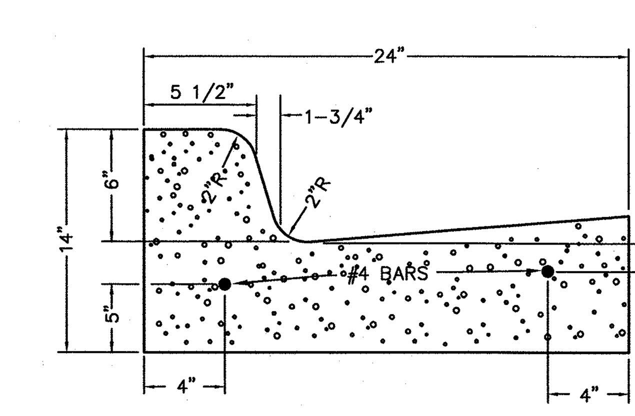
NOTE:
1. ALL FACILITIES FOR THE DISABLED SHALL CONFORM WITH THE AMERICAN WITH DISABILITIES ACT AND ALL REVISIONS.
2. THE CHARACTERS AND THE BACKGROUND OF SIGNS SHALL BE EGGSHELL, MATTE OR OTHER NON-GLARE FINISH. CHARACTERS AND SYMBOLS SHALL CONTRAST WITH THEIR BACKGROUND. LIGHT CHARACTERS ON DARK BACKGROUND ARE PREFERRED.
3. CONTRAST LEVELS OF SYMBOLS TO BACKGROUND TO BE A MINIMUM OF 70%.
4. CONTRACTOR SHALL VERIFY THAT THE SYMBOL SHOWN MEETS THE CURRENT STANDARD OF THE INTERNATIONAL SYMBOL OF ACCESSIBILITY AND SHALL BE IN COMPLIANCE WITH ICC/ANSI FIGURE 703.7.2.1.



CONCRETE JOINTS
NOT TO SCALE



SPILL-OUT (MODIFIED MDOT DETAIL F-4)
NOT TO SCALE



BARRIER (MDOT DETAIL F4)
NOT TO SCALE

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

LEGEND

BENCHMARK

REVISIONS *2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW*

SCALE
0 20 40 80
SCALE: 1"=40'

PREPARED BY
JOSEPH K. MAYNARD P.E., MICH No. 52559

STATE OF MICHIGAN
JOSEPH K. MAYNARD ENGINEER No. 52559
LICENSED PROFESSIONAL ENGINEER

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FAX. 734-761-9530
WASHTENAWENGINEERING.COM

WASHTENAW ENGINEERING

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET
DETAILS

PROJECT
FOUNTAIN BLUE

SECTION *8* TOWN *3* SOUTH RANGE *6* EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN

JOB NO.	*32226*
DWG NO.	*226-det*
FIELD BOOK	*NONE*
FILE NO.	*10301*
DATE	*6-01-17*
SHEET	*15*

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THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING RECORDS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

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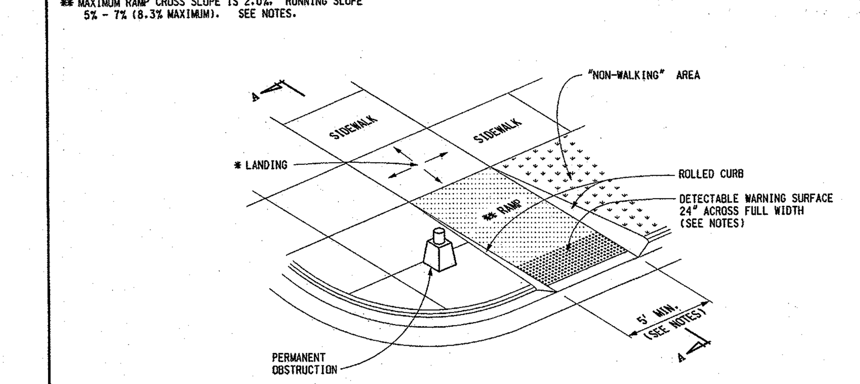
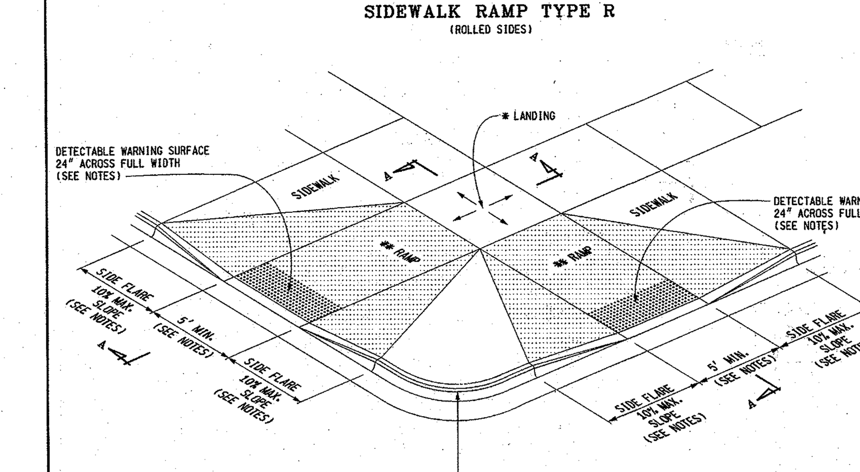
Sheet 1 of 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



SIDEWALK RAMP TYPE R
(ROLLED SIDES)



SIDEWALK RAMP TYPE F
(FLARED SIDES. TWO RAMPS SHOWN)

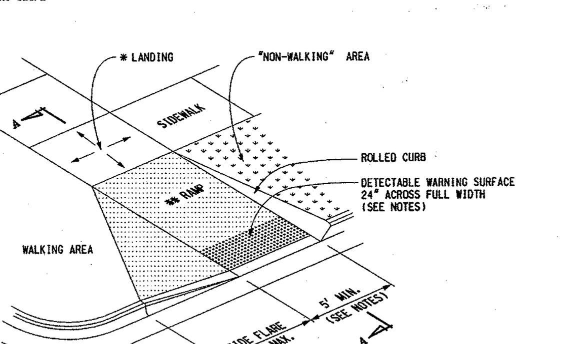
MDOT — Michigan Department of Transportation. PREPARED BY DESIGN DIVISION. DRAWN BY: B.L.T. CHECKED BY: W.K.P.
DEPARTMENT DIRECTOR Kirk T. Steudle
APPROVED BY: DIRECTOR, BUREAU OF FIELD SERVICES
APPROVED BY: DIRECTOR, BUREAU OF DEVELOPMENT

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 1 OF 7

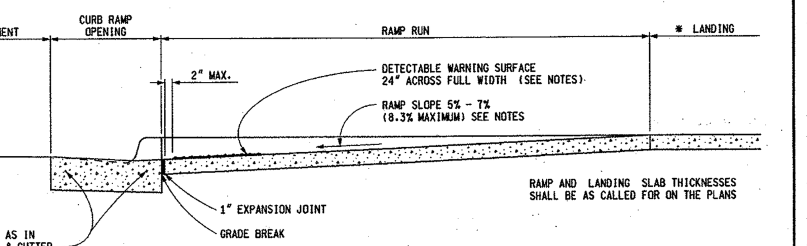
Sheet 2 of 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



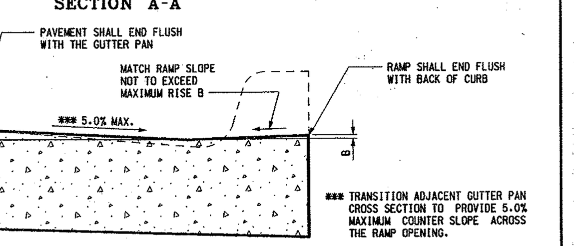
SIDEWALK RAMP TYPE RF
(ROLLED / FLARED SIDES)



SECTION A-A

CURB TYPE	MAXIMUM RISE (INCHES) A	B
B1	3/4	1
B2	3/4	1
B3	3/4	1
D1	3/4	1
D2	3/4	1
D3	3/4	1
C1	1/2	1/2
C2	1/2	1/2
C3	3/4	1/2
C4	3/4	1/2
C5	1	1/2
C6	1	1/2
F1	1/2	1/2
F2	1/2	1/2
F3	3/4	1/2
F4	3/4	1/2
F5	1	1/2
F6	1	1/2

FOR CURB TYPES SEE STANDARD PLAN R-30-SERIES



SECTION THROUGH CURB RAMP OPENING
(TYPICAL ALL RAMP TYPES)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 2 OF 7

Sheet 3 of 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

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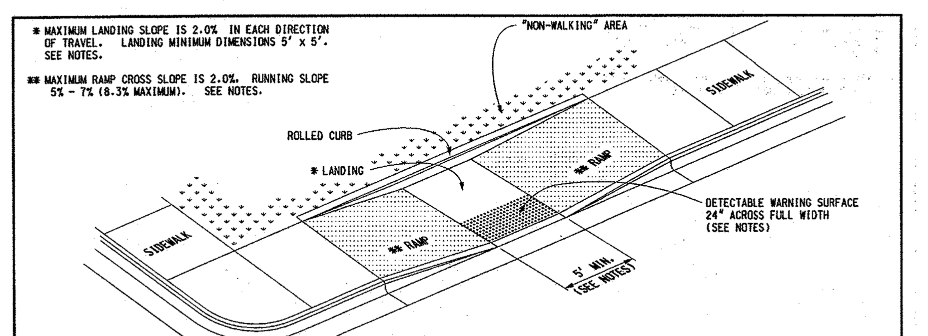
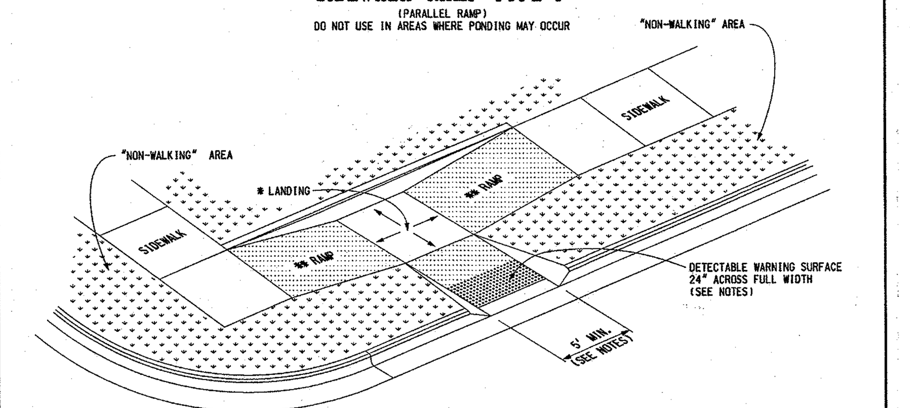
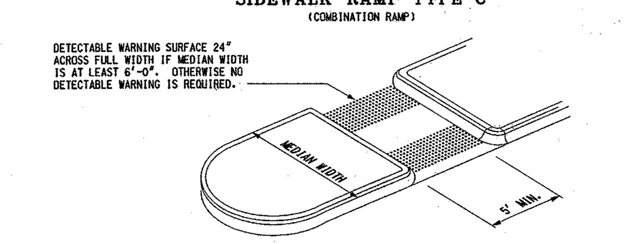


SIDEWALK RAMP TYPE P
(PARALLEL RAMP)
DO NOT USE IN AREAS WHERE PONDING MAY OCCUR



SIDEWALK RAMP TYPE C
(COMBINATION RAMP)



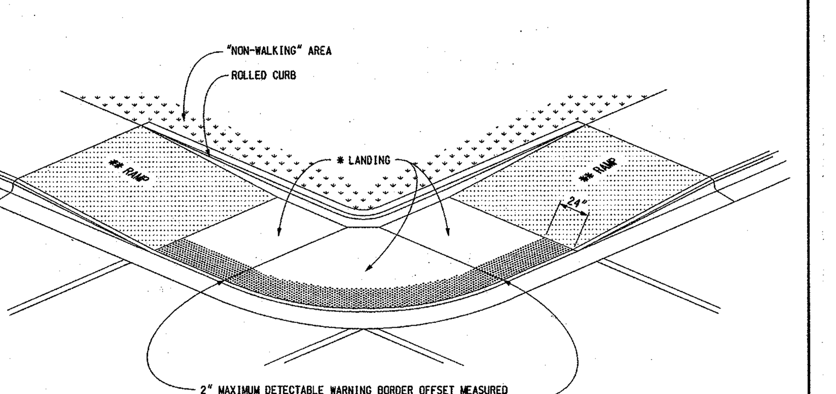
SIDEWALK RAMP TYPE M
(MEDIAN ISLAND)

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 3 OF 7

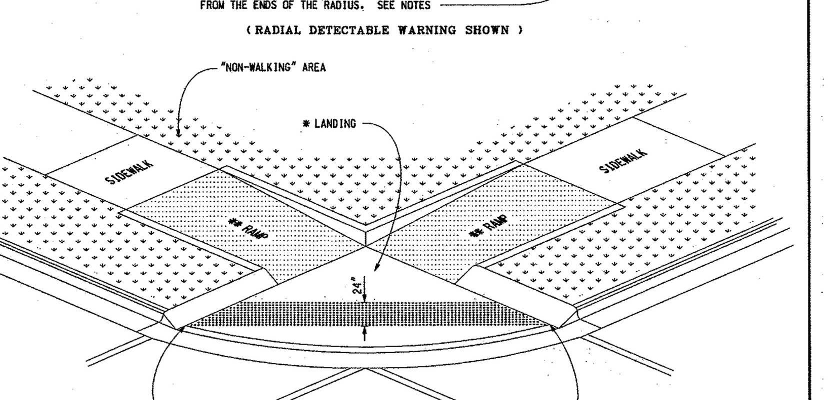
Sheet 4 of 7

* MAXIMUM LANDING SLOPE IS 2.0% IN EACH DIRECTION OF TRAVEL. LANDING MINIMUM DIMENSIONS 5' x 5'. SEE NOTES.

** MAXIMUM RAMP CROSS SLOPE IS 2.0%. RUNNING SLOPE 5% - 7% (8.3% MAXIMUM). SEE NOTES.



(RADIAL DETECTABLE WARNING SHOWN)



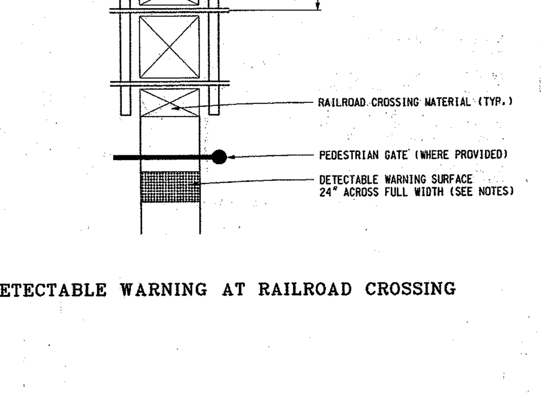
(TANGENT DETECTABLE WARNING SHOWN)

SIDEWALK RAMP TYPE D
(DEPRESSED CORNER)
USE ONLY WHEN INDEPENDENT DIRECTIONAL RAMPS CAN NOT BE CONSTRUCTED FOR EACH CROSSING DIRECTION

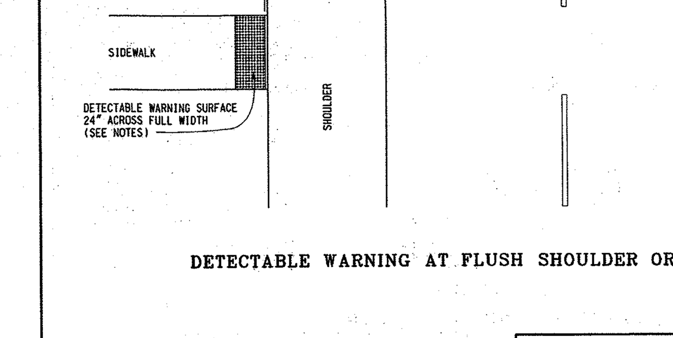
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 4 OF 7

Sheet 5 of 7

* THE DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE RAIL CROSSING IS 6' MINIMUM AND 15' MAXIMUM FROM THE CENTERLINE OF THE NEAREST RAIL. DO NOT PLACE DETECTABLE WARNING ON RAILROAD CROSSING MATERIAL.



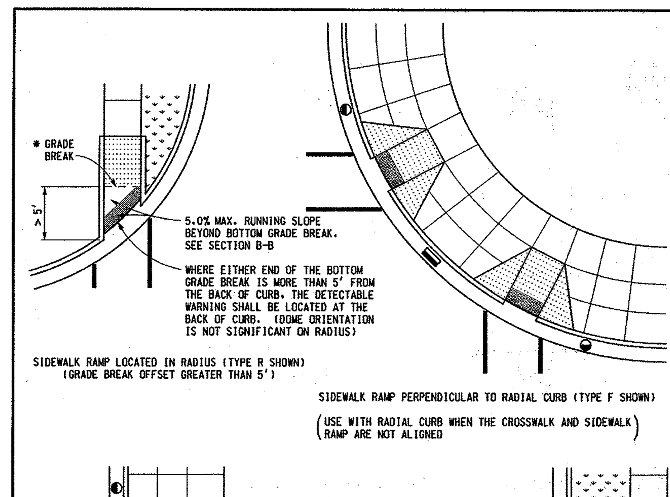
DETECTABLE WARNING AT RAILROAD CROSSING



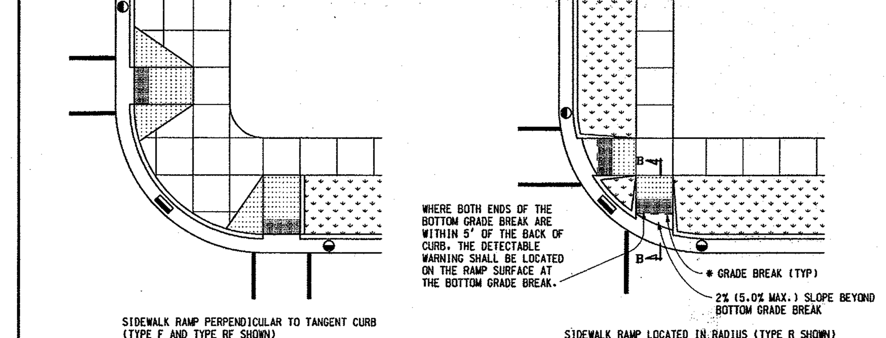
DETECTABLE WARNING AT FLUSH SHOULDER OR ROADWAY

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 5 OF 7

Sheet 6 of 7



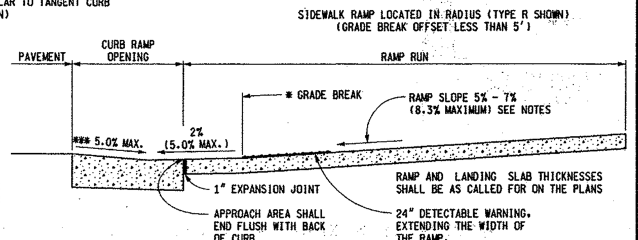
LEGEND
- SLOPED SURFACE
- DETECTABLE WARNING
- "NON-WALKING" AREA
- CROSSWALK MARKING
- PREFERRED LOCATION OF DRAINAGE INLET (TYP.)
- ALTERNATE LOCATION OF DRAINAGE INLET (TYP.)



* GRADE BREAKS AT THE TOP AND BOTTOM OF CURB RAMPS SHALL BE PERPENDICULAR TO THE DIRECTION OF TRAVEL.

*** TRANSITION ADJACENT GUTTER PAN CROSS SECTION TO PROVIDE 5.0% MAXIMUM COUNTER SLOPE ACROSS THE RAMP OPENING.

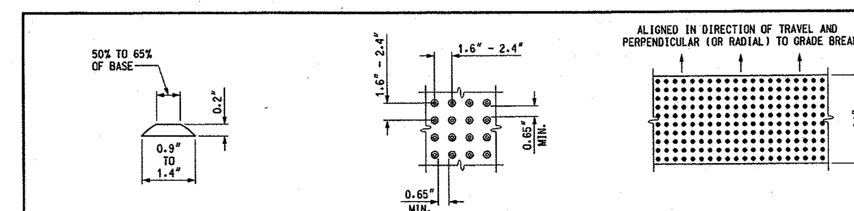
SEE SHEET 2 FOR CURB RAMP OPENING DETAILS.



SECTION B-B
SIDEWALK RAMP ORIENTATION

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 6 OF 7

Sheet 7 of 7



DETECTABLE WARNING DETAILS

NOTES:

DETAILS SPECIFIED ON THIS PLAN APPLY TO ALL CONSTRUCTION, RECONSTRUCTION, OR ALTERATION OF STREETS, CURBS, OR SIDEWALKS IN THE PUBLIC RIGHT OF WAY.

SIDEWALK RAMPS ARE TO BE LOCATED AS SPECIFIED ON THE PLANS OR AS DIRECTED BY THE ENGINEER.

RAMPS SHALL BE PROVIDED AT ALL CORNERS OF AN INTERSECTION WHERE THERE IS EXISTING OR PROPOSED SIDEWALK AND CURB. RAMPS SHALL ALSO BE PROVIDED AT MARKED AND/OR SIGNALIZED MID-BLOCK CROSSINGS.

SURFACE TEXTURE OF THE RAMP SHALL BE THAT OBTAINED BY A COARSE BROOMING, TRANSVERSE TO THE RUNNING SLOPE.

SIDEWALK SHALL BE RAMPED WHERE THE DRIVEWAY CURB IS EXTENDED ACROSS THE WALK.

CARE SHALL BE TAKEN TO ASSURE A UNIFORM GRADE ON THE RAMP. WHERE CONDITIONS PERMIT, IT IS DESIRABLE THAT THE SLOPE OF THE RAMP BE IN ONLY ONE DIRECTION, PARALLEL TO THE DIRECTION OF TRAVEL.

RAMP WIDTH SHALL BE INCREASED, IF NECESSARY, TO ACCOMMODATE SIDEWALK SNOW REMOVAL EQUIPMENT NORMALLY USED BY THE MUNICIPALITY.

WHEN 5' MINIMUM WIDTHS ARE NOT PRACTICABLE, RAMP WIDTH MAY BE REDUCED TO NOT LESS THAN 4' AND LANDINGS TO NOT LESS THAN 4' x 4'.

CURB RAMPS WITH A RUNNING SLOPE ≤5% DO NOT REQUIRE A TOP LANDING. HOWEVER, ANY CONTINUOUS SIDEWALK OR PEDESTRIAN ROUTE CROSSING THROUGH OR INTERSECTING THE CURB RAMP MUST INDEPENDENTLY MAINTAIN A CROSS SLOPE NOT GREATER THAN 2% PERPENDICULAR TO ITS OWN DIRECTION(S) OF TRAVEL.

