FINAL SITE PLAN AMENDMENT

INGLEWOOD PARK - PHASE 4

PART OF A MIXED USE PLANNED UNIT DEVELOPMENT

PITTSFIELD TOWNSHIP, SECTION 21

WASHTENAW COUNTY, MICHIGAN

DEVELOPMENT TEAM

PROPERTY OWNER
PITTSFIELD PROPERY, LLC
C/O THOMAS LABRET
2669 GRATIOT AVE
DETROIT, MI 48207

APPLICANT / DEVELOPER
SCHAFER DEVELOPMENT, LLC
29800 MIDDLEBELT RD, SUITE 150
FARMINGTON HILLS, MI 48334
PHONE: (248) 613-6262
FAX: (248) 932-0128

CIVIL ENGINEER
ATWELL, LLC
311 N. MAIN ST.
ANN ARBOR, MI 48104
PHONE: (734) 994-4000
FAX: (734) 994-1590
CONTACT: MATT BUSH