DETECTABLE WARNING SURFACE COVERAGE IS 24" MINIMUM IN THE DIRECTION OF RAMP/PATH TRAVEL AND THE FULL WIDTH OF THE RAMP/PATH OPENING EXCLUDING CURBED OR FLARED CURB TRANSITION AREAS. A BORDER OFFSET NOT GREATER THAN 2" MEASURED ALONG THE EDGES OF THE DETECTABLE WARNING IS ALLOWABLE. FOR RADIAL CURB THE OFFSET IS MEASURED FROM THE ENDS OF THE RADIUS.

FOR NEW ROADWAY CONSTRUCTION, THE RAMP CROSS SLOPE MAY NOT EXCEED 2.0%. FOR ALTERATIONS TO EXISTING ROADWAYS, THE CROSS SLOPE MAY BE TRANSITIONED TO MEET AN EXISTING ROADWAY GRADE. THE CROSS SLOPE TRANSITION SHALL BE APPLIED UNIFORMLY OVER THE FULL LENGTH OF THE RAMP.

THE MAXIMUM RUNNING SLOPE OF 8.3% IS RELATIVE TO A FLAT (0%) REFERENCE. HOWEVER, IT SHALL NOT REQUIRE ANY RAMP OR SERIES OF RAMPS TO EXCEED 15 FEET IN LENGTH NOT INCLUDING LANDINGS OR TRANSITIONS.

DRAINAGE STRUCTURES SHOULD NOT BE PLACED IN LINE WITH RAMPS. THE LOCATION OF THE RAMP SHOULD TAKE PRECEDENCE OVER THE LOCATION OF THE DRAINAGE STRUCTURE. WHERE EXISTING DRAINAGE STRUCTURES ARE LOCATED IN THE RAMP PATH OF TRAVEL, USE A MANUFACTURER'S ADA COMPLIANT GRATE. OPENINGS SHALL NOT BE GREATER THAN 1/2". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

CROSSWALK AND STOP LINE MARKINGS, IF USED, SHALL BE SO LOCATED AS TO STOP TRAFFIC SHORT OF RAMP CROSSINGS. SPECIFIC DETAILS FOR MARKING APPLICATIONS ARE GIVEN IN THE "MICHIGAN MANUAL ON UNIFORM TRAFFIC CONTROL DEVICES".

FLARED SIDES WITH A SLOPE OF 10% MAXIMUM, MEASURED ALONG THE ROADSIDE CURB LINE, SHALL BE PROVIDED WHERE AN UNOBSTRUCTED CIRCULATION PATH LATERALLY CROSSES THE SIDEWALK RAMP. FLARED SIDES ARE NOT REQUIRED WHERE THE RAMP IS BORDERED BY LANDSCAPING, UNPAVED SURFACE OR PERMANENT FIXED OBJECTS. WHERE THEY ARE NOT REQUIRED, FLARED SIDES CAN BE CONSIDERED IN ORDER TO AVOID SHARP CURB RETURNS AT RAMP OPENINGS.

DETECTABLE WARNING PLATES MUST BE INSTALLED USING FABRICATED OR FIELD CUT UNITS CAST AND/OR ANCHORED IN THE PAVEMENT TO RESIST SHIFTING OR HEAVING.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
F.H.W.A. APPROVAL | 12-11-2017 PLAN DATE | R-28-J | SHEET 7 OF 7

CIVIL ENGINEERS
PLANNERS * SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
ANN ARBOR, MI 48103
TEL. 734-761-8800
FAX. 734-761-9530
WASHTENAWENGINEERING.COM

WASHTENAW ENGINEERING

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET
SIDEWALK DETAILS

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN
JOB NO. 32226
DWG NO. 226-sidewalk-detail
FIELD BOOK NONE
FILE NO. 10301
DATE 6-01-17
16 SHEET

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

STATE OF MICHIGAN — JOSEPH K. MAYNARD ENGINEER No. 52559 — LICENSED PROFESSIONAL ENGINEER

LEGEND

☼ = LIGHT POLE	x901.23 = SPOT ELEV.	TC = TOP OF CURB	= GRAVEL
= UTILITY POLE	= POST	TW = TOP OF WALL	= FENCE
= GUY ANCHOR	⊗ = GATE VALVE	O = MANHOLE	= CONCRETE
= HYDRANT	= SIGN	□ = CATCHBASIN	= ASPHALT
		= END SECTION	

r = EXISTING STORM
s = EXISTING SANITARY
w = EXISTING WATER
g = EXISTING GAS
e = EXISTING ELECTRIC
t = EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.
BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.
(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE
NO SCALE

PREPARED BY
JOSEPH K. MAYNARD P.E., MICH No. 52559

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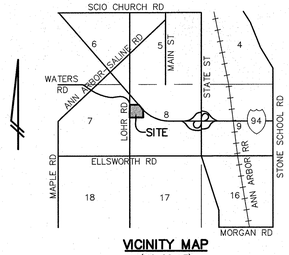
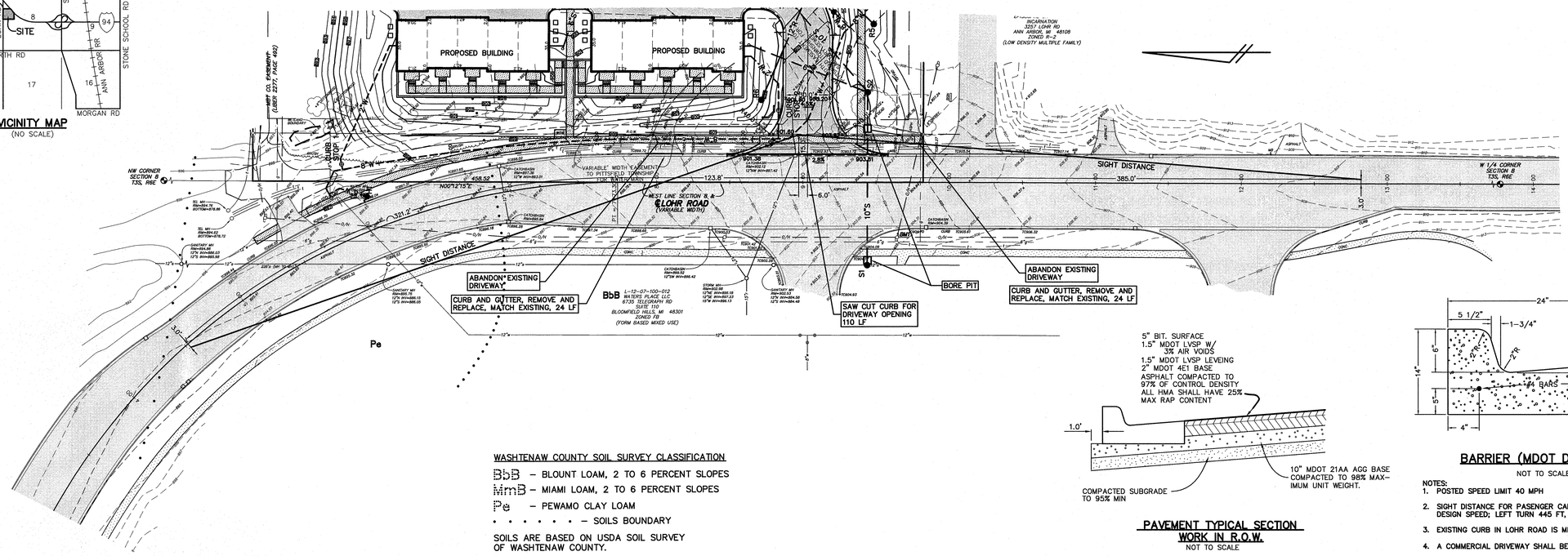


VICINITY MAP
(NO SCALE)

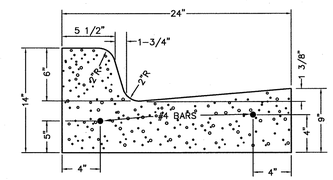


WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MmB – MIAMI LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

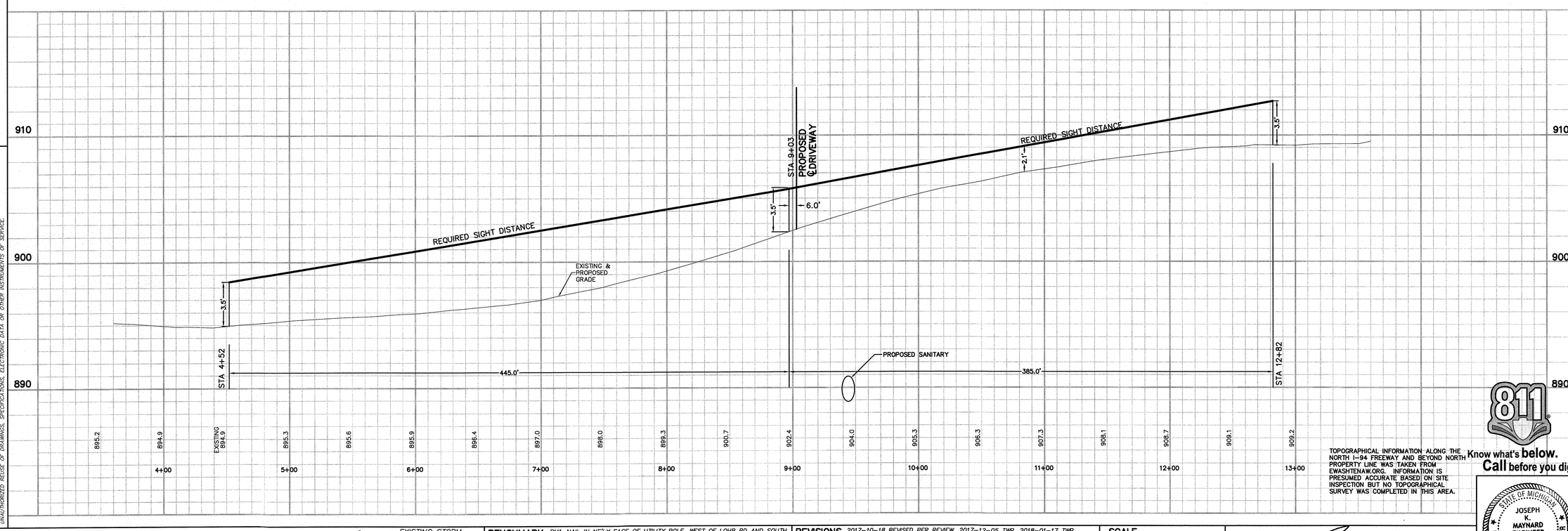
PAVEMENT TYPICAL SECTION WORK IN R.O.W.
NOT TO SCALE



BARRIER (MDOT DETAIL F4)
NOT TO SCALE

f4 curb

NOTES:
1. POSTED SPEED LIMIT 40 MPH
2. SIGHT DISTANCE FOR PASENGER CARS FROM STOP FOR 40 MPH DESIGN SPEED; LEFT TURN 445 FT, RIGHT TURN 385 FT.
3. EXISTING CURB IN LOHR ROAD IS MDOT F4
4. A COMMERCIAL DRIVEWAY SHALL BE AN MDOT TYPE "M" OPENING.
5. SANITARY MAIN CROSSING LOHR ROAD SHALL BE DONE BY JACK AND BORE. MIN OFFSET FROM EDGE OF ASPHALT SHALL BE 4' THEN A 1:1 SLOPE TO BOTTOM OF BORE PIT.



TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

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

LEGEND

- LIGHT POLE
- UTILITY POLE
- GUY ANCHOR
- HYDRANT
- SPOT ELEV.
- POST
- GATE VALVE
- SIGN
- TC = TOP OF CURB
- TW = TOP OF WALL
- MANHOLE
- CATCHBASIN
- END SECTION
- GRAVEL
- FENCE
- CONCRETE
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REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 20 40 80
SCALE: 1"=40'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

STATE OF MICHIGAN JOSEPH K. MAYNARD ENGINEER No. 52559 LICENSED PROFESSIONAL ENGINEER

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17 JOB NO. 32226
DWG NO. 226-ent-pp
FIELD BOOK NONE
FILE NO. 10301
SHEET 17

PROJECT
FOUNTAIN BLUE

SHEET
ENTRANCE SITE DISTANCE PLAN & PROFILE

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

CIVIL ENGINEERS
PLANNERS • SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
ANN ARBOR, MI 48103
TEL 734-761-8800
FAX 734-761-9530
WASHTENAWENGINEERING.COM
WASHTENAW ENGINEERING

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THE UNDERGROUND UTILITIES SHOWN HAVE BEEN LOCATED FROM FIELD SURVEY INFORMATION AND EXISTING RECORDS. THE SURVEYOR MAKES NO GUARANTEES THAT THE UNDERGROUND UTILITIES SHOWN COMPRISE ALL SUCH UTILITIES IN THE AREA, EITHER IN-SERVICE OR ABANDONED. THE SURVEYOR FURTHER DOES NOT WARRANT THAT THE UNDERGROUND UTILITIES SHOWN ARE IN THE EXACT LOCATION INDICATED. ALTHOUGH THE SURVEYOR DOES CERTIFY THAT THEY ARE LOCATED AS ACCURATELY AS POSSIBLE FROM INFORMATION AVAILABLE. THE SURVEYOR HAS NOT PHYSICALLY LOCATED THE UNDERGROUND UTILITIES.

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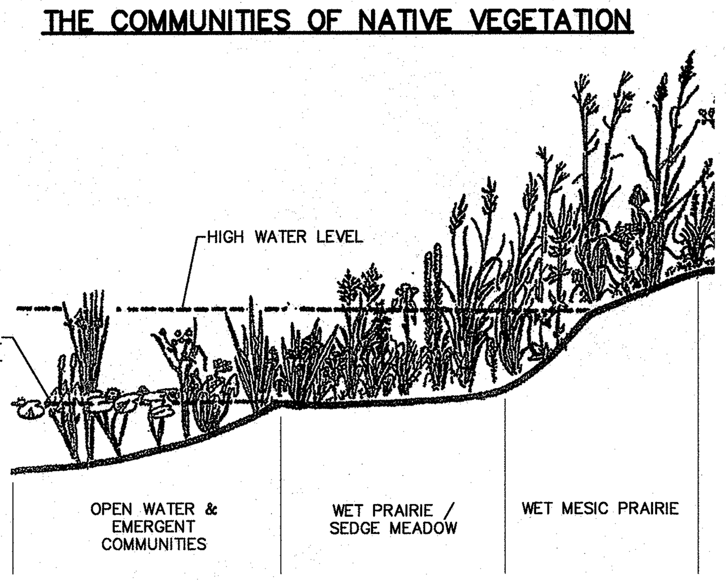
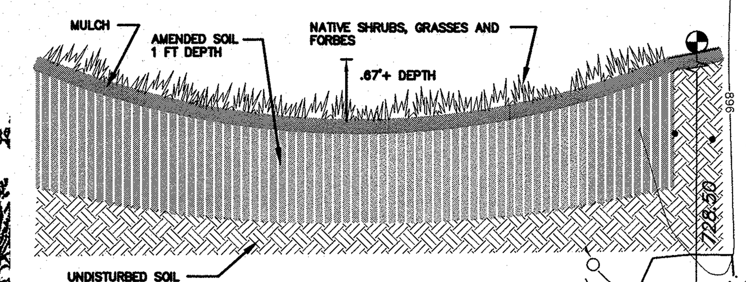
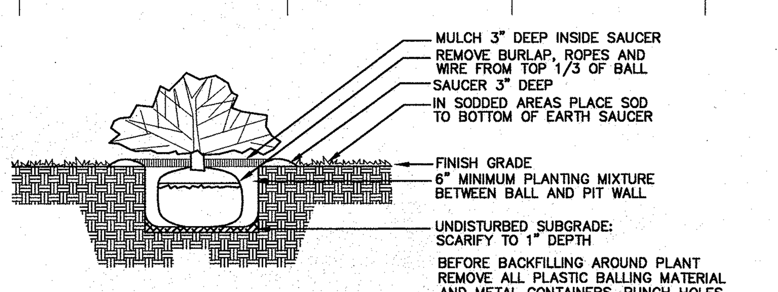
THE COMMUNITIES OF NATIVE VEGETATION



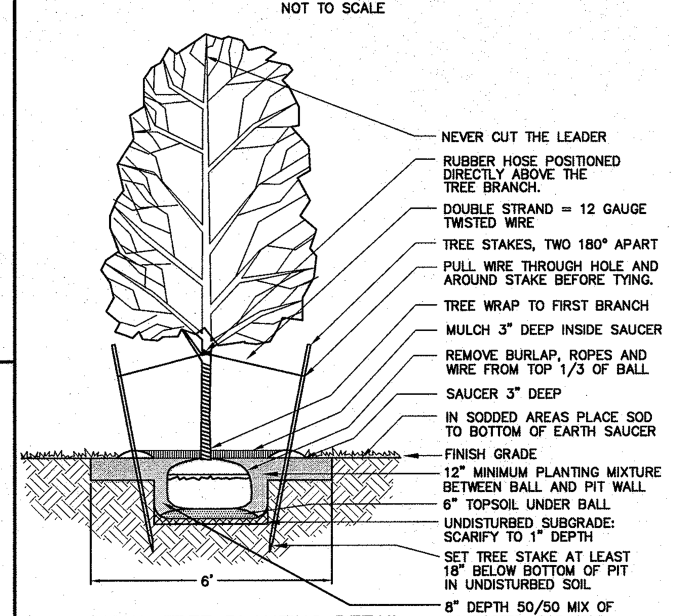


RAIN GARDEN – CROSS SECTION
NOT TO SCALE

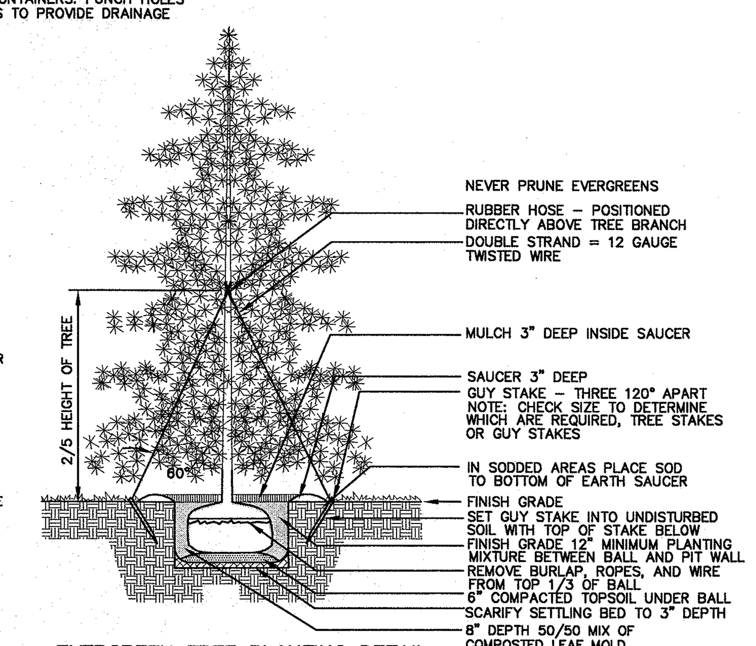
AMENDED SOIL
50% – 60% SAND
20% – 30% TOPSOIL (LOW CLAY CONTENT)
20% – 30% COMPOST
ORGANIC MULCH-LEAF LITTER OR HARDWOOD MULCH AROUND PLANTS.
AMENDED SOIL
NATIVE SOIL, IF SOIL IS VERY SANDY, WORK IN COMPOST OR HARDWOOD MULCH TO 30" DEEP. ORGANICS SHOULD COMPRISE 25% OF VOLUME.



SHRUB PLANTING DETAIL
NOT TO SCALE



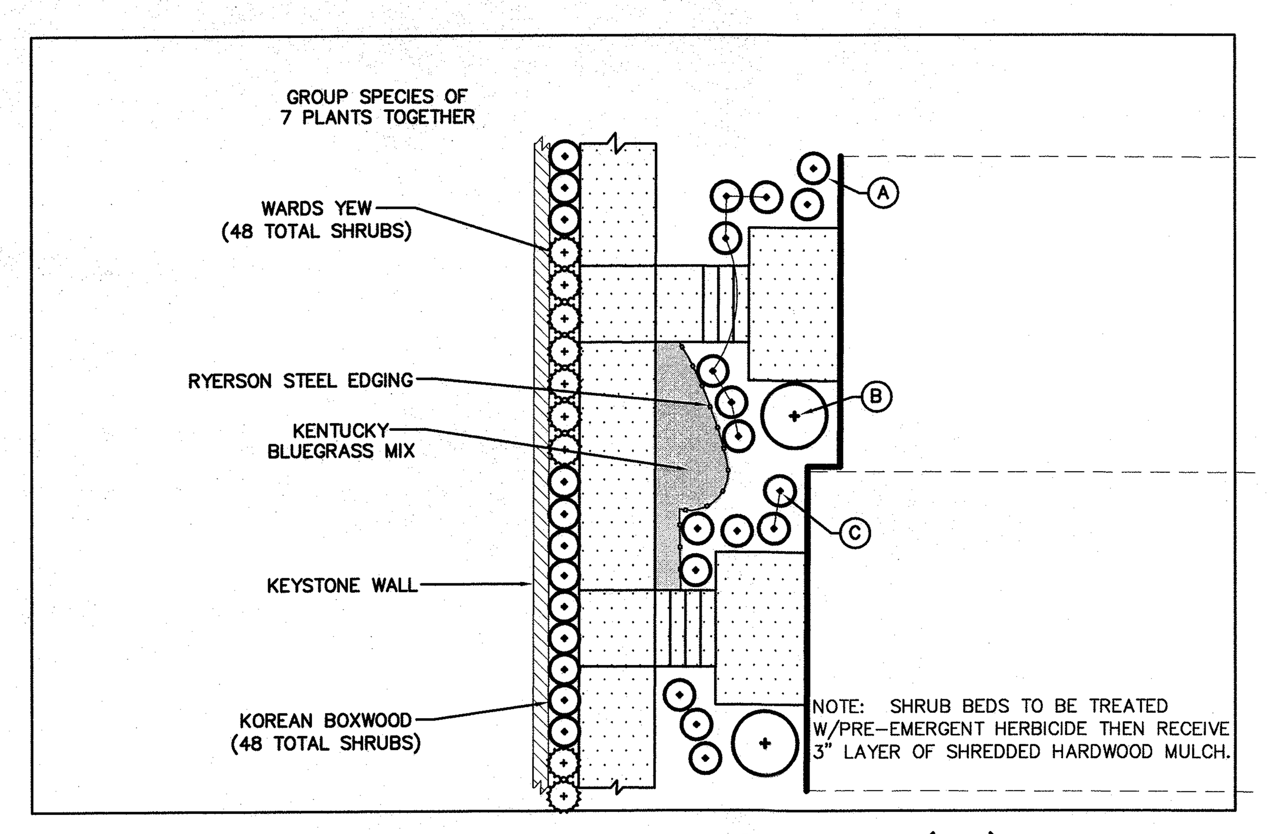
DECIDUOUS TREE PLANTING DETAIL
NOT TO SCALE



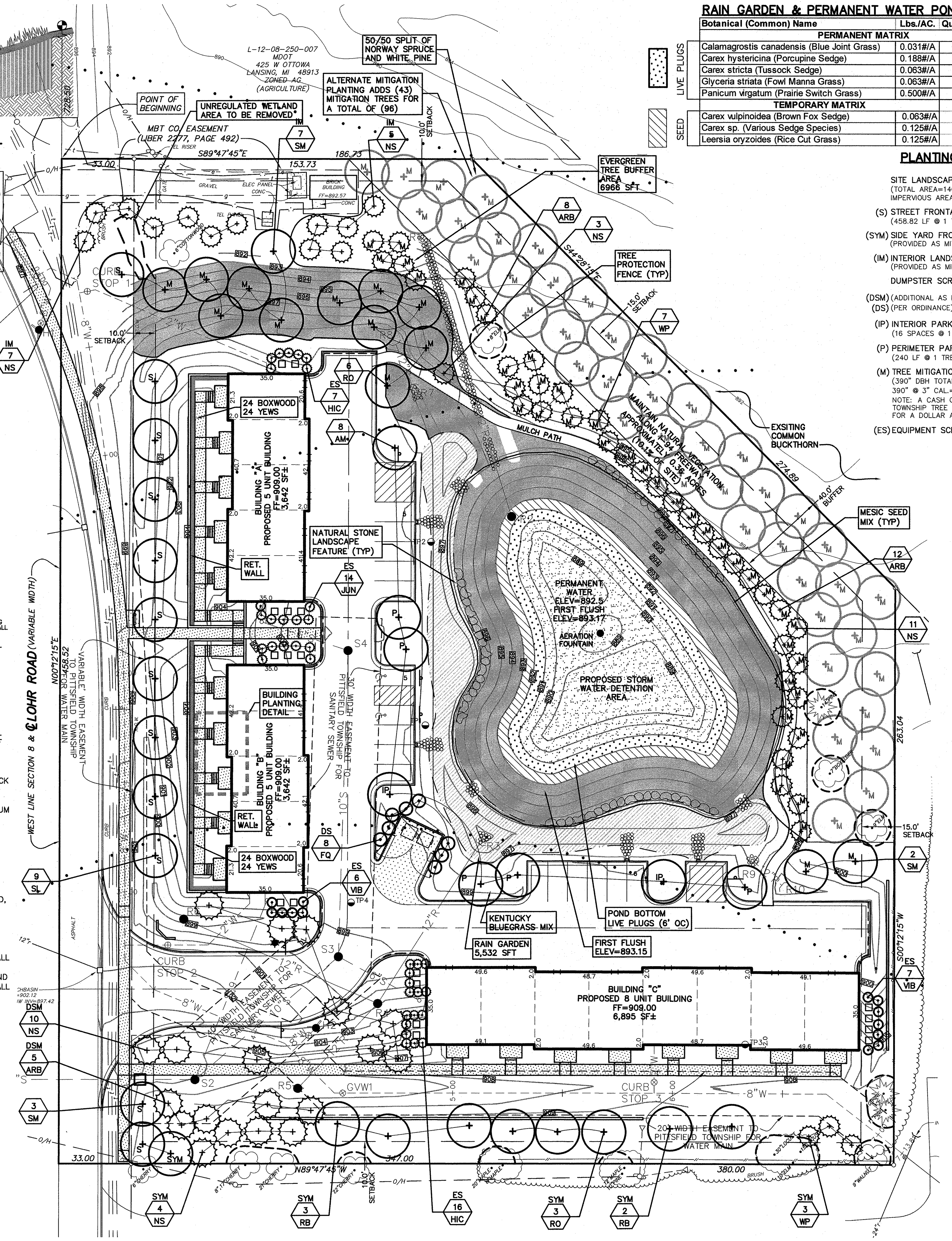
EVERGREEN TREE PLANTING DETAIL
NOT TO SCALE

GENERAL LANDSCAPE NOTES

1. ALL WORKMANSHIP AND MATERIALS SHALL CONFORM TO PITTSFIELD TOWNSHIP STANDARDS AND SPECIFICATIONS. ALL PLANT MATERIAL SHALL BE SIZES AND MEASUREMENTS CONFORMING TO THE USA STANDARD FOR NURSERY STOCK. ALL PLANT MATERIAL SHALL BE OF SELECTED SPECIMEN QUALITY AND HAVE A NORMAL HABIT OF GROWTH. ALL PLANT MATERIAL IS SUBJECT TO THE APPROVAL OF THE LANDSCAPE ARCHITECT.
2. ALL PLANT MATERIAL SHALL BE BALLED AND BURLAPPED STOCK MOVED BY TREE SPADE OR CONTAINER STOCK. NO BARE ROOT STOCK IS PERMITTED. ALL PLANT BALLS SHALL BE FIRM, INTACT AND SECURELY WRAPPED AND BOUND.
3. ALL PLANT BEDS SHALL BE EXCAVATED OF ALL BUILDING MATERIALS AND OTHER EXTRANEOUS OBJECTS AND POOR SOILS TO A MINIMUM DEPTH OF TWELVE INCHES (12") AND ALL BACKFILLED TO GRADE WITH PLANTING MIX (SEE BELOW).
4. PLANTING MIXTURE SHALL BE 50% COMPOSTED LEAF MOLD & 50% FRIABLE LOAM SOIL.
5. ALL PLANT BEDS AND INDIVIDUAL PLANTS SHALL BE MULCHED WITH A THREE INCH (3") LAYER OF SHREDDED BARK MULCH.
6. ALL PLANTS AND PLANT BEDS SHALL BE THOROUGHLY WATERED.
7. THE CONTRACTOR SHALL GUARANTEE ALL PLANT MATERIALS FOR A PERIOD OF ONE (1) YEAR FROM THE DATE THE WORK IS ACCEPTED, IN WRITING, BY THE LANDSCAPE ARCHITECT. THE CONTRACTOR SHALL REPLACE, WITHOUT COST TO THE OWNER, WITHIN A SPECIFIED PERIOD OF TIME, ALL DEAD PLANTS, AND ALL PLANTS NOT IN A VIGOROUS, THRIVING CONDITION, AS DETERMINED BY THE LANDSCAPE ARCHITECT DURING AND AT THE END OF THE GUARANTEE PERIOD. REPLACEMENT STOCK SHALL CONFORM TO THE ORIGINAL REQUIREMENTS.
8. ALL AREAS OF THE SITE THAT BECOME DISTURBED DURING CONSTRUCTION AND ARE NOT TO BE PAVED, STONED OR LANDSCAPED SHALL BE SEEDED AND MULCHED. IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ESTABLISH A DENSE LAWN OF PERMANENT GRASSES, FREE OF LUMPS AND DEPRESSIONS. ANY PART OF THE AREA THAT FAILS TO SHOW A UNIFORM GERMINATION SHALL BE RESEEDED AND SUCH RESEEDING SHALL CONTINUE UNTIL A DENSE LAWN IS ESTABLISHED. DAMAGE TO SEEDED AREAS RESULTING FROM EROSION SHALL BE REPAIRED BY THE CONTRACTOR.
9. ALL AREAS OF THE SITE SCHEDULED FOR SEEDING SHALL BE DISCED AND GRADED IN CONFORMANCE WITH THE GRADING PLAN.
10. IT IS THE CONTRACTOR'S RESPONSIBILITY TO LOCATE THE UTILITIES, BOTH ABOVE AND UNDERGROUND PRIOR TO LANDSCAPING. ANY CONFLICTS BETWEEN UTILITIES AND PLANT MATERIAL SHALL BE REPORTED TO THE LANDSCAPE ARCHITECT.



BUILDING PLANTING DETAIL (TYP)
SCALE 1"=10'



RAIN GARDEN & PERMANENT WATER POND EDGE

	Botanical (Common) Name	Lbs./AC.	Quantity	Spacing
	PERMANENT MATRIX			
LIVE PLUGS	Calamagrostis canadensis (Blue Joint Grass)	0.031#/A	357	5' O.C.
LIVE PLUGS	Carex hystericina (Porcupine Sedge)	0.188#/A	357	5' O.C.
LIVE PLUGS	Carex stricta (Tussock Sedge)	0.063#/A	357	5' O.C.
LIVE PLUGS	Glyceria striata (Fowl Manna Grass)	0.063#/A	357	5' O.C.
LIVE PLUGS	Panicum virgatum (Prairie Switch Grass)	0.500#/A	510	7' O.C.
	TEMPORARY MATRIX			
SEED	Carex vulpinoidea (Brown Fox Sedge)	0.063#/A		
SEED	Carex sp. (Various Sedge Species)	0.125#/A		
SEED	Leersia oryzoides (Rice Cut Grass)	0.125#/A		

EXISTING TREES TO REMAIN

DBH	TYPE	CONDITION
7	BOXELDER	BOXELDER
8	ELM	POOR
9	ELM	FAIR
10	ELM	FAIR
15	LOCUST	FAIR
30	LOCUST	GOOD
10	PINE	GOOD
11	PINE	GOOD
14	PINE	GOOD
9	WALNUT	GOOD

CONTROL FOR COMMON BUCKTHORN

A PRIMARY GOAL IN CONTROLLING THIS SPECIES IS TO PREVENT SEED PRODUCTION AND DISPERSAL. A VARIETY OF TECHNIQUES INCLUDING BOTH MECHANICAL AND CHEMICAL CONTROLS MAY BE MOST EFFECTIVE AND SHOULD BE TAILORED TO THE SPECIFIC CONDITIONS ON THE SITE. IT IS CRITICAL TO MONITOR THE SITE TO ENSURE THAT CUT STUMPS OR TREATED PLANTS DO NOT RESPROUT AND THE SEED BANK IS EXHAUSTED. WHERE ABUNDANT SEED SOURCES ARE PRESENT NEARBY, MONITORING MAY BE REQUIRED INDEFINITELY.

PLANTING REQUIREMENT SUMMARY

	REQUIRED	PROVIDED
SITE LANDSCAPE AREA (TOTAL AREA=140,216 SF± IMPERVIOUS AREA=50,897 SF±)	20%	36.3%
(S) STREET FRONTAGE/GREENBELT TREES (458.82 LF @ 1 TREE PER 40'=12)	12 TREES	12 TREES
(SYM) SIDE YARD FRONTAGE (PROVIDED AS MITIGATION)	0 TREES	16 TREES
(IM) INTERIOR LANDSCAPING (PROVIDED AS MITIGATION)	0 TREES	12 TREES
DUMPSTER SCREENING		
(DSM) (ADDITIONAL AS MITIGATION)	0 TREES	15 TREES
(DS) (PER ORDINANCE)	8 SHRUBS	8 SHRUBS
(IP) INTERIOR PARKING LOT LANDSCAPING (16 SPACES @ 1 TREE PER 8 SPACES=2)	2 TREES	2 TREES
(P) PERIMETER PARKING LOT LANDSCAPING (240 LF @ 1 TREE PER 40'=6)	6 TREES	6 TREES
(M) TREE MITIGATION (390" DBH TOTAL INCHES REQUIRED MITIGATION, 390" @ 3" CAL.=130 TREES) NOTE: A CASH CONTRIBUTION WILL BE MADE TO THE PITTSFIELD TOWNSHIP TREE FUND FOR THE REMAINING 34 MITIGATION TREES FOR A DOLLAR AMOUNT TO BE DETERMINED.	130 TREES	96 TREES
(ES) EQUIPMENT SCREENING		50 SHRUBS

BOTTOM POND

SIDE SLOPE (MESIC MIX)

Botanical (Common) Name	Lbs./AC.
PERMANENT MATRIX	
Andropogon gerardii (Big Blue Stem)	1.500#/A
Andropogon scoparius (Little Blue Stem)	.750#/A
Bouteloua curtipendula (Side Oats Grama)	1.000#/A
Panicurri virgatum (Prairie Switch Grass)	0.250#/A
Sorghastrum nutans (Indian Grass)	1.000#/A
TEMPORARY MATRIX	
Agropyron trachycaulum (SlenderWheat Grass)	0.500#/A
Elymus canadensis (Prairie Wild Rye)	1.000#/A
Lolium multiflorum (Annual Rye)	5.00#/A
FORBS	
Asclepias tuberosa (Butterfly Weed)	0.063#/A
*Aster azureus (SkyBlueAster)	0.006#/A
Aster laevis (Smooth Blue Aster}	0.016#/A
Aster novae,.angliae (New England Aster)	0.031#/A
Baptisia leucantha (White Wild Indigo)	0.078#/A
Cassia rasciculata (Partridge Pea)	0.125#/A
Ceariothus americanus (New Jersey Tea)	0.063#/A
Coreopsis palmata (Prairie Coreopsis)	0.016#/A
Desmanthus illinoensis (Illinois Bundle Flower)	0.125#/A
Echinacea pallida (Pale Purple Coneflower)	0.250#/A
Eryngium yuccifofium (Rattlesnake Master)	0.125#/A
Lespedeza capitata (Round-Head. Bush Clover)	0.125#/A
Liatris aspera (Rough Blazing Star)	0.125#/A
Liatris pycnostachya (Prairie Blazing Star)	0.188#/A
Lupinus perennis {Wild Lupines)	0.125#/A
Monarda fistulosa (Prairie Bergamot)	0.016#/A
Parthenium integrifolium (Wild Quinine)	0.125#/A
Penstemon grandiflorus (Lg-Flwrd. Beard Tong.)	0.188#/A
Petalostemum candidum (White Prairie Clover)	0.063#/A
Petalostemum purpureum (Purple Prairie Clover)	0.188#/A
Potentilla arguta (Prairie Cinquefoil).	0.031#/A
Pycnanthemum virginianum (Mountain Mint)	0.016#/A
Ratibida pinnata (Yellow Coneflower)	0.250#/A
Rudbeckia hirta {Black-eyed susan)	0.188#/A
Silphium laciniatum (Compass Plant)	0.125#/A
Silphium terebinthinaceum (Prairie Dock)	0.063#/A
Solidago nemoralis (Old-Field Goldenrod).	0.063#/A
Solidago rigiqa (Rigid Goldenrod)	0.125#/A
Solidago speciosa (Showy Goldenrod)	0.063#/A
Verbena stricta (Hoary Vervain)	0.063#/A
Veronicastrium virglnicum (Culver's Root)	0.063#/A
Zizia aurea (Golden Alexander)	0.031#/A
Annuals & Short Lived Perennials Mix	3.000#/A
TOTAL LBS. PER ACRE	**48.122#/A**

KENTUCKY BLUEGRASS MIX

20% KENTUCKY BLUE 98/80
25% PERENNIAL RYE
25% CREEPING RED FESCUE
10% BARON KENTUCKY BLUEGRASS
10% KEN BLUE KENTUCKY BLUEGRASS

SEED RATE: 4 LBS/1000 SFT
FERTILIZER RATE: 15.30.15 3.25 LBS/1000 SFT

RAIN GARDEN PLANT LIST

Key	Quantity	Botanical Name	Common Name	Size	Remarks	Location
CA	20	Anemone Canadensis	Canadian Anemone	2"	plug	bottom
WG	15	Geranium macculatum	Wild geranium	2"	plug	bottom
BS	20	Liatris spicata	Blazing star	2"	plug	bottom
BL	20	Lobelia siphilitica	Blue lobelia	2"	plug	bottom
BI	25	Iris virginica	Blue flag iris	2"	plug	bottom
SF	25	Onoclea sensibilis	Sensitive fern	4"	pot	bottom
PT	30	Chelone lyonii	Pink turtlehead	2"	plug	bottom
FS	14	Carex vulpinoidea	Fox sedge	2"	plug	bottom
NEA	22	Aster novae–angliae	New England Aster	4"	plug	side slope
NWO	25	Allium cernuum	Nobbing wild onion	2"	plug	bottom

Rain Garden Soil Mix and Hydrologic Components
- 2" layer Hardwood shredded mulch, to be placed over Rain Garden surface
- 20% Composted leaf mold, 20% sphagnum peat moss to be thoroughly mixed into friable loam soil, 12" deep layer of this planting mixture to be placed over sub–grade.

WOODY PLANT LIST

LOCATION	Key	Qty.	Scientific Name	Common Name	Size	Remarks
	TREES					
4 SYM, 10 DSM, 14 M 12 IM	NS	36	Picea abies	Norway Spruce	8'min. 3"cal.	B&B
3 SYM, 7 M	WP	10	Pinus strobus	White Pine	8'min. 3"cal.	B&B
5 DSM, 20 M	ARB	25	Thuja occidentalis	American Aborvitae	8'min. 3"cal.	B&B
1 SYM, 3 S, 9 M	SM	13	Acer saccharum	Sugar Maple	3"cal.	B&B
9 S	SL	9	Gleditsia triacanthos	Sunburst Locust	3"cal.	B&B
2 IP, 6 P	AM	8	Acer rubrum 'Armstrong'	Armstrong Maple	3"cal.	B&B
1 IP	RB	5	Betula nigra	River Birch	3"cal.	B&B
3 SYM, 6 M	RO	9	Quercus rubra	Red Oak	3"cal.	B&B
TOTAL TREES		113				
	SHRUBS					
DS	FQ	8	Chaenomeles speciosa	Flowering Quince	5' min.HT.	Container
ES	HIC	23	Taxus Hicksi	Hicks Yew	36" min.HT.	Container
ES	JUN	14	Juniperus Chinensis 'Spartan'	Spartan Juniper	5' min.HT.	Container
ES	VIB	13	Viburnum Burkwoodi	Burkwood Viburnum	36" min.HT.	Container

	COMMON NAME	SCIENTIFIC NAME	SIZE	REMARKS
(A)	WARDS YEW	TAXUS WARDII	18"	B&B
OR	CRANBERRY COTONEASTER	COTONEASTER APICULATUS	18"	CONT.
OR	GREEN SARGENT JUNIPER	JUNIPERUS CHINENSIS 'GREEN SARGENT'	18"	CONT.
(B)	LEATHER LEAF VIBURNUBA	VIBURNUBA RHYTIDOPHYILUM	36"	B&B
OR	COMPACT BURNING BUSH	EUONYMUS ALATUS CONPACTA	36"	CONT.
OR	BRISTOL RUBY WEIGELD	WEIGELA BRISTOL RUBY	36"	CONT.
(C)	GOLDEN VICARY PRIVET	LIQUSTRUM VICARY	24"	CONT.
OR	FRENCH HYDRANGEA	HYDRANGEA MACPOPHYLLA	24"	CONT.
OR	HICKS YEW	TAXUS HICKSI	36"	B&B
	KOREAN BOXWOOD	BUXUS MICROPHYLIA VAR. KOREANA	18"	CONT.
	WARDS YEW	TAXUS X. MEDIA 'WARDII'	18"	CONT.

1ST YEAR LANDSCAPE MAINTENANCE

- LAWN AREAS – NEWLY PLANTED DOMESTIC LAWN AREAS WILL BE MOWED AND MAINTAINED AT 3" HEIGHT THROUGHOUT THE GROW SEASON. ANY DAMAGED OR BARE AREAS WILL BE REPAIRED WITH SPECIFIED SEED MIX AS INDICATED IN THE CONSTRUCTION PLAN.
- DETENTION BASIN – BASIN SEED MIX RESTORATION MIX ARE NATIVE SPECIES PLANTS THAT ADAPT TO CHANGING WEATHER CONDITIONS, SUPPLEMENTAL MAINTENANCE INCLUDES LATE FALL MOWING OR "PRESCRIBED BRUNING". ANY DAMAGED OR BARE AREAS WILL BE REPAIRED WITH SPECIFIED SEED MIX AS INDICATED IN THE CONSTRUCTION PLANS.
- TREE PLANTINGS & LANDSCAPING – NEW TREE PLANTINGS WILL RECEIVE ADEQUATE WATERING AT TIME OF PLANTING. ALL TREES WILL RECEIVE 4" HARDWOOD SHREDDED BARK MULCH WHICH WILL BE ADEQUATE TO MAINTAIN GROUND MOISTURE FOR ALL NEW TREES THROUGHOUT THE GROWING SEASON. IN CASE OF DROUGHT CONDITIONS, THE SITE CONDITIONS WILL BE EVALUATED AT THE TIME AND THE APPROPRIATE MITIGATION WILL BE IMPOSED.

LANDSCAPE LEGEND

- = RAIN GARDEN
- = MESIC TO DRY PRAIRIE WITH FLOWER SEED MIX
- = TREE PROTECTION FENCING
- = PROPOSED EVERGREEN SHRUB
- = PROPOSED DECIDUOUS SHRUB
- = PROPOSED EVERGREEN TREE
- = PROPOSED DECIDUOUS TREE
- = EXISTING DECIDUOUS TREE
- = EXISTING EVERGREEN TREE
- = EXISTING SAVED TREE WITH PROTECTIVE FENCE
- = ALTERNATE MITIGATION TREE
- M = MITIGATION
- S = STREET TREE

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

WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

LEGEND

- = LIGHT POLE
- = UTILITY POLE
- = GUY ANCHOR
- = HYDRANT
- x901.23 = SPOT ELEV.
- = POST
- = GATE VALVE
- = SIGN
- TC = TOP OF CURB
- TW = TOP OF WALL
- = MANHOLE
- = CATCHBASIN
- = END SECTION
- = GRAVEL
- = FENCE
- = CONCRETE
- = ASPHALT
- r = EXISTING STORM
- s = EXISTING SANITARY
- w = EXISTING WATER
- g = EXISTING GAS
- e = EXISTING ELECTRIC
- t = EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.
BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.
(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY [signature]
GERALD J. SOSNOWSKI RLA, MICH No. 982

STATE OF MICHIGAN — GERALD J. SOSNOWSKI LANDSCAPE ARCHITECT NO. 982 — REGISTERED LANDSCAPE ARCHITECT

CIVIL ENGINEERS
PLANNERS * SURVEYORS
LANDSCAPE ARCHITECTS
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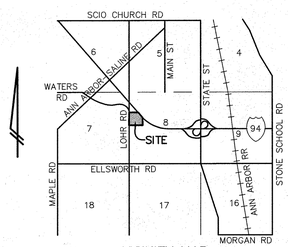
WASHTENAW ENGINEERING

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

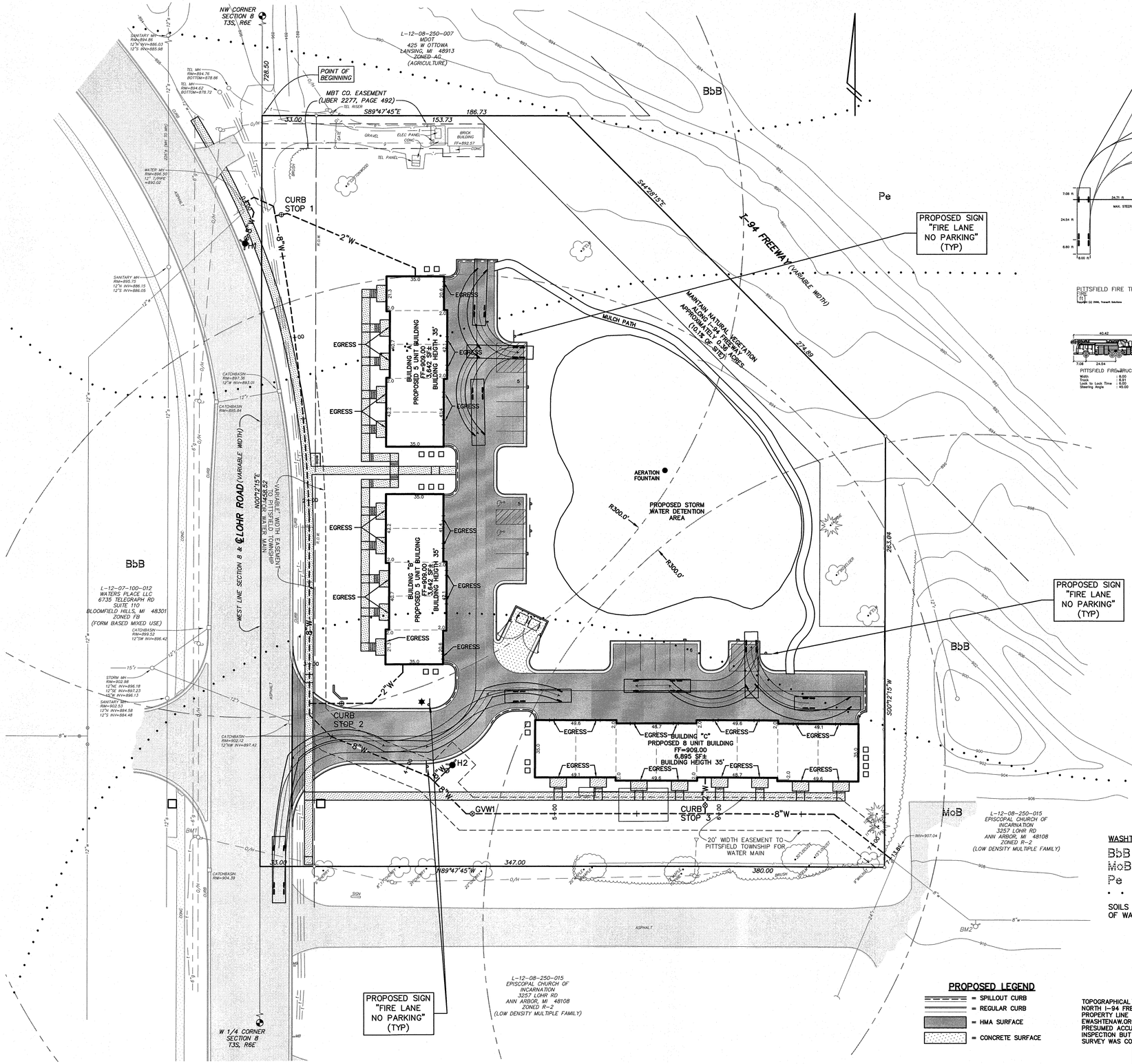
SHEET
LANDSCAPING PLAN

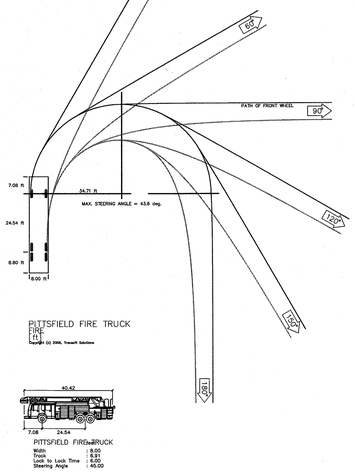
PROJECT
FOUNTAIN BLUE

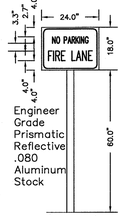
SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN
DATE 6-01-17
JOB NO. 32226
DWG NO. 226-land
FIELD BOOK NONE
FILE NO. 10301
18 SHEET



VICINITY MAP
(NO SCALE)







NO PARKING
FIRE LANE SIGN
NOT TO SCALE

NOTES:

1. ALL BUILDINGS ARE TWO STORY TOWNHOUSES FOR RESIDENTIAL OCCUPANCY.
2. THERE IS NO PROPOSED FIRE DEPARTMENT CONNECTIONS TO THE PROPOSED BUILDINGS.
3. THE EXISTING HYDRANT AT THE NORTH END OF THE SITE IS BEING RELOCATED TO MAKE IT MORE ACCESSIBLE AT THE REQUEST OF THE TOWNSHIP.
4. ADDRESS NUMBERS SHALL BE PROVIDED ON THE REAR OF EACH UNIT ENTRY DOOR.
5. NO PARKING SIGNS SHALL BE POSTED ON THE REAR OF BUILDINGS TO ALLEVIATE THE DESIGN TO PARK IN FRONT OF GARAGES.

WASHTENAW COUNTY SOIL SURVEY CLASSIFICATION

BbB – BLOUNT LOAM, 2 TO 6 PERCENT SLOPES
MoB – MORLEY LOAM, 2 TO 6 PERCENT SLOPES
Pe – PEWAMO CLAY LOAM
• • • • • • – SOILS BOUNDARY

SOILS ARE BASED ON USDA SOIL SURVEY OF WASHTENAW COUNTY.

PROPOSED LEGEND

= SPILLOUT CURB
= REGULAR CURB
= HMA SURFACE
= CONCRETE SURFACE

TOPOGRAPHICAL INFORMATION ALONG THE NORTH I-94 FREEWAY AND BEYOND NORTH PROPERTY LINE WAS TAKEN FROM EWASHTENAW.ORG. INFORMATION IS PRESUMED ACCURATE BASED ON SITE INSPECTION BUT NO TOPOGRAPHICAL SURVEY WAS COMPLETED IN THIS AREA.

WETLANDS DELINEATED BY: BWA CONSULTING, DATED NOV. 2016

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

STATE OF MICHIGAN
JOSEPH K. MAYNARD
ENGINEER No. 52559
LICENSED PROFESSIONAL ENGINEER

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LEGEND

= LIGHT POLE
= UTILITY POLE
= GUY ANCHOR
= HYDRANT
= SPOT ELEV.
= POST
= GATE VALVE
= SIGN
TC = TOP OF CURB
TW = TOP OF WALL
= MANHOLE
= CATCHBASIN
= END SECTION
= GRAVEL
= FENCE
= CONCRETE
= ASPHALT
= EXISTING STORM
= EXISTING SANITARY
= EXISTING WATER
= EXISTING GAS
= EXISTING ELECTRIC
= EXISTING TELEPHONE

BENCHMARK BM1=NAIL IN NE'LY FACE OF UTILITY POLE, WEST OF LOHR RD AND SOUTH OF DRIVEWAY TO KOHLS, ELEV=905.84.

BM2=TOP NUT ON HYDRANT NEAR SOUTHEAST CORNER OF SITE, ELEV=912.88.

(DATUM=NAVD 88)

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW

SCALE 0 15 30 60
SCALE: 1"=30'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

CIVIL ENGINEERS
PLANNERS • SURVEYORS
LANDSCAPE ARCHITECTS
3526 W. LIBERTY RD
SUITE 400
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FAX. 734-761-9530
WASHTENAWENGINEERING.COM
WASHTENAW ENGINEERING

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET
FIRE PROTECTION SHEET

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE 6-01-17
JOB NO. 32226
DWG NO. 226-fire
FIELD BOOK NONE
FILE NO. 10301

SHEET 19

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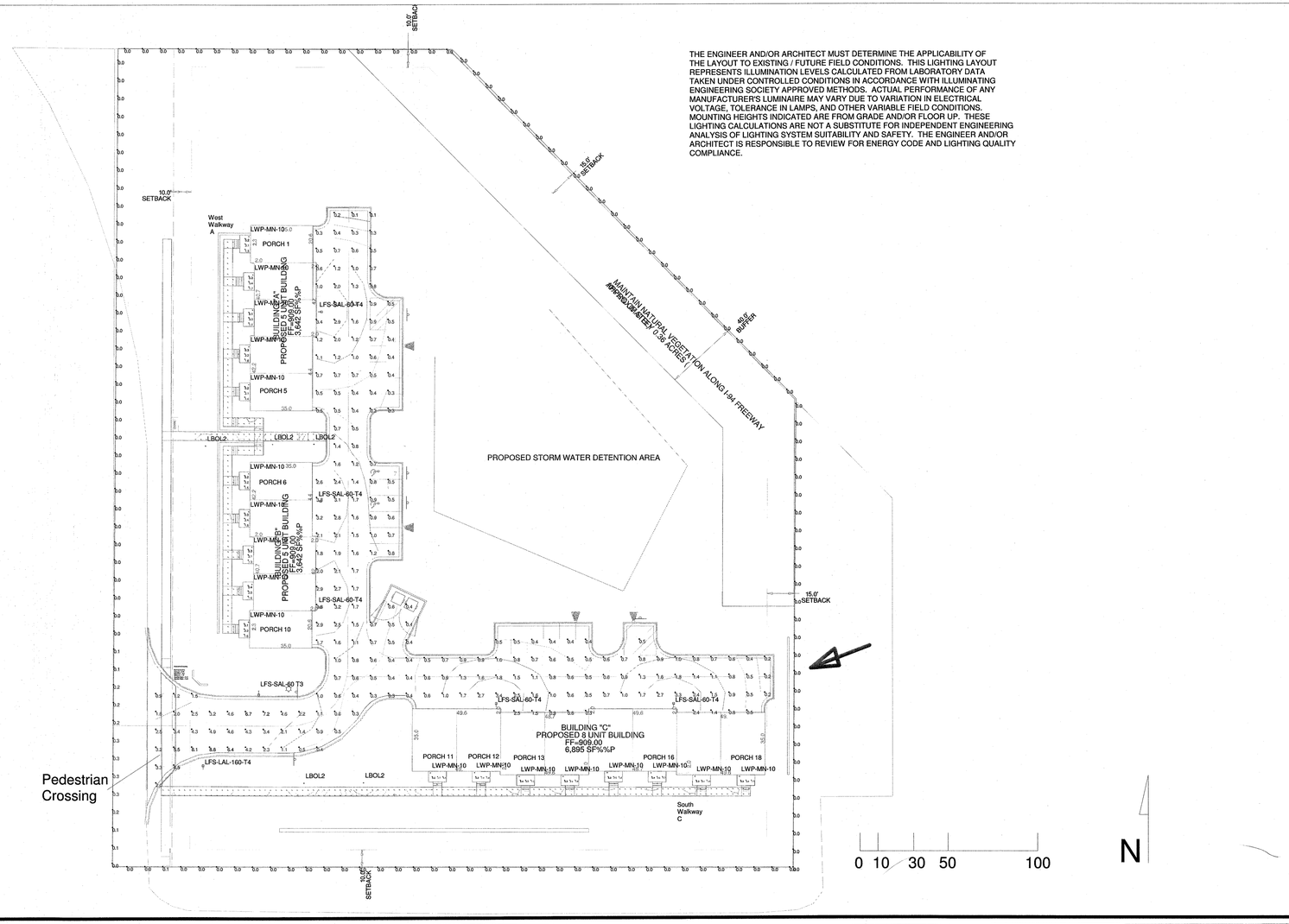


THE ENGINEER AND/OR ARCHITECT MUST DETERMINE THE APPLICABILITY OF THE LAYOUT TO EXISTING / FUTURE FIELD CONDITIONS. THIS LIGHTING LAYOUT REPRESENTS ILLUMINATION LEVELS CALCULATED FROM LABORATORY DATA TAKEN UNDER CONTROLLED CONDITIONS IN ACCORDANCE WITH ILLUMINATING ENGINEERING SOCIETY APPROVED METHODS. ACTUAL PERFORMANCE OF ANY MANUFACTURER'S LUMINAIRE MAY VARY DUE TO VARIATION IN ELECTRICAL VOLTAGE, TOLERANCE IN LAMPS, AND OTHER VARIABLE FIELD CONDITIONS. MOUNTING HEIGHTS INDICATED ARE FROM GRADE AND/OR FLOOR UP. THESE LIGHTING CALCULATIONS ARE NOT A SUBSTITUTE FOR INDEPENDENT ENGINEERING ANALYSIS OF LIGHTING SYSTEM SUITABILITY AND SAFETY. THE ENGINEER AND/OR ARCHITECT IS RESPONSIBLE TO REVIEW FOR ENERGY CODE AND LIGHTING QUALITY COMPLIANCE.

Luminaire Schedule

Symbol	Qty	Label	Lum. Lumens	LLF	Description
	18	LWP-MN-10	960	0.890	1503061315-005, MODEL_ LW
	1	LFS-SAL-60 T3	7683	0.890	
	5	LFS-SAL-60-T4	7645	0.890	
	5	LBOL2	1764	0.890	
	1	LFS-LAL-160-T4	21469	0.890	

Calculation Summary

Label	CalcType	Units	Avg	Max	Min	Avg/Min	Max/Min
AsphaltLOT_Planar	Illuminance	Fc	1.44	8.8	0.1	14.40	88.00
Perimeter	Illuminance	Fc	0.02	0.3	0.0	N.A.	N.A.
Porch_1_Top_1	Illuminance	Fc	3.27	5.2	1.5	2.18	3.47
Porch_10_Top_1	Illuminance	Fc	3.33	5.1	1.6	2.08	3.19
Porch_18_Top_1	Illuminance	Fc	3.40	5.3	1.5	2.27	3.53
Porch_5_Top_1	Illuminance	Fc	3.23	5.2	1.4	2.31	3.71
Porch_6_Top_1	Illuminance	Fc	3.33	5.2	1.6	2.08	3.25
SouthWalkway C_Planar	Illuminance	Fc	1.14	6.1	0.0	N.A.	N.A.
WestWalkway A_Planar	Illuminance	Fc	1.06	6.5	0.0	N.A.	N.A.
PedestrianCrossing	Illuminance	Fc	3.72	6.5	1.2	3.10	5.42

Fixtures: 18 LWP–MN–10wallpacks
11 watts; 960 lumens
Mounting height: 8 ft
LWP–MN–10–DB–1–NW–X–X–PC1–X(4000K)

Fixtures: 1 LFS–SAL–60 Type 3
60 watts; 7,683 lumens
Mounting height: 16 ft
LFS–SAL–60–CC–T3–C–1–NW–X–7P–X–X(4000K)

Fixtures: 1 LFS–LAL–160 Type 4
160 watts; 21,469 lumens
Mounting height: 16 ft
LFS–LAL–160–CC–T4–C–1–NW–MAS–7P–X–X(4000K)

Fixtures: 5 LFS–SAL–60 Type
60 watts; 7,645 lumens
Mounting height: 20 ft
LFS–SAL–60–T3–C–1–NW–WM–7P–X–X(4000K)

Fixtures: 5 LBOL2 bollards
19 watts; 1,764 lumens
Mounting height: ground level
LBOL2–R–DB–1–8–NW–X(4000K)

LUMINAIRES TO BE EQUIPPED WITH NIGHTTIME DIMMING CONTROLS, TO BE INSTALLED BY CONTRACTORS

Illuminance Values
- 0.2 - 0.29 fc
- 0.3 - 0.49 fc
- 0.5 - 0.99 fc
- 1.0 - 1.99 fc
- 2.0 - 5.0 fc

Lumecon | Luminance + Economy

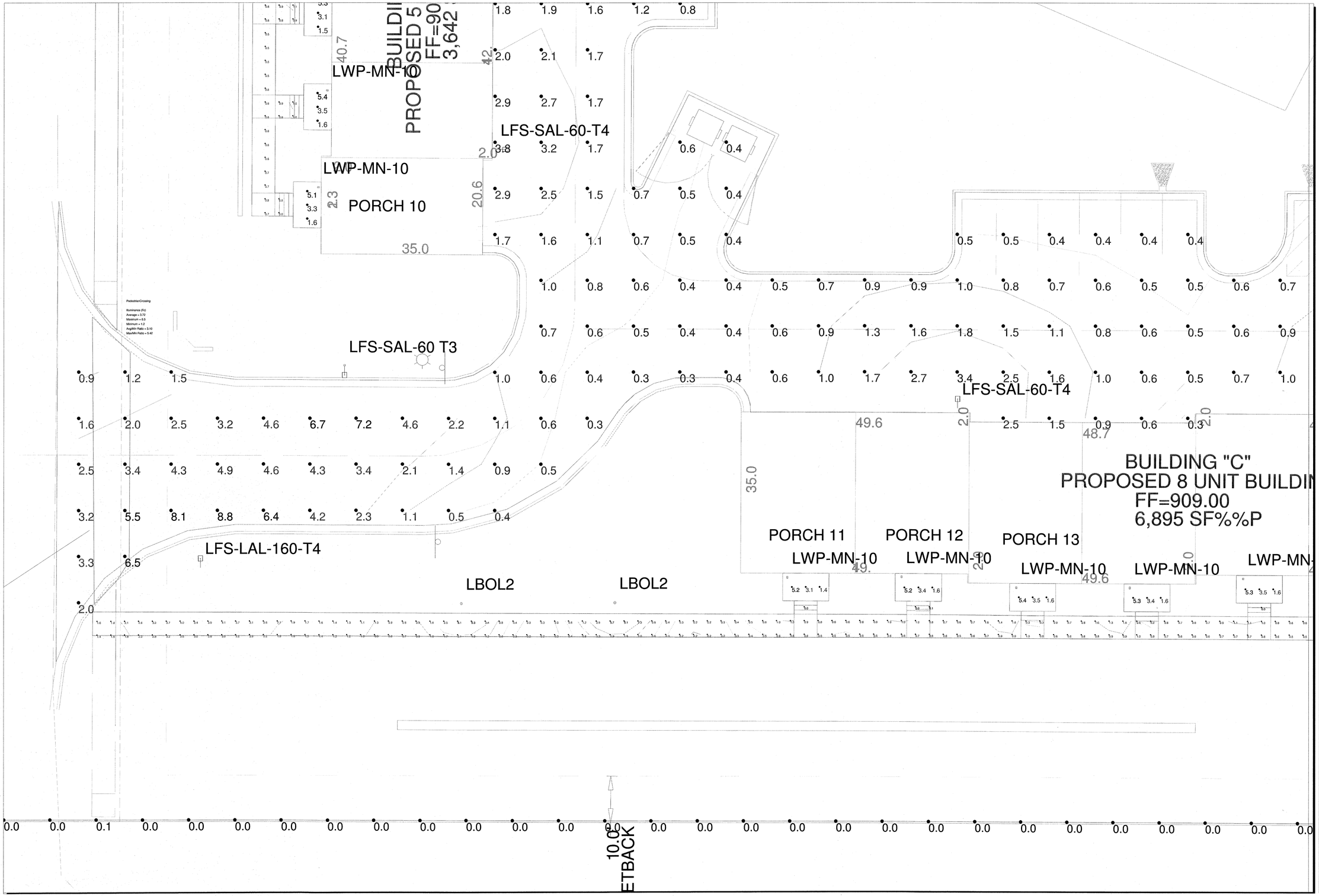
#	Date	Comments

Revisions

Drawn By: M. Woznicki
Checked By:
Date:5/15/2018
Scale:

Fountain Blue

PHOTOMETRIC PLAN



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#	Date	Comments

Revisions

Drawn By: M. Woznicki
Checked By:
Date:5/15/2018
Scale:

Fountain Blue

SIDEWALK PHOTOMETRIC PLAN

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Lumecon FIRE SERIES — LFS - SAL LED Small Wall Pack

THIS ONE

Catalog Number:
Project:
Comments:
Prepared By: Date:

Description

The LFS-SAL small wall pack light is the first of its kind in Lumecon's LED Fire Series. Combining a sleek fixture design with energy efficient performance allows this fixture to be used in parking lots, roadways, pathways and general area lighting applications.

Performance Data

Model	Watts	Equiv	Delivered Lumens	Efficacy
LFS-SAL-30 (Type V)	31W	250W HD	3,999 Lm	133 LPW
LFS-SAL-30 (Type III)	30W	250W HD	3,929 Lm	131 LPW
LFS-SAL-30 (Type II)	30W	250W HD	4,039 Lm	134 LPW
LFS-SAL-30 (Narrow)	30W	250W HD	4,283 Lm	141 LPW
LFS-SAL-60 (Type V)	60W	250W HD	7,883 Lm	131 LPW
LFS-SAL-60 (Type III)	60W	250W HD	7,683 Lm	128 LPW
LFS-SAL-60 (Type II)	60W	250W HD	7,920 Lm	132 LPW
LFS-SAL-60 (Narrow)	60W	250W HD	8,400 Lm	140 LPW
LFS-SAL-80 (Type V)	78W	400W HD	10,264 Lm	130 LPW
LFS-SAL-80 (Type III)	78W	400W HD	9,937 Lm	127 LPW
LFS-SAL-80 (Type II)	78W	400W HD	10,296 Lm	132 LPW
LFS-SAL-80 (Narrow)	78W	400W HD	10,920 Lm	140 LPW
vLFS-SAL-110 (Type V)	109W	400W HD	13,971 Lm	128 LPW
LFS-SAL-110 (Type III)	107W	400W HD	13,384 Lm	125 LPW
LFS-SAL-110 (Type II)	109W	400W HD	14,200 Lm	130 LPW
LFS-SAL-110 (Narrow)	109W	400W HD	15,460 Lm	141 LPW

Technical Specifications

Input Voltage: 120-277V. For 347-480V step-down transformer and enclosure available. Check Accessories on page 2.

Housing: Die cast aluminum housing and front frame with textured architectural bronze powder coat finish over a chromate conversion coating. Housing features an integrated heat sink and driver compartment built into the fixture design. Optional photocell accessory available.

Lens: Tempered clear glass lens.

Mounting: Wall mount bracket standard.

Effective Projected Area (EPA): 1.97 ft²

Color Temperature: 3000K WW, 4000K NW (standard), 5000K CW. All LED's are rated for a minimum of 100,000 hours of continuous operation at ambient temperatures from -40°F/-40°C to 95°F/35°C.

Color Rendering Index (CRI): Minimum of 70 or higher.

Dimming: 0-10V standard dimming capability.

Surge Protection: Thermally protected 20kA/ 40kV varistor type surge suppressor is included and meets IEEE/ANSI C62.41.2 guidelines for "C High exposure." Also meets IEC61643-11 Class II / EN61643-11 Type 2, and US Dept of Energy MSSLC Model Spec for surge protection. The device is wired in series with the luminaire input power in order to interrupt power to the luminaire when consumed, protecting the LED power supply and circuit boards from additional electrical surges.

Lumecon ETD™ System: The enhanced thermal dissipation system engines are thermally bonded to provide maximum thermal dissipation to the exterior of the fixture to ensure long life. To protect the light engine panel from moisture and corrosion, the LED light engine panel is uniformly coated with a UV stabilized acrylic polymer resin that meets MIL and ASTM dielectric standards, UL, and IPC standards for flammability, moisture resistance and thermal shock.

Certification Data: CSA Listed to UL 1598, UL 8750 and CSA 22.2 No. 250 for Wet Locations. *Full compliance and test documentation is available for TM-21, LM-79, LM-80, ETL Listing to UL1598 and UL 8750, and Lighting Facts.

DesignLights Consortium® (DLC) Qualified Product: The 4000K NW is DLC® qualified. Unless noted, not all versions of this product may be DLC® qualified. For a complete list of Lumecon DLC® Qualified Products visit: www.designlights.org.

Manufacturing Origin: US Manufactured and Assembled.

Buy American: Meets Buy American requirements within the ARRA.

Warranty: 10 Year L70 performance based warranty. For full warranty terms, please visit our website: www.lumecon.com

FIXTURE SHALL BE BLACK COLOR

20kA SURGE PROTECTION · lighting facts · NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS

Email: sales@lumecon.com Website: www.lumecon.com Phone: 248-477-5009 3.28.2017
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Lumecon FIRE SERIES — LFS - SAL LED Small Wall Pack

Ordering Information

LFS-SAL – Options / Ordering Example: LFS-SAL-110-DB-T5-C-1-NW-WM-X-X

WATTAGE	COLOR	DISTRIBUTION	LENS	VOLTAGE	COLOR TEMPERATURE
30 - 30 Watts 60 - 60 Watts 80 - 80 Watts 110 - 110 Watts	DB - Dark Bronze CC - Custom Color	T5 - Type V* T3 - Type III* T2- Type II* NR - Narrow* *DLC® Qualified	C - Clear Glass	1 - 120v - 277v* ^347 - 480v see Accessories *DLC® Qualified	NW - Neutral* CW - Cool WW - Warm *DLC® Qualified

MOUNTING METHODS	PHOTOCELL	OCCUPANCY SENSOR	ACCESSORIES (Order as separate line item)
WM - Wall Mount Bracket	X - None R - Receptacle Only RS - Receptacle Only with Shorting Cap 7P - Seven-pin Twist Lock Photocell Receptacle Only (controls by others) PC1 - 120v - 277v Twist Lock Photocell* * Includes receptacle	X - None OC1 - On/Off OC2 - Dim/High	713-1000 - 347v-480v Step-down Transformer 664RTSC - Enclosure Box for Step-down Transformer* *Field Installed

If OCC Sensor Option is selected, mounting height specifications need to be clarified:
- [ ] Mounting height between 0' - 10'
- [ ] Mounting height between 10' - 20'
- [ ] Mounting height over 20'+

OCC Sensor Patterns

Coverage Patterns: 0' - 10' Mounting Height (Coverage Top View, Coverage Side Area); 10' - 20' Mounting Height (Coverage Top View, Coverage Side Area); 20' + Mounting Height (Coverage Top View, Coverage Side Area)

Dimensions & Weights

Model	Width	Height	Length	Weight
LFS-SAL	13.39"	3.58"	15"	15 lbs.

15" · 3.58" · 13.39"

FIXTURE SHALL BE LFS-SAL-60-CC-T3-C-1-NW-X-7P-X-X (4000K)
AND
FIXTURE SHALL BE LFS-SAL-60-CC-T3-C-1-NW-WM-7P-X-X (4000K)

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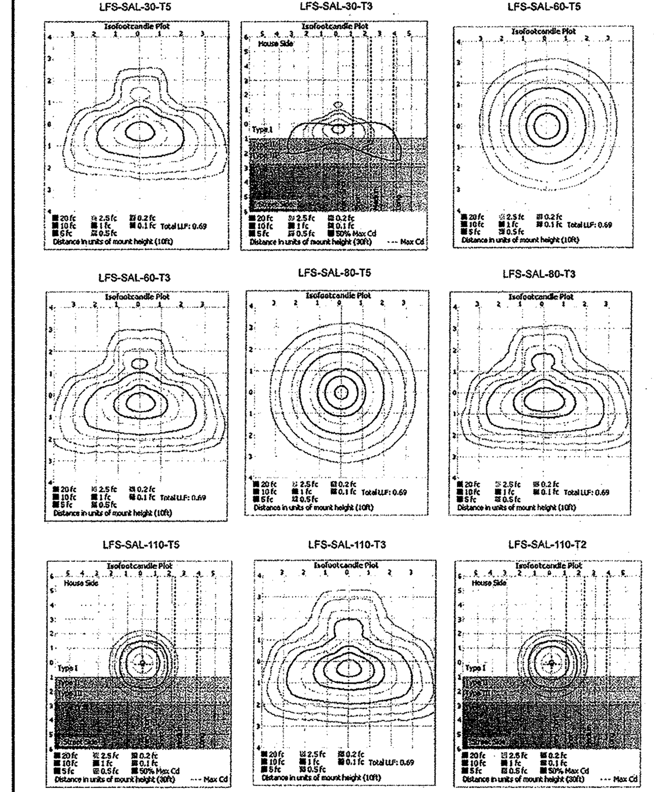
Lumecon FIRE SERIES — LFS - SAL LED Small Wall Pack

Photometric Data

For .ies files of this product, please visit the downloads tabs on the LFS-SAL product page: http://lumecon.com/products/lfs-sal-small-wall-pack/



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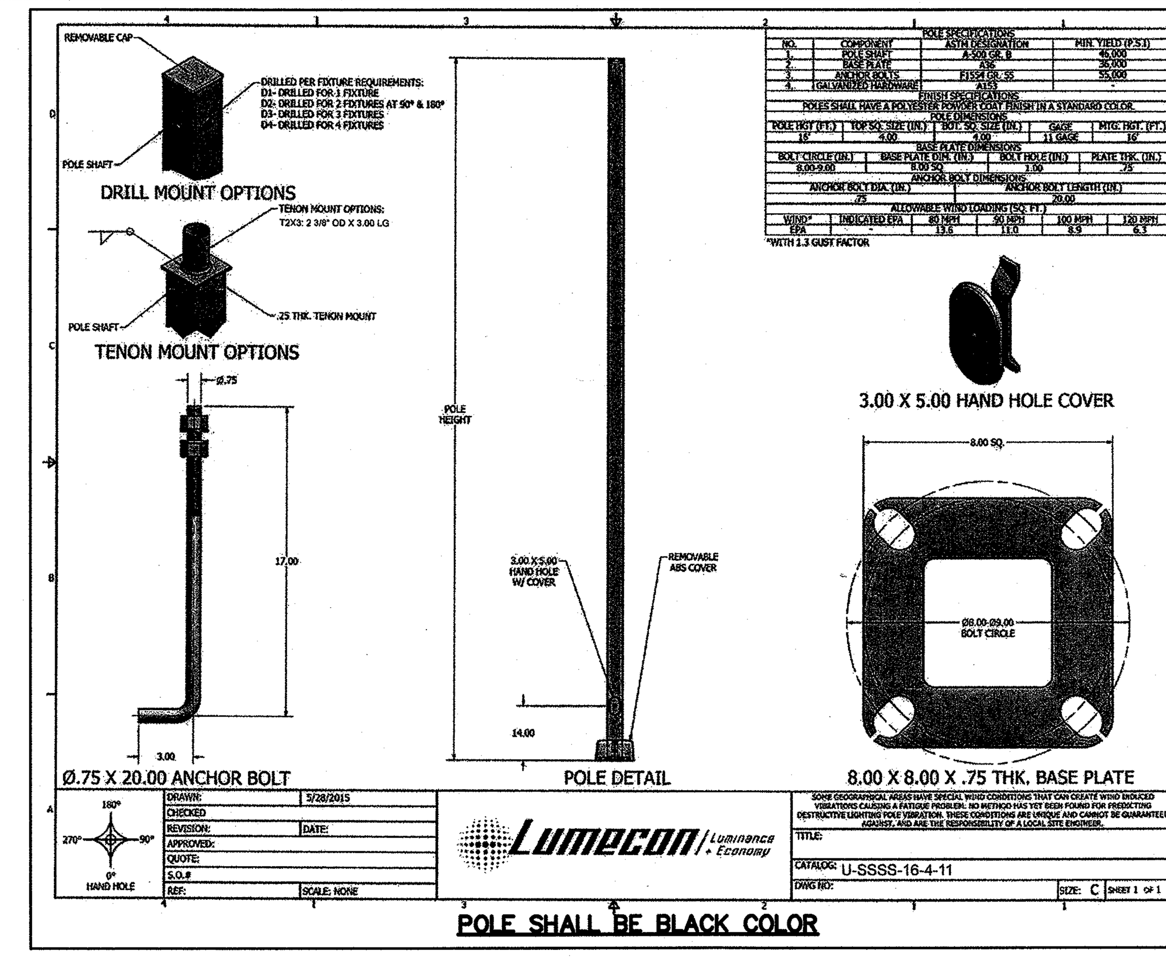
Lumecon pole detail



NO.	COMPONENT	ASTM DESIGNATION	MIN. YIELD (P.S.I.)
1.	POLE SHAFT	A-500 GR. B	46,000
2.	BASE PLATE	A36	36,000
3.	ANCHOR BOLTS	F1554 GR. 55	55,000
4.	GALVANIZED HARDWARE	A153	-

POLE HGT (FT.)	TOP SQ. SIZE (IN.)	BOT. SQ. SIZE (IN.)	GAGE	MTG. HGT. (FT.)
16'	4.00	4.00	11 GAGE	16'

BOLT CIRCLE (IN.)	BASE PLATE DIM. (IN.)	BOLT HOLE (IN.)	PLATE THK. (IN.)
8.00-9.00	8.00 SQ.	1.00	.75

ANCHOR BOLT DIA. (IN.)	ANCHOR BOLT LENGTH (IN.)
.75	20.00

WIND*	INDICATED EPA	80 MPH	90 MPH	100 MPH	120 MPH
EPA	-	13.6	11.0	8.9	6.3

POLE SHALL BE BLACK COLOR

Lumecon FIRE SERIES — LFS - LAL LED Large Area Light

THIS ONE

Catalog Number:
Project:
Comments:
Prepared By: Date:

Description

The LFS-LAL large area light is the first of its kind in Lumecon's LED Fire Series. Combining a sleek fixture design with energy efficient performance allows this fixture to be used in parking lots, roadways, pathways and general area lighting applications replacing existing fixtures up to 1,000W HID one-for-one.

Performance Data

Model	Watts	Equiv	Delivered Lumens	Efficacy
LFS-LAL-160 (Type V)	160W	400W HID	21,508 Lm	134 LPW
LFS-LAL-160 (Type IV)	159W	400W HID	21,467 Lm	135 LPW
LFS-LAL-160 (Type III)	158W	400W HID	20,000 Lm	127 LPW
LFS-LAL-160 (Type II)	161W	400W HID	21,777 Lm	136 LPW
LFS-LAL-240 (Type V)	245W	1,000W HID	30,373 Lm	124 LPW
LFS-LAL-240 (Type IV)	242W	1,000W HID	30,920 Lm	128 LPW
LFS-LAL-240 (Type III)	236W	1,000W HID	28,803 Lm	122 LPW
LFS-LAL-240 (Type II)	243W	1,000W HID	31,726 Lm	130 LPW
LFS-LAL-285 (Type V)	278W	1,000W HID	32,611 Lm	117 LPW

Dimensions & Weights

Model	Width	Height	Length	Weight
LFS-LAL	15 1/4"	5 7/8"	22"	30 lbs.

Technical Specifications

Input Voltage: 120-277V or 347-480V.

Housing: Die cast aluminum housing and front frame with textured architectural bronze powder coat finish over a chromate conversion coating. Housing features an integrated heat sink and driver compartment built into the fixture design. Optional photocell accessory available.

Lens: Tempered clear glass lens.

Mounting: Mounting arm designed for a square / round pole (standard). Additional mounting options include a pole mounting arm adaptor.

Effective Projected Area (EPA): 0.67ft² (0.84ft² with arm)

Color Temperature: 3000K WW, 4000K NW (standard), 5000K CW.

LED Lifetime: All LED's are rated for a minimum of 100,000 hours of continuous operation at ambient temperatures from -40°F/-40°C to 95°F/35°C.

Color Rendering Index (CRI): Minimum of 70 or higher.

Dimming: 0-10V standard dimming capability.

Surge Protection: Thermally protected 20kA/ 40kV varistor type surge suppressor is included and meets ANSI C136.2-2015: Extreme Level. Also meets IEC61643-11 Class II / EN61643-11 Type 2, and US Dept of Energy MSSLC Model Spec for surge protection. The device is wired in series with the luminaire input power in order to interrupt power to the luminaire when consumed, protecting the LED power supply and circuit boards from additional electrical surges.

Lumecon ETD™ System: The enhanced thermal dissipation system engines are thermally bonded to provide maximum thermal dissipation to the exterior of the fixture to ensure long life. To protect the light engine panel from moisture and corrosion, the LED light engine panel is uniformly coated with a UV stabilized acrylic polymer resin that meets MIL and ASTM dielectric standards, UL, and IPC standards for flammability, moisture resistance and thermal shock.

Certification Data: CSA Listed to UL 1598, UL 8750 and CSA 22.2 No. 250 for Wet Locations. *Full compliance and test documentation is available for TM-21, LM-79, LM-80, ETL Listing to UL1598 and UL 8750, and Lighting Facts.

DesignLights Consortium® (DLC) Qualified Product: Unless noted, not all versions of this product may be DLC® qualified. For a complete list of Lumecon DLC® Qualified Products visit: www.designlights.org.

Manufacturing Origin: US Manufactured and Assembled.

Buy American: Meets Buy American requirements within the ARRA.

Warranty: 10 Year L70 performance based warranty. For full warranty terms, please visit our website: www.lumecon.com

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Please see www.lumecon.com for current specifications and documentation. Sheet / LFS-LAL_05142018

Lumecon FIRE SERIES — LFS - LAL LED Large Area Light

Ordering Information

LFS-LAL – Options / Ordering Example: LFS-LAL-240-DB-T5-C-1-NW-MAS-X-X

WATTAGE	COLOR	DISTRIBUTION	LENS	VOLTAGE	COLOR TEMPERATURE
160 - 160 Watts 240 - 240 Watts 285 - 285 Watts* *285 only available in T5 and 120/277V	DB - Dark Bronze CC - Custom Color	T5 - Type V T4 - Type IV T3 - Type III T2- Type II	C - Clear Glass	1 - 120v - 277v 2 - 347 - 480v	NW - Neutral CW - Cool WW - Warm

MOUNTING METHODS	PHOTOCELL	OCCUPANCY SENSOR	ACCESSORIES
MAS - Mounting Arm (Square Pole)* MAR - Mounting Arm (Round Pole)* PM - Pole Mount Arm Adaptor* SB - Swivel Bracket SF - Slip Fitter Y - Yoke *Designed to mount to a 4", 5" or 6" pole	X - None R - Receptacle Only RS - Receptacle Only with Shorting Cap 7P - Seven-pin Twist Lock Photocell Receptacle Only (controls by others) PC1 - 120v - 277v Twist Lock Photocell* PC2 - 347v - 480v Twist Lock Photocell* * Includes receptacle	X - None OC1 - On/Off OC2 - Dim/High	LFS-LAL Wire Guard LFS-LAL Glare Shield

If OCC Sensor Option is selected, mounting height specifications need to be clarified:
- [ ] Mounting height between 0' - 10'
- [ ] Mounting height between 10' - 20'
- [ ] Mounting height over 20'+

OCC Sensor Patterns

Coverage Patterns: 0' - 10' Mounting Height (Coverage Top View, Coverage Side Area); 10' - 20' Mounting Height (Coverage Top View, Coverage Side Area); 20' + Mounting Height (Coverage Top View, Coverage Side Area)

Option Samples

LFS-LAL Mounted Arm (Square)
LFS-LAL Mounted Arm (Round)
LFS-LAL Pole Mount (Arm Adaptor)
LFS-LAL Swivel Bracket
LFS-LAL Slip Fitter
LFS-LAL Yoke Mount
LFS-LAL Wire Guard
LFS-LAL Glare Shield

FIXTURE SHALL BE LFS-LAL-160-CC-1-NW-MAS-7P-X-X (4000K)

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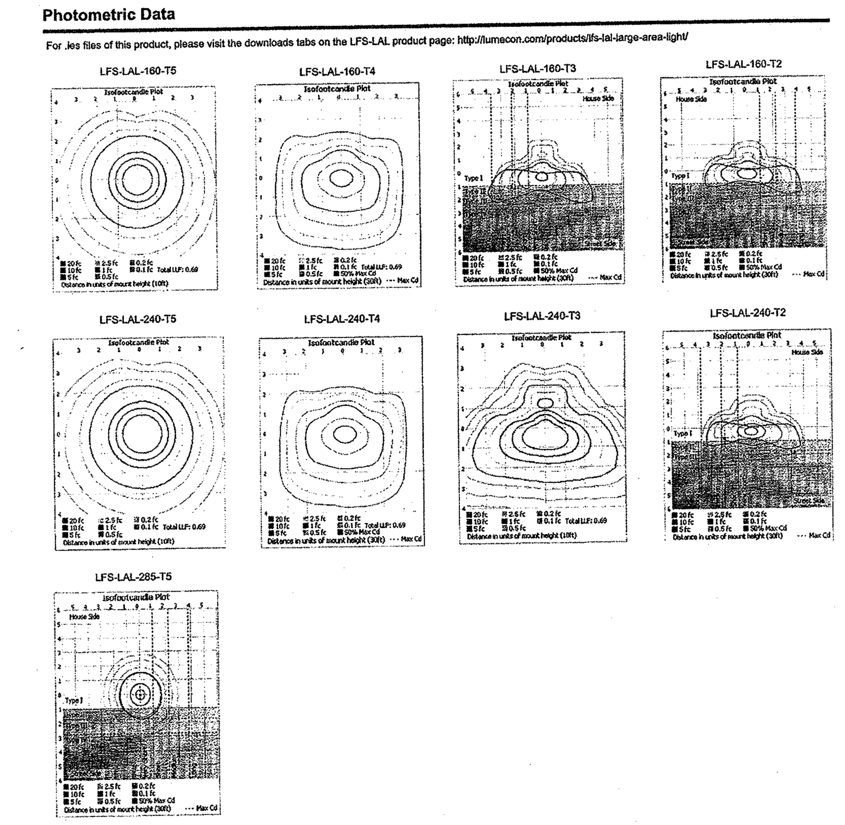
Please see www.lumecon.com for current specifications and documentation. Sheet / LFS-LAL_05142018

Lumecon FIRE SERIES — LFS - LAL LED Large Area Light

Photometric Data

For .ies files of this product, please visit the downloads tabs on the LFS-LAL product page: http://lumecon.com/products/lfs-lal-large-area-light/



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Please see www.lumecon.com for current specifications and documentation. Sheet / LFS-LAL_05142018

Lumecon — LBOL2 LED Decorative

Round

Catalog Number:
Project:
Comments:
Prepared By: Date:

Description

The LBOL2 walkway bollard is built with a robust die-cast aluminum housing and vandal resistant polycarbonate lens. Available in one wattage version and equivalent to a 100W HID, the LBOL2 is a perfect solution for lighting entrance walkways and for general illumination purposes.

Performance Data

Model	Watts	Equiv	Delivered Lumens	Efficacy
LBOL2 - Round	19W	100W HID	1,795 Lm	95 LPW

Dimensions & Weights

Model	Width	Height	Weight
LBOL2 - Round	7"	34 3/8"	13.5 lbs.

9¼" · 34¾" · 7" · Round

Technical Specifications

Input Voltage: 120-277V or 347-480V

Housing: Extruded aluminum housing with a powder coat finish over a chromate conversion coating. Housing features a flush mounting base, vandal-resistant screws and a top.

Lens: Clear polycarbonate lens.

Mounting: 8" anchor bolts and mounting kit provided standard. Additional anchor bolt lengths include 12" and 15" options.

Effective Projected Area (EPA): 1.9 ft²

Color Temperature: 2700K WW, 4000K NW (standard), 5000K CW.

LED Lifetime: All LED's are rated for a minimum of 100,000 hours of continuous operation at ambient temperatures from -40°F/-40°C to 95°F/35°C.

Color Rendering Index (CRI): Minimum of 70 or higher.

Dimming: 0-10V standard dimming capability.

Surge Protection: Thermally protected 20kA/ 40kV varistor type surge suppressor is included and meets ANSI C136.2-2015: Extreme Level. Also meets IEC61643-11 Class II / EN61643-11 Type 2, and US Dept of Energy MSSLC Model Spec for surge protection. The device is wired in series with the luminaire input power in order to interrupt power to the luminaire when consumed, protecting the LED power supply and circuit boards from additional electrical surges.

Lumecon ETD™ System: The enhanced thermal dissipation system engines are thermally bonded to provide maximum thermal dissipation to the exterior of the fixture to ensure long life. To protect the light engine panel from moisture and corrosion, the LED light engine panel is uniformly coated with a UV stabilized acrylic polymer resin that meets MIL and ASTM dielectric standards, UL, and IPC standards for flammability, moisture resistance and thermal shock.

Certification Data: CSA Listed to UL 1598, UL 8750 and CSA 22.2 No. 250 for Wet Locations. *Full compliance and test documentation is available for TM-21, LM-79, LM-80, CSA Listing to UL1598 and UL 8750 and Lighting Facts.

Manufacturing Origin: US Manufactured and Assembled.

Buy American: Meets Buy American requirements within the ARRA.

Warranty: 10 Year L70 performance based warranty. For full warranty terms, please visit our website: www.lumecon.com

20kA SURGE PROTECTION · NATIONAL ASSOCIATION OF ELECTRICAL DISTRIBUTORS

Email: sales@lumecon.com Website: www.lumecon.com Phone: 248-477-5009
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Please see www.lumecon.com for current specifications and documentation. Sheet/LBOL2_05142018

Lumecon — LBOL2 LED Decorative

Ordering Information

LBOL2 – Round Options / Ordering Example: LBOL2-R-DB-1-8-NW-X

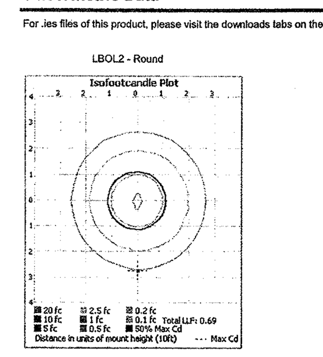
TYPE	COLOR	VOLTAGE	MOUNTING METHODS	COLOR TEMPERATURE	INLINE FUSE
R - Round	DB - Dark Bronze BK - Black* *Extended lead time in Black Square	1 - 120v - 277v 2 - 347v - 480v	8 - 8" Anchor Bolts 12 - 12" Anchor Bolts 15 - 15" Anchor Bolts	NW - Neutral CW - Cool WW - Warm	X - None F - Inline Fuse, 2.5A

Options & Accessories

Anchor Bolt Assembly (Included)

Photometric Data

For .ies files of this product, please visit the downloads tabs on the LFS-SFL product page: http://lumecon.com/products/lbol-walkway-bollard/



FIXTURE SHALL BE LBOL2-R-DB-1-8-NW-X

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Lumecon — LWP - MN LED Wall Pack

Photocell Included

Catalog Number:
Project:
Comments:
Prepared By: Date:

Description

The LWP-MN mini wall pack fixture delivers the illumination performance to replace a 70W HID fixture one-for-one. With a dusk to dawn photocell built standard into every fixture, the LWP-MN is perfect for building facades, general security, storage areas, and entry door applications.

Performance Data

Model	Watts	Equiv	Delivered Lumens	Efficacy
LWP-MN-10	11W	70W HID	1,029 Lm	94 LPW

Dimensions & Weights

Model	Width	Height	Depth	Weight
LWP-MN-10	6 3/4"	11"	5 1/4"	3.35 lbs.

5 1/4" · 6 3/4" · 11"

Technical Specifications

Input Voltage: 120-277V

Housing: Dark bronze polycarbonate front housing with clear prismatic lens. Die cast aluminum back plate with cast-in template for mounting over an electrical box.

Lens: Molded prismatic polycarbonate lens.

Mounting: Die cast aluminum back plate with cast-in template for mounting directly over a 4" recessed outlet box, or by use of ½" surface conduit.

Effective Projected Area (EPA): 0.54 ft²

Color Temperature: 2700K WW, 4000K NW (standard), 5000K CW.

LED Lifetime: All LED's are rated for a minimum of 100,000 hours of continuous operation at ambient temperatures from -40°F/-40°C to 95°F/35°C.

Color Rendering Index (CRI): Minimum of 70 or higher.

Photocell: Voltage specific (120VAC or 277VAC) dusk-to-dawn lighting control photocell included standard.

Surge Protection: Thermally protected 20kA/ 40kV varistor type surge suppressor is included and meets ANSI C136.2-2015: Extreme Level. Also meets IEC61643-11 Class II / EN61643-11 Type 2, and US Dept of Energy MSSLC Model Spec for surge protection. The device is wired in series with the luminaire input power in order to interrupt power to the luminaire when consumed, protecting the LED power supply and circuit boards from additional electrical surges.

Lumecon ETD™ System: The enhanced thermal dissipation system engines are thermally bonded to provide maximum thermal dissipation to the exterior of the fixture to ensure long life. To protect the light engine panel from moisture and corrosion, the LED light engine panel is uniformly coated with a UV stabilized acrylic polymer resin that meets MIL and ASTM dielectric standards, UL, and IPC standards for flammability, moisture resistance and thermal shock.

Battery Back-Up (Optional): When triggered into emergency mode, the BBU operates the LEDs for a code-compliant 90 minutes. When AC power is restored, the driver automatically returns to charging mode. The BBU is a UL recognized component and meets all applicable safety standards.

Certification Data: ETL Listed to UL 1598, UL 8750 and CSA 22.2 No. 250 for Wet Locations. *Full compliance and test documentation is available for TM-21, LM-79, LM-80, ETL Listing to UL1598 and UL 8750 and Lighting Facts.

Manufacturing Origin: US Manufactured and Assembled.

Buy American: Meets Buy American requirements within the ARRA.

Warranty: 10 Year L70 performance based warranty. For full warranty terms, please visit our website: www.lumecon.com

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Please see www.lumecon.com for current specifications and documentation. Sheet/LWP-MN_05142018

Lumecon — LWP - MN LED Wall Pack

Ordering Information

Ordering Example: LWP-MN-10-DB-1-NW-X-X-PC1-X

WATTAGE	COLOR	VOLTAGE	COLOR TEMPERATURE	OCCUPANCY SENSOR	BATTERY BACK-UP
10 - 10 Watts	DB - Dark Bronze	1 - 120v - 277v	NW - Neutral CW - Cool WW - Warm	X - None OC1 - On/Off	X - None BB1 -120v BBU* BB2 -277v BBU* BBC1 -120v BBU Cold Temp Rated* BBC2 -277v BBU Cold Temp Rated* * Requires external box

PHOTOCELL	INLINE FUSE
X - None PC1 - 120v/277v PC	X - None F - Inline Fuse, 2.5A

Battery Back-Up

An external battery back-up box may be required on certain light fixtures. Please contact Lumecon Sales Agent for clarification.

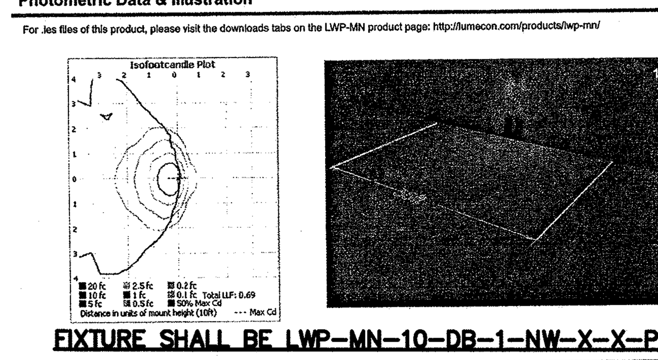
UL Component Recognized / CSA certified

Lumecon's Emergency LED driver has been tested in accordance with the standards set forth in UL 924, "Emergency Lighting and Power Equipment," and with the standards set forth in C22.2 No. 141, "Unit Equipment for Emergency Lighting." Our Emergency LED driver's are UL Component Recognized and CSA Certified for factory installation only. Emergency illumination time exceeds the National Electrical Code (NEC), Life Safety Code (NFPA-LSC), National Building Code of Canada (NBC), National Fire Code of Canada (NFC) and UL 90-minute requirements.

10.5" · 6" · 5.5" · 13.75"

Photometric Data & Illustration

For .ies files of this product, please visit the downloads tabs on the LWP-MN product page: http://lumecon.com/products/lwp-mn/



FIXTURE SHALL BE LWP-MN-10-DB-1-NW-X-X-PC1-X

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BENCHMARK

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN, 2018-05-07 PER TWP. REVIEW, 2018-07-03 PER TWP. REVIEW.

SCALE 0 20 40 80
SCALE: 1"=40'

PREPARED BY JOSEPH K. MAYNARD P.E., MICH No. 52559

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SHEET
PHOTOMETRIC DETAILS

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY * MICHIGAN

JOB NO. 32226
DWG NO. 226-det
FIELD BOOK NONE
FILE NO. 10301

DATE 6-01-17
SHEET 22

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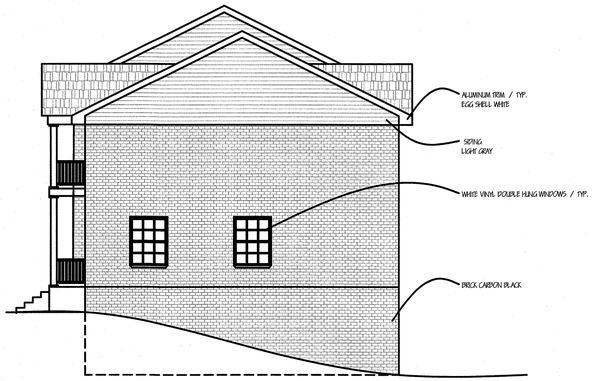
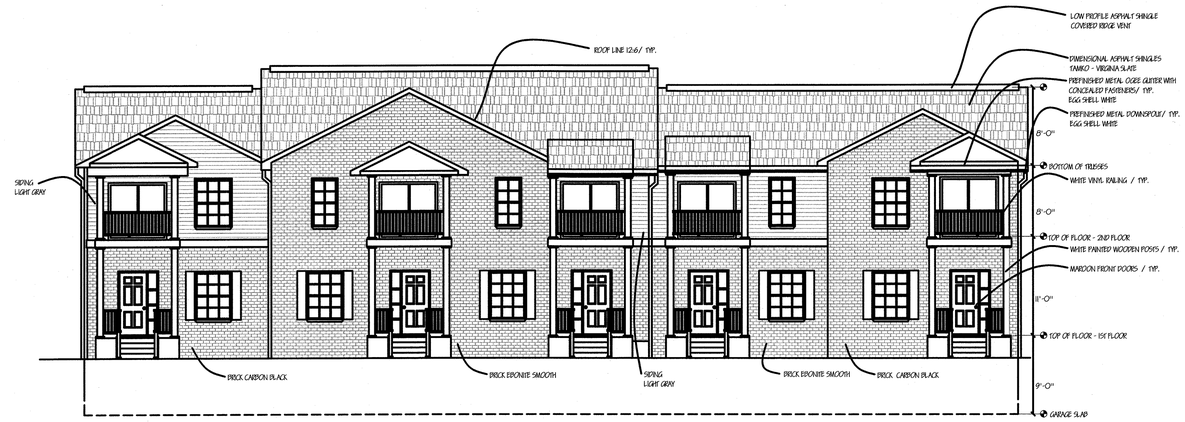
PROJECT ITEMS:
1. ALL UNITS TO HAVE FULL DEPTH BRICK ON ALL SIDES AS INDICATED.
2. SIDING TO BE DONE IN HARDY BOARD, CEMENT BOARD OR OTHER SIMILARLY STYLE LIKE VINYL SIDING IS ALLOWED.
3. BUILDING MUST MEET MINIMUM BUILDING ENERGY STANDARDS.
4. HOT WATER SYSTEMS WILL BE HIGH EFFICIENT MEETING OR EXCEEDING ENERGY CODE.
5. ALL WINDOWS TO BE DOUBLE PANE AND MEET OR EXCEED ENERGY CODE.
6. ALL HVAC SYSTEMS TO BE HIGH EFFICIENT TO MEET OR EXCEED ENERGY CODE.
7. ALL WINDOWS AND DOORS SHALL MEET OR EXCEED ENERGY CODE.
8. ALL UNITS TO HAVE 2X6 EXTERIOR WALLS WITH FULL INSULATION.

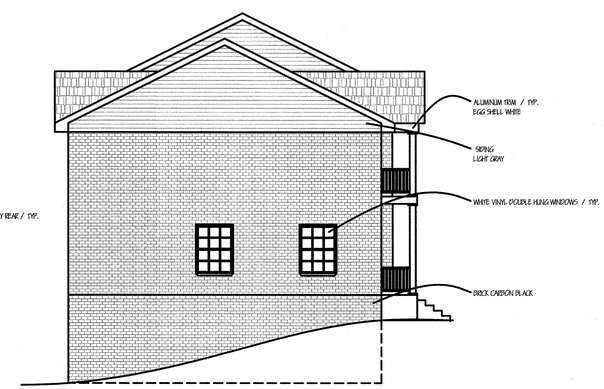


SIDE ELEVATION - BUILDING 'A'
SCALE: 1/8" = 1'-0"



FRONT ELEVATION - BUILDING 'A'
SCALE: 1/8" = 1'-0"

BACK ELEVATION - BUILDING 'A'
SCALE: 1/8" = 1'-0"



SIDE ELEVATION - BUILDING 'A'
SCALE: 1/8" = 1'-0"

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SCALE

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SHEET
BUILDING A
ELEVATION PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17 JOB NO. 32226
DWG NO. 226-ELEV
FIELD BOOK NONE
FILE NO. 10301
SHEET 23

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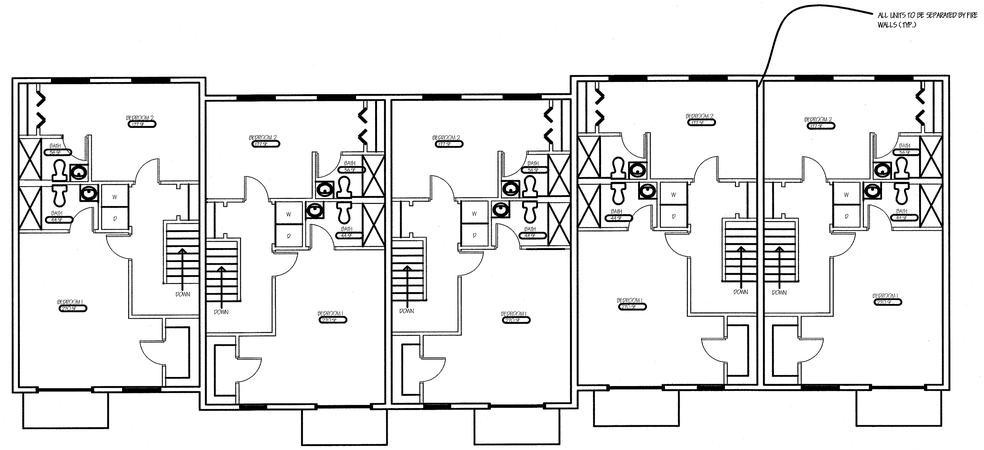
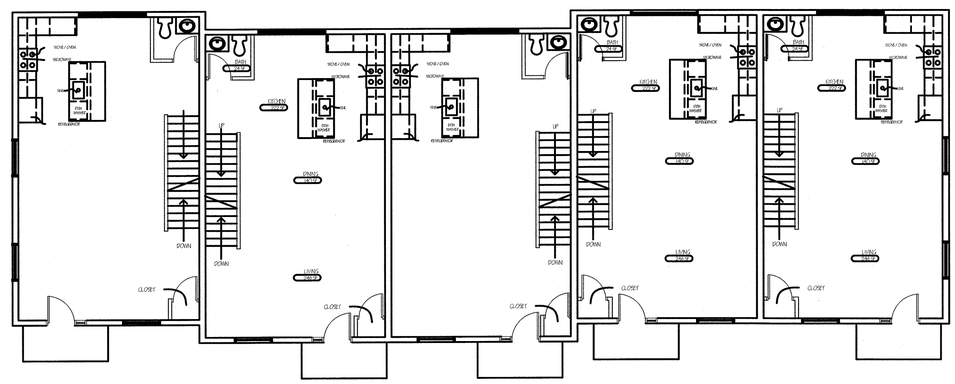
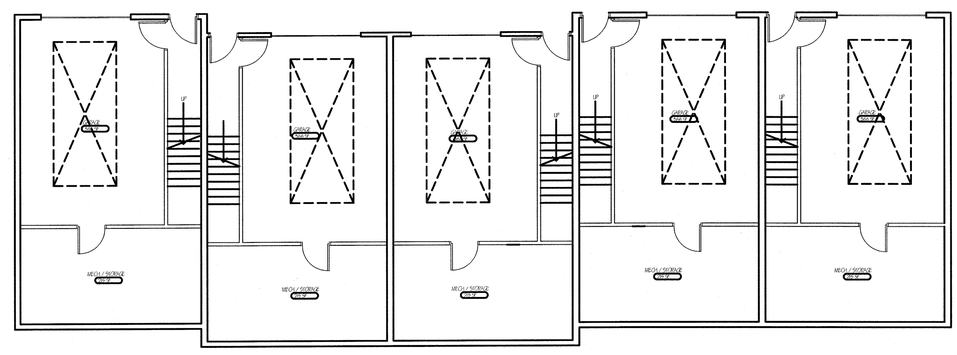


SECOND FLOOR PLAN - BUILDING 'A'
SCALE: 1/8" = 1'-0"



FIRST FLOOR PLAN - BUILDING 'A'
SCALE: 1/8" = 1'-0"



BASEMENT FLOOR PLAN - BUILDING 'A'
SCALE: 1/8" = 1'-0"

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SHEET
BUILDING A
FLOOR PLAN

PROJECT
FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17
JOB NO. 32226
DWG NO. 226-ELEV
FIELD BOOK NONE
FILE NO. 10301
SHEET 24

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PROJECT ITEMS:
1. ALL UNITS TO HAVE FULL DEPTH BRICK ON ALL SIDES AS INDICATED.
2. SIDING TO BE DONE IN HARDY BOARD, CEMENT BOARD OR OTHER SIMILARLY STYLE (NO VINYL SIDING IS ALLOWED).
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5. ALL WINDOWS TO BE DOUBLE PAIN AND MEET OR EXCEED ENERGY CODE.
6. ALL HVAC SYSTEMS TO BE HIGH EFFICIENT TO MEET OR EXCEED ENERGY CODE.
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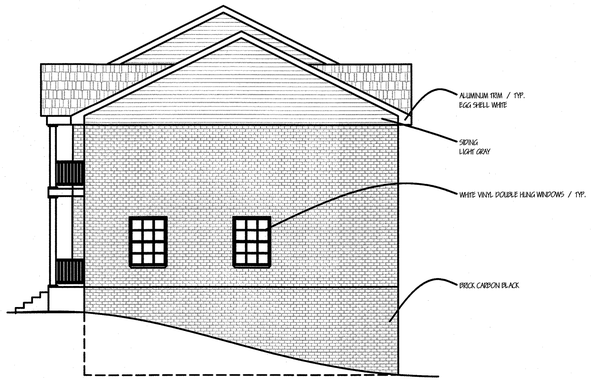
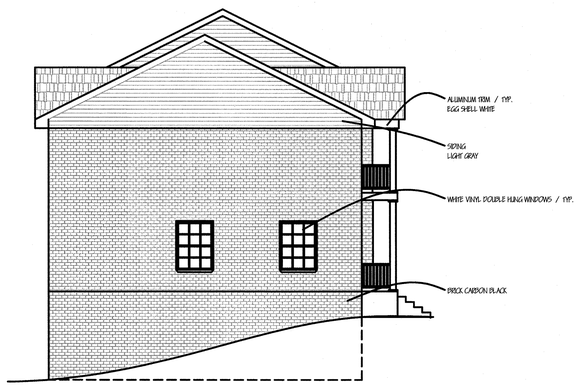


SIDE ELEVATION - BUILDING 'B'
SCALE: 1/8" = 1'-0"

FRONT ELEVATION - BUILDING 'B'
SCALE: 1/8" = 1'-0"

BACK ELEVATION - BUILDING 'B'
SCALE: 1/8" = 1'-0"



SIDE ELEVATION - BUILDING 'B'
SCALE: 1/8" = 1'-0"

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SHEET
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PROJECT
FOUNTAIN BLUE

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REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN

SCALE

PREPARED BY

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
DATE 6-01-17
JOB NO. 32226
DWG NO. 226-ELEV
FIELD BOOK NONE
FILE NO. 10301
SHEET 25

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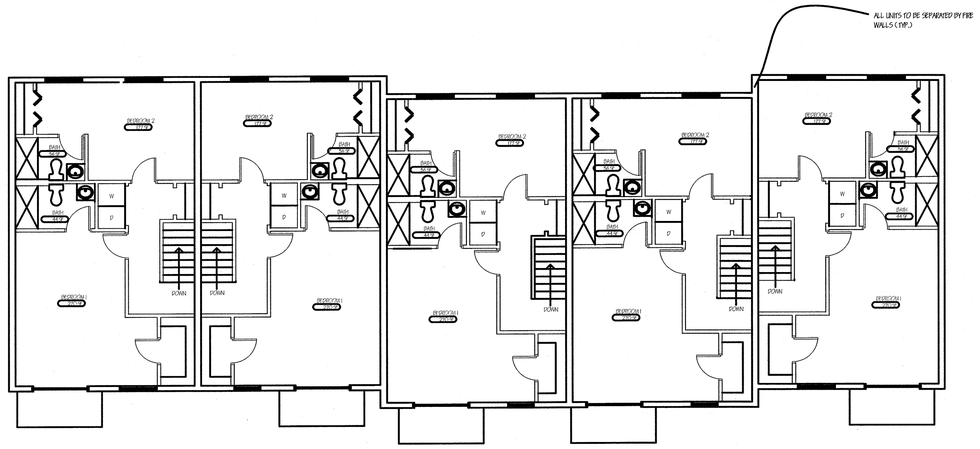
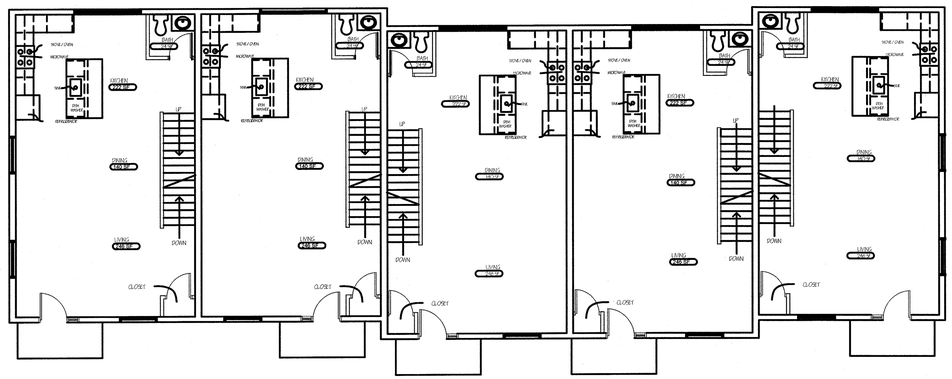
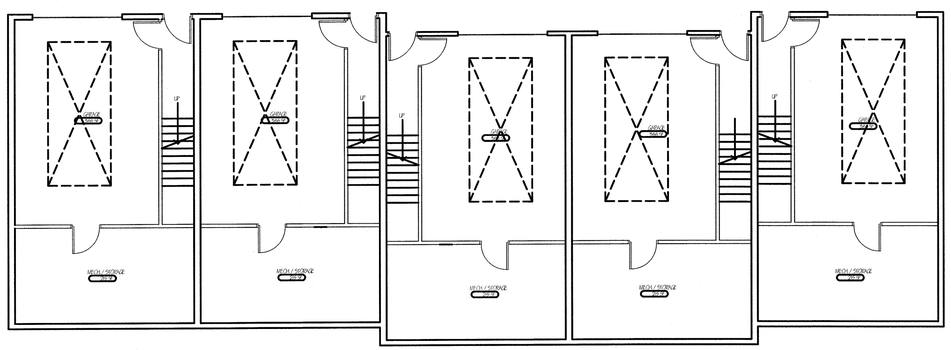


SECOND FLOOR PLAN - BUILDING 'B'
SCALE: 1/8" = 1'-0"



FIRST FLOOR PLAN - BUILDING 'B'
SCALE: 1/8" = 1'-0"



BASEMENT FLOOR PLAN - BUILDING 'B'
SCALE: 1/8" = 1'-0"

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CIVIL ENGINEERS
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WASHTENAW ENGINEERING

CLIENT
DIRECT MANAGED INC
3707 PARKWOOD CIRCLE
ANN ARBOR, MI 48108
TEL (734)-260-3395

SHEET
BUILDING B FLOOR PLAN

PROJECT
FOUNTAIN BLUE

GEORGE WEINHAGEN, RA
5567 POINTE PELEE COURT
HAMBURG TWP., MI 48189
517-214-6322

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

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN
JOB NO. 32226
DWG NO. 226-ELEV
FIELD BOOK NONE
FILE NO. 10301
DATE 6-01-17
SHEET 26

LEGEND

BENCHMARK

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN

SCALE

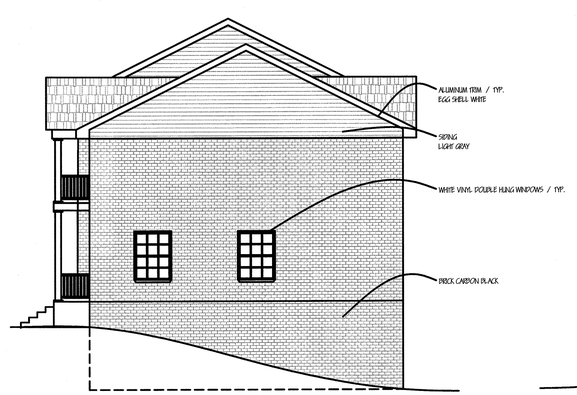
PREPARED BY

FRONT ELEVATION - BUILDING 'C'

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

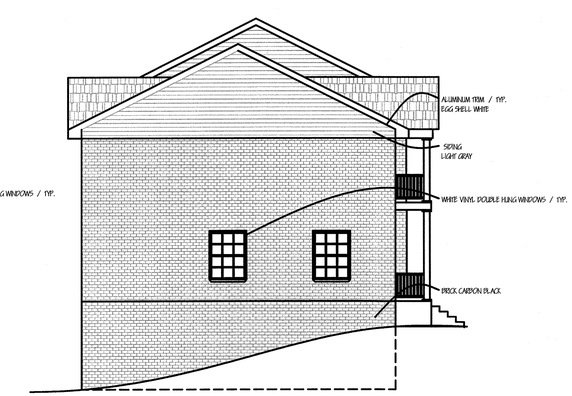
BACK ELEVATION - BUILDING 'C'

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



SIDE ELEVATION - BUILDING 'C'

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



SIDE ELEVATION - BUILDING 'C'

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

PROJECT NOTES:
1. ALL UNITS TO HAVE FULL DEPTH BRICK ON ALL SIDES AS INDICATED.
2. SIDING TO BE STONE IN HARDY BOARD, CEMENT BOARD OR OTHER SIMILARLY STYLE (NO VINYL SIDING IS ALLOWED).
3. BUILDINGS MUST MEET MINIMUM BUILDING ENERGY STANDARDS.
4. HOT WATER SYSTEMS WILL BE HIGH EFFICIENT MEETING OR EXCEEDING ENERGY CODE.
5. ALL WINDOWS TO BE DOUBLE PAIN AND MEET OR EXCEED ENERGY CODE.
6. ALL HVAC SYSTEMS TO BE HIGH EFFICIENT TO MEET OR EXCEED ENERGY CODE.
7. ALL WINDOWS AND DOORS SHALL MEET OR EXCEED ENERGY CODE.
8. ALL UNITS TO HAVE 2X6 EXTERIOR WALLS WITH FULL INSULATION.

GEORGE WEINHAGEN, RA
5567 POINTE PELEE COURT
HAMBURG TWP., MI 48189
517-214-6322

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TEL (734)-260-3395

SHEET

BUILDING C
ELEVATION PLAN

PROJECT

FOUNTAIN BLUE

SECTION 8 TOWN 3 SOUTH RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY • MICHIGAN

DATE 6-01-17 | JOB NO. 32226 | DWG NO. 2ND ELEV | FIELD BOOK NONE | FILE NO. 10301

SHEET 27

LEGEND

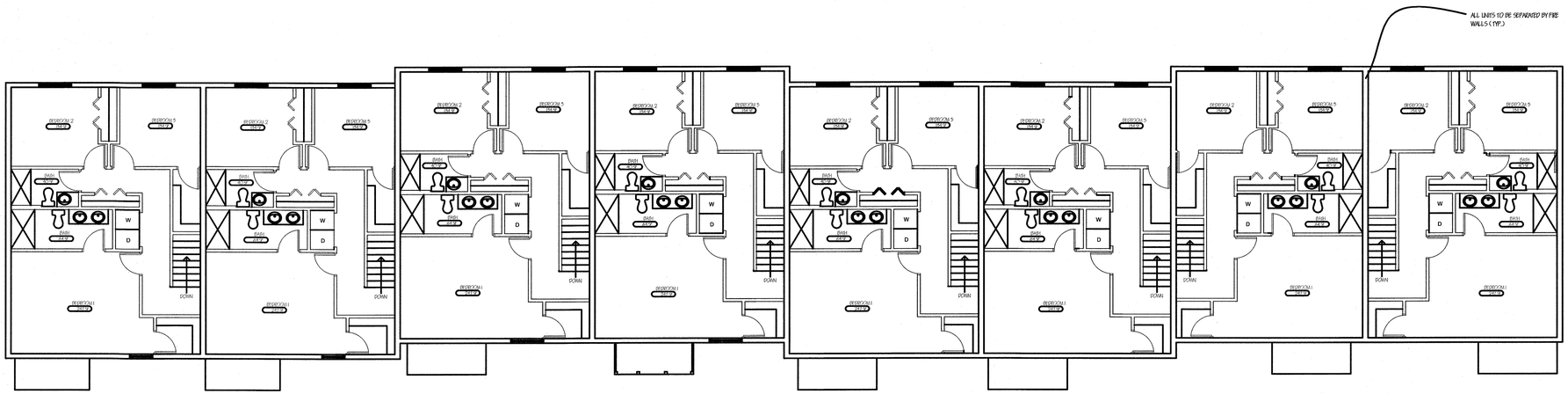
BENCHMARK

REVISIONS 2017-10-18 REVISED PER REVIEW, 2017-12-05 TWP, 2018-01-17 TWP. 2018-02-21 TWP, 2018-03-16 FINAL SITE PLAN

SCALE

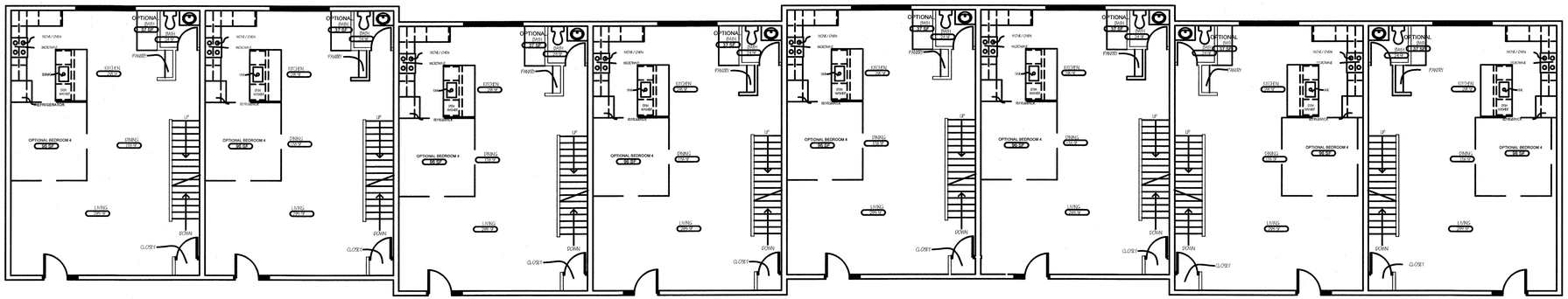
PREPARED BY

H:\32xfiles\32226\dwg\building Plans\Elevations 03-15-2018-32540NS.dwg, 3/15/2018 3:21:38 PM, 1:1



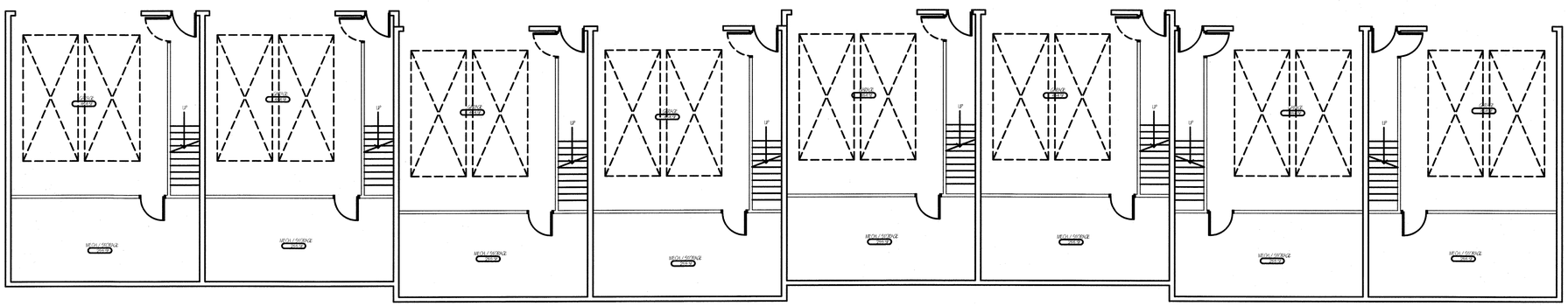
SECOND FLOOR PLAN - BUILDING 'C'

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



FIRST FLOOR PLAN - BUILDING 'C'

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



BASEMENT FLOOR PLAN - BUILDING 'C'

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SHEET

BUILDING C FLOOR PLAN

PROJECT

FOUNTAIN BLUE

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WASHTENAW COUNTY • MICHIGAN

DATE 6-01-17
JOB NO. 32226
DWG NO. 226-FLEV
FIELD BOOK NONE
FILE NO. 10301

SHEET 28

LEGEND

BENCHMARK

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SCALE

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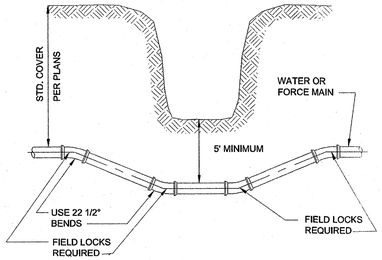
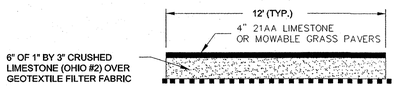
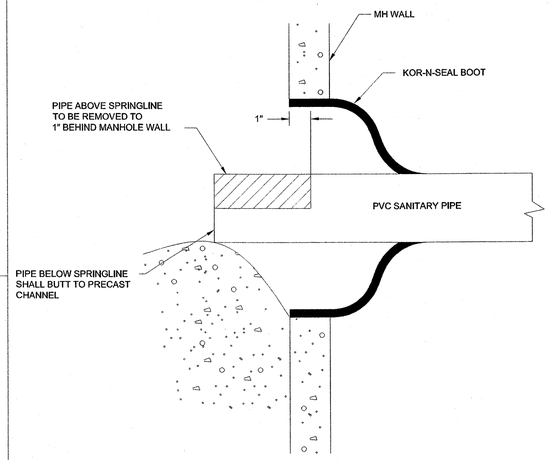


DITCH & STREAM CROSSING



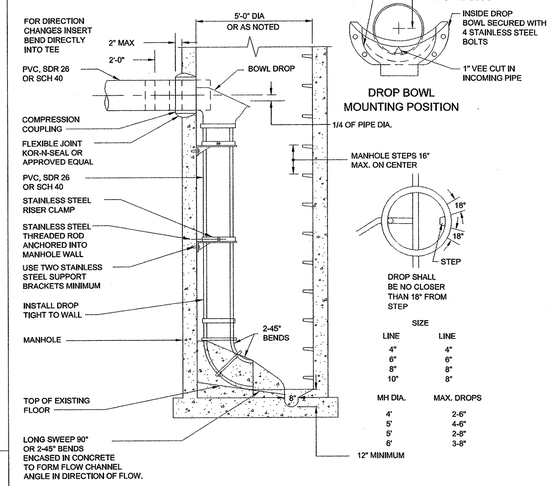
SANITARY SEWER ACCESS PATH



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.



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

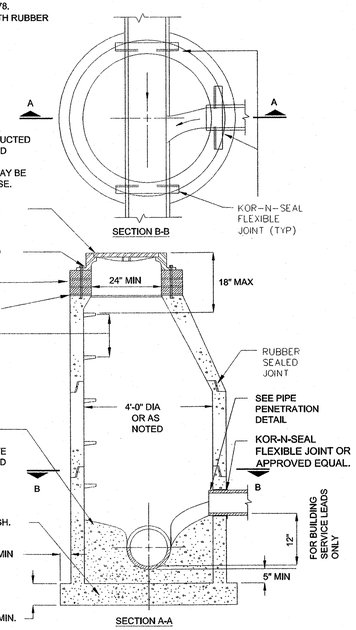
MH DIA.	MAX. DROPS
4'	2-6"
5'	4-6"
5'	2-8"
6'	3-8"

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.



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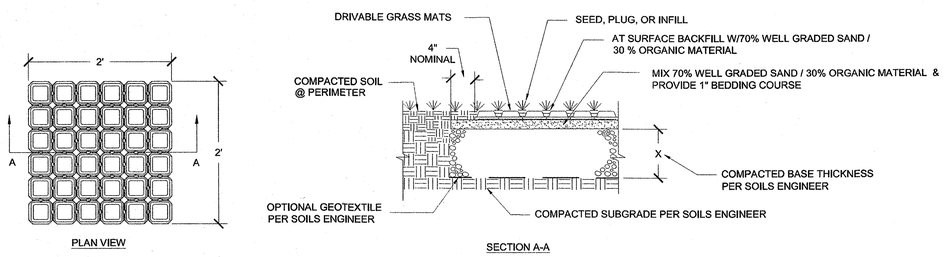
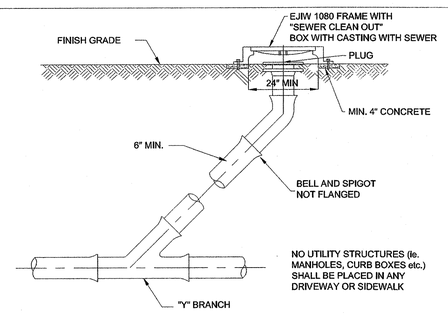
SANITARY MANHOLE

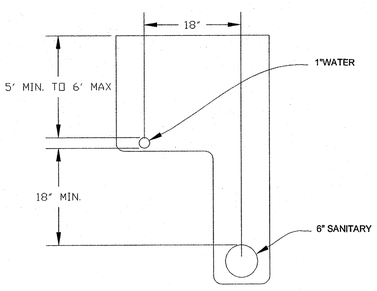
NOTE:
FOR STORMWATER MANAGEMENT APPLICATIONS INCLUDING STORAGE AND INFILTRATION, ALTERNATE INFILLS, BASE MATERIAL, AND DRAINAGE MAY BE REQUIRED



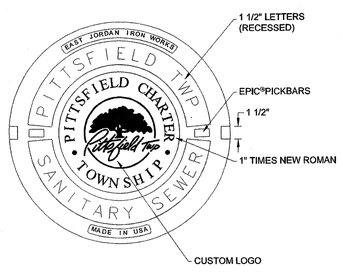
TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



SANITARY SEWER CLEANOUT

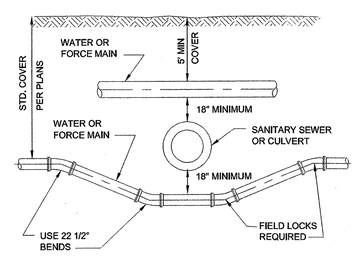


TYPICAL L TRENCH DETAIL HOUSE LEADS

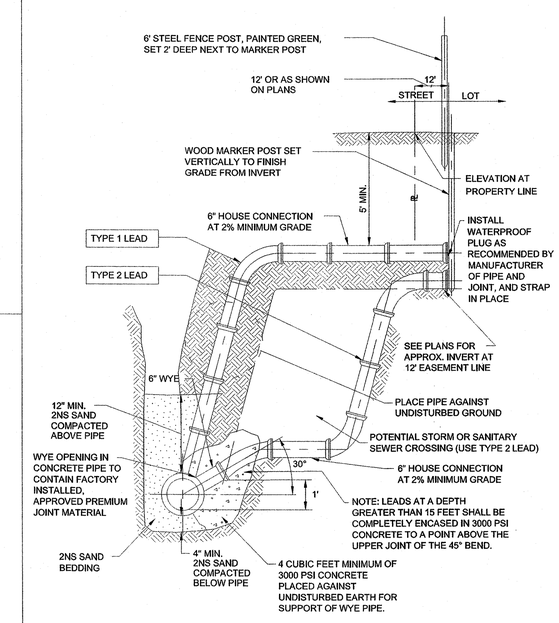


EAST JORDAN IRON WORKS 1040 Z BOLT DOWN FRAME
EAST JORDAN IRON WORKS 1040 AGS COVER

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	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
29

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 equipl-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:

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

(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 manl-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, uni-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 Prol-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

PITTSFIELD CHARTER TOWNSHIP

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Revision	By	Appd.	YY.MM.DD
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: SS-02	BWA	DRW	07.10.01
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SANITARY SEWER SPECIFICATIONS

Project No. 2075001300

Scale NOT TO SCALE

Revision 30

STORM SEWER AND DRAINAGE STRUCTURES

1.00 GENERAL

1.01 DESCRIPTION

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

1.02 TESTING

A. General

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

B. Test for Alignment

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

C. Material Tests

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

D. Submittals

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

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

2.00 PRODUCTS

2.01 PIPE

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

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

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

2.02 REINFORCED CONCRETE MANHOLES

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

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

2.03 MORTAR FOR MANHOLES

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

2.04 BRICK AND BLOCK

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

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

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

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

2.05 STRUCTURE FRAMES AND COVERS

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

B. Frames and Covers shall be as follows:

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.

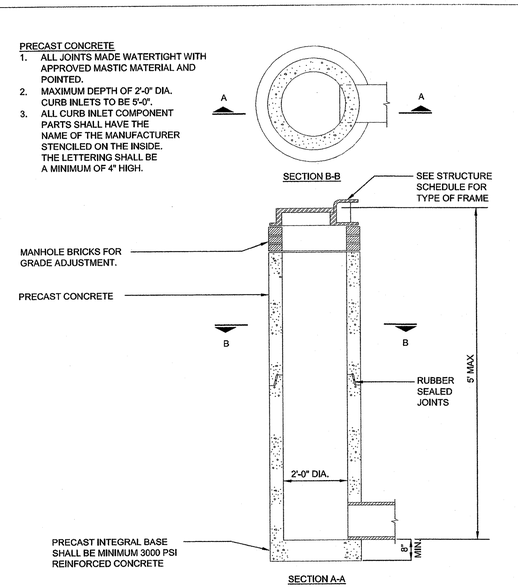
C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut out shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration.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

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

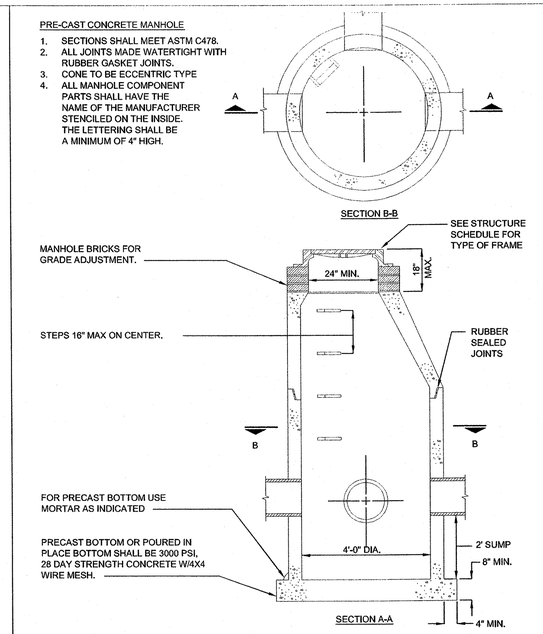
3.05 ANIMAL GRATES

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

PCT February 2008



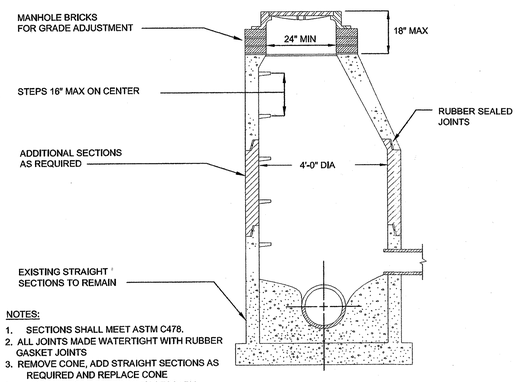
2' DIAMETER INLET



4' DIAMETER CATCH BASIN

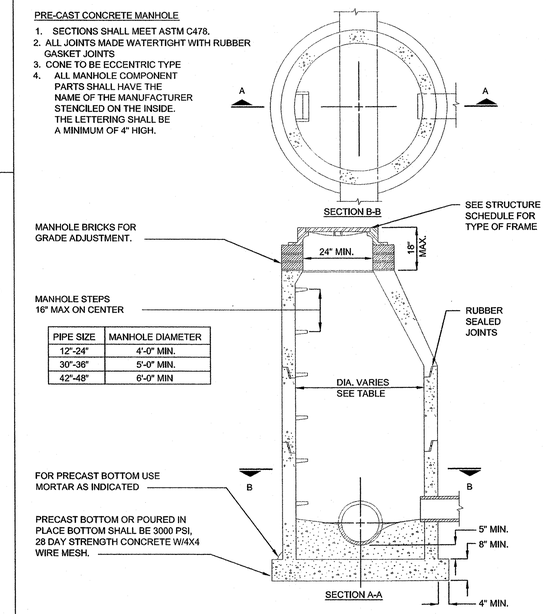
AFFIX TO SURFACE ON OR NEAR ALL DRAINAGE COVERS.

STORM DRAIN MARKER



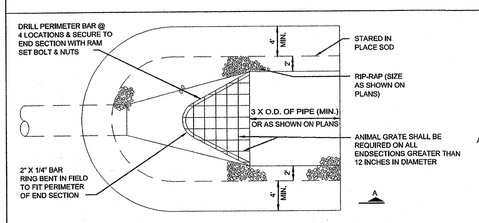
NOTES:
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. REMOVE CONE, ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE
4. ADD MANHOLE STEPS AS NECESSARY
5. ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT

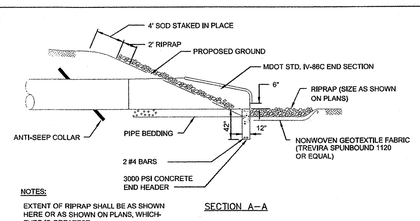
MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL



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

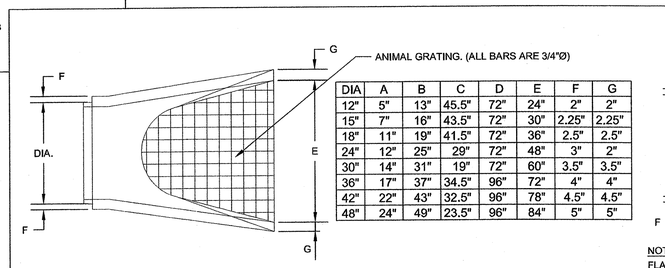
STORM SEWER MANHOLE



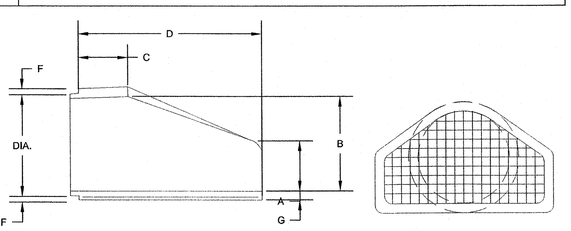


NOTES:
EXTENT OF RIPRAP SHALL BE AS SHOWN HERE OR AS SHOWN ON PLANS, WHICH-EVER IS GREATEST.

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

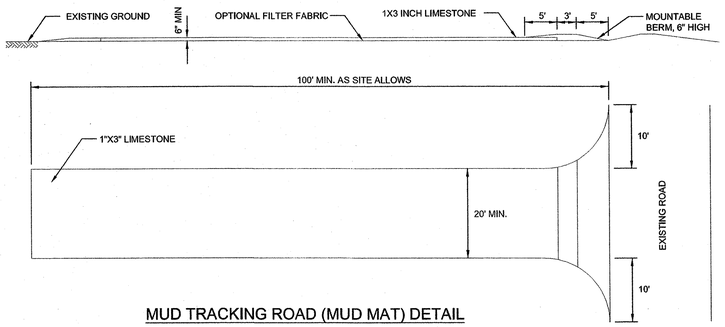
Pittsfield Township, Michigan

Title
STORM SEWER DETAILS AND SPECIFICATIONS

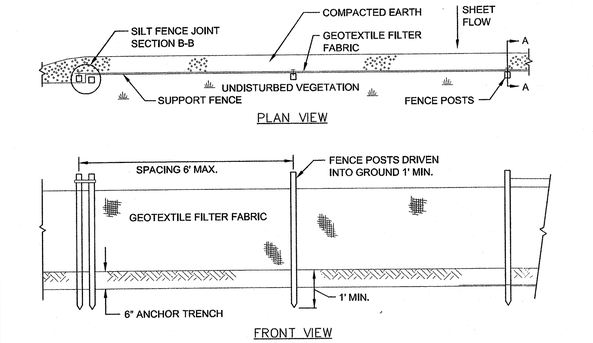
Project No. 2075001300

Scale NOT TO SCALE

Revision

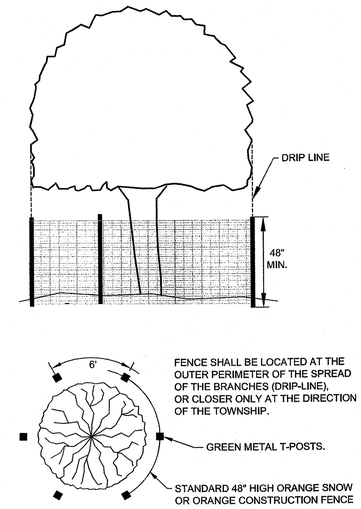


MUD TRACKING ROAD (MUD MAT) DETAIL



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.

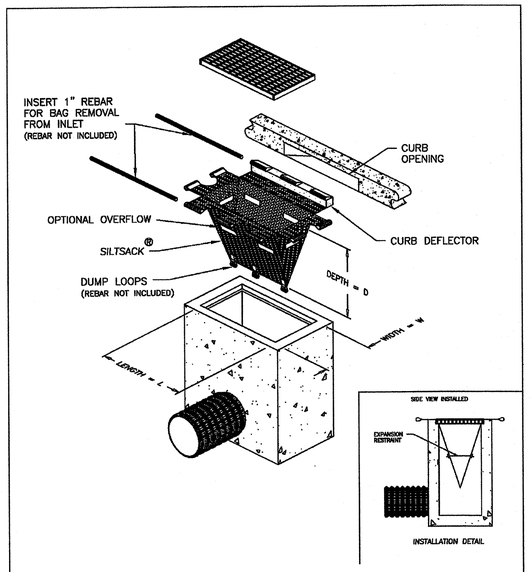
CATCH BASIN/MANHOLE PROTECTION

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

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
425 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

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

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

Issued	By	Appd.	YY.MM.DD
File Name: SE-01	TTN	DRW	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 32

STORM SEWER AND DRAINAGE STRUCTURES

1.00 GENERAL

1.01 DESCRIPTION

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

1.02 TESTING

A. General

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

B. Test for Alignment

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

C. Material Tests

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

D. Submittals

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

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

2.00 PRODUCTS

2.01 PIPE

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

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

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

2.02 REINFORCED CONCRETE MANHOLES

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

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

2.03 MORTAR FOR MANHOLES

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

2.04 BRICK AND BLOCK

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

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

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

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

2.05 STRUCTURE FRAMES AND COVERS

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

B. Frames and Covers shall be as follows:

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.

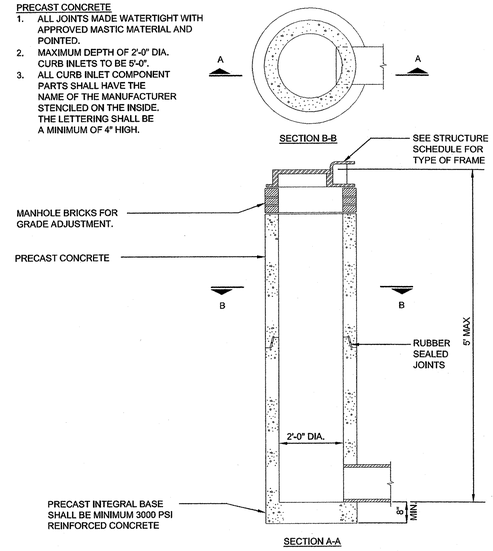
D. Closure of the manhole wall shall be made watertight using concrete.

3.05 ANIMAL GRATES

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

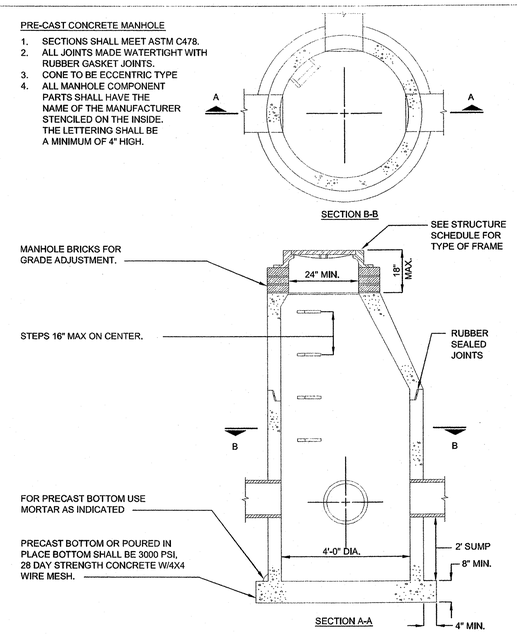
PCT February 2008

PRECAST CONCRETE
1. ALL JOINTS MADE WATERTIGHT WITH APPROVED MASTIC MATERIAL AND POINTED.
2. MAXIMUM DEPTH OF 2'-0" DIA. CURB INLETS TO BE 5'-0".
3. ALL CURB INLET COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.



2' DIAMETER INLET

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.

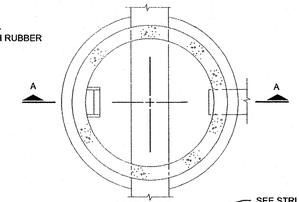


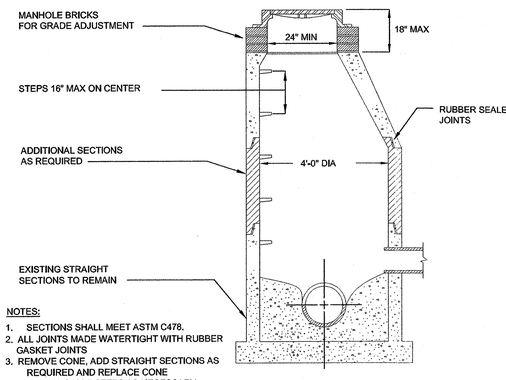
4' DIAMETER CATCH BASIN

AFFIX TO SURFACE ON OR NEAR ALL DRAINAGE COVERS.

STORM DRAIN MARKER

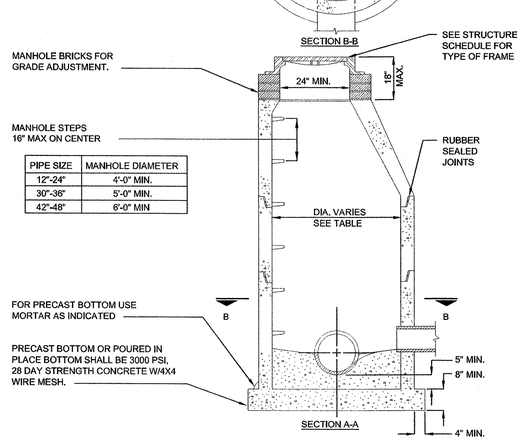
PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.





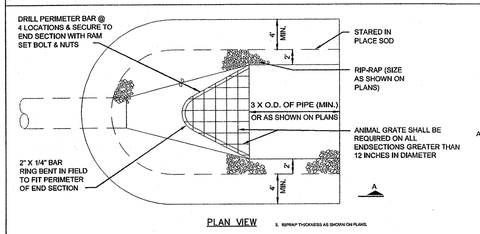
NOTES:
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. REMOVE CONE, ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE
4. ADD MANHOLE STEPS AS NECESSARY
5. ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT

MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL



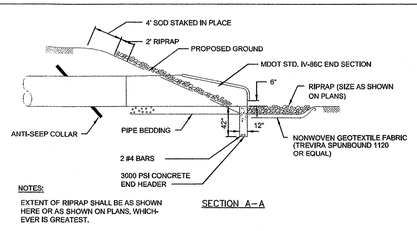
PIPE SIZE	MANHOLE DIAMETER
12"-24"	4'-0" MIN.
30"-36"	5'-0" MIN.
42"-48"	6'-0" MIN

STORM SEWER MANHOLE



PLAN VIEW

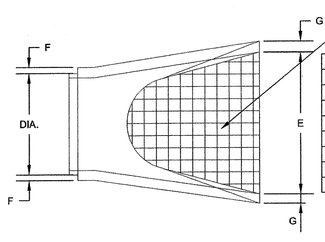
S. RIPRAP THICKNESS AS SHOWN ON PLANS.



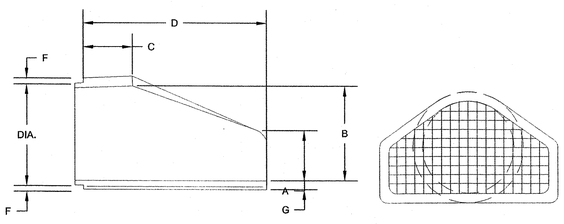
NOTES:
EXTENT OF RIPRAP SHALL BE AS SHOWN HERE OR AS SHOWN ON PLANS, WHICH-EVER IS GREATEST.

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"



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STANDARD END SECTIONS FOR PRECAST CONCRETE

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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

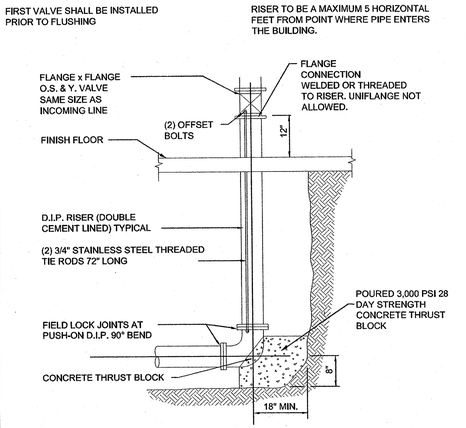
Pittsfield Township, Michigan

Title
STORM SEWER DETAILS AND SPECIFICATIONS

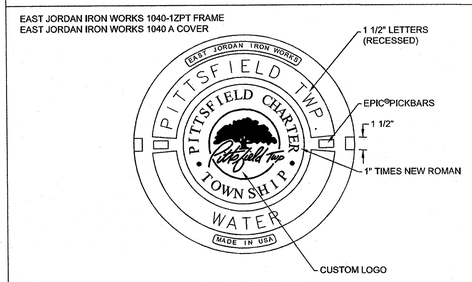
Project No. 2075001300

Scale NOT TO SCALE

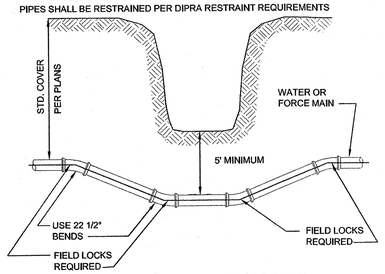
Revision



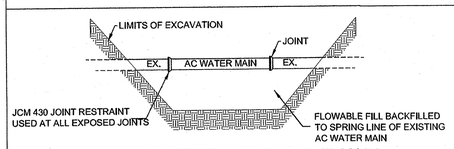
FIRE PROTECTION RISER DETAIL



COVER DETAIL



DITCH & STREAM CROSSING



ASBESTOS CEMENT (AC) WATER MAIN

ELBOWS

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

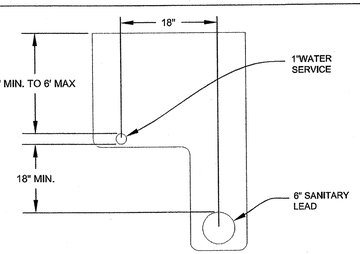
TEES, CROSSES & HYDRANTS		
PIPE DIA. INCHES		BEARING AREA SQUARE FEET
4		1.5
6		2.9
8		4.8
10		7.1
12		10.0
16		17.1
18		21.0
20		26.0

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.

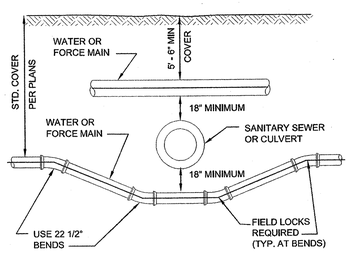
SOIL CHARACTERISTICS	FACTOR
(A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY	0.33
(B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY	0.50
(C) LOOSE FINE SAND; FIRM INORGANIC SILT	0.67
(D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT SOFT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

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

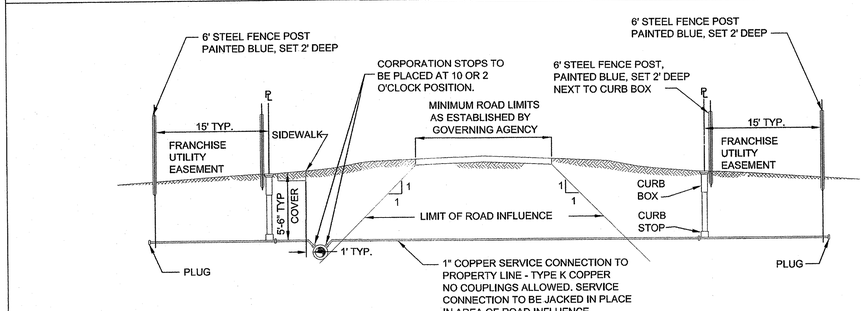
THRUST BLOCK



TYPICAL L TRENCH DETAIL HOUSE LEADS

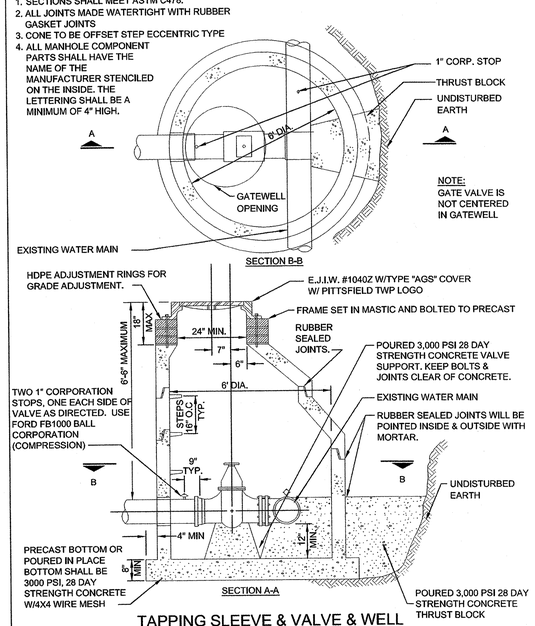


SEWER OR CULVERT CROSSING

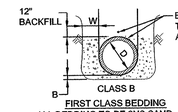


WATER MAIN CONNECTION

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



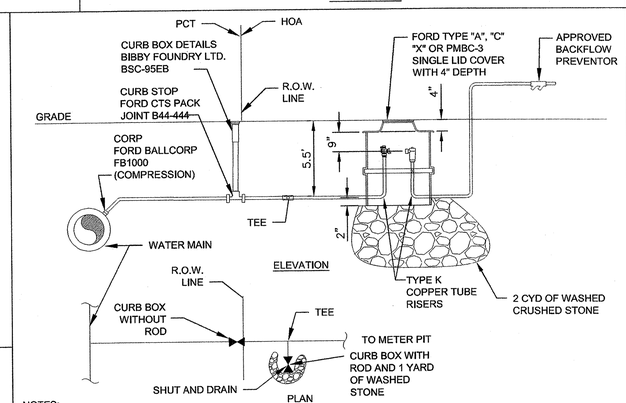
BLUE, 12 GAUGE SINGLE STRAND TRACER WIRE ATTACHED TO WATER MAIN PIPE MUST BE WRAPPED WITH POLLY WRAP AND SECURELY TAPED AT ENDS.

FIRST CLASS BEDDING
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.

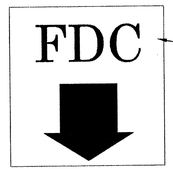
PIPE	D	W	B
PVC	0"-12"	12" MIN. 18" MAX.	4"
A-C,V.C.P.	0"-12"	6" MIN. 12" MAX.	4"
DIP	0"-24"	6" MIN. 12" MAX.	4"
A-C,CONC.	0"-24"	6" MIN. 12" MAX.	4"
CONC. DIP	24" +	6" MIN. 12" MAX.	4"

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.

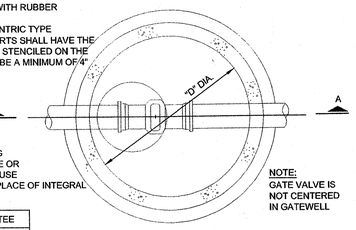
IRRIGATION METER PIT DETAIL



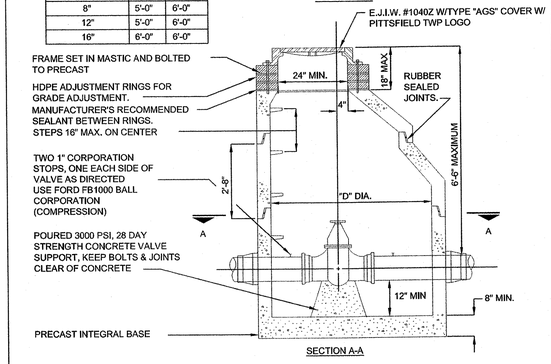
RED "REFLECTIVE" LETTERS WITH WHITE "REFLECTIVE" BACKGROUND. LETTERS WILL BE A MINIMUM OF 8" TALL BY 4" WIDE WITH 2" GIRTH, WITH AN 8" TALL 4" WIDE RED ARROW UNDER LETTERS POINTING DIRECTLY AT THE CONNECTION. TALLER BUILDINGS MAY REQUIRE LARGER LETTERING. SIGN SIZE AND LOCATION DETERMINED BY FIRE MARSHALL

FIRE DEPARTMENT CONNECTION LABEL DETAIL

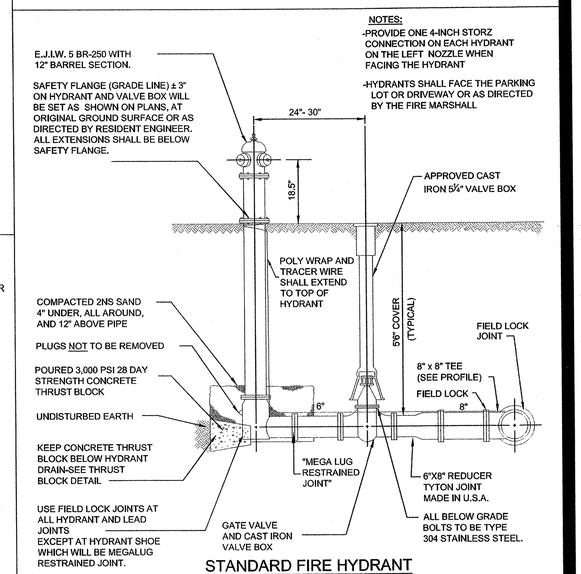
PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. 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.



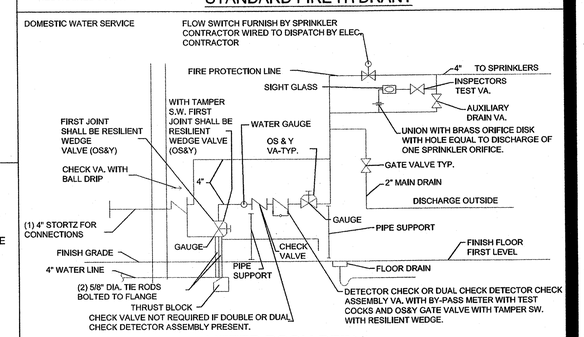
STRAIGHT THRU		TEE
VALVE SIZE	"D"	"D"
8"	5'-0"	6'-0"
12"	5'-0"	6'-0"
16"	6'-0"	6'-0"



STANDARD GATE VALVE & WELL



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
	Dwn.	Chkd.	Dsgn. YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
WATER MAIN DETAILS

Project No. 2075001300

Scale NOT TO SCALE

Revision

1.00 GENERAL

1.01 DESCRIPTION

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

1.02 NOTIFICATION

A. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department at (734) 882-2110, 24 hours prior to flushing or chlorination of the water main.

B. CONTRACTOR shall schedule bacteriological testing with the ENGINEER 48 hours prior.

C. CONTRACTOR shall notify the ENGINEER and the Pittsfield Township Utilities Department 48 hours prior to connecting to an existing water main.

1.03 SUBMITTALS

A. The CONTRACTOR shall submit shop drawings or data sheets for all pipe, manholes, manhole castings, pipe to manhole connections, valves, hydrants and the B-1 Poly 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 less 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 composition rubber and the cast iron valve clamps shall be packed with o-ring seals and held tight to the stem by a threaded bronze hex retainer ring and threaded bronze locknut, anchored with set screws.

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

F. The hydrants shall be 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' - 8' 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.

PITTSFIELD CHARTER TOWNSHIP

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SPEC. UPDATES	MRH	DRW	14.01.24
TWP REV	BWA	DRW	11.04.27
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Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
WATER MAIN SPECIFICATIONS

Project No. 2075001300

Scale

Revision

Earthwork

1.00 GENERAL

1.01 DESCRIPTION

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

1.02 WORK WITHIN RIGHTS-OF-WAY

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

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

1.03 WORK WITHIN EASEMENTS

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

1.04 SOIL BORINGS

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

2.00 PRODUCTS

2.01 BACKFILL MATERIAL

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

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

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

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

2.02 ENCASING PIPE

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

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

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

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

	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 this 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 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 traveling shield for sewer construction shall require that the device be approved for use by a professional engineer. Sheet piling and timbers in trench excavations shall be withdrawn in a manner so as to prevent subsequent settlement of the pipe or additional backfill loadings which might overload the pipe.

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

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

3.08 GENERAL BACKFILLING

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

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

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

3.09 BACKFILLING FOR SEWERS AND WATER MAINS

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

1. Under gravel driveways, gravel roads and shoulders, the backfill shall be granular material which shall be solidly compacted by mechanical 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 prepared 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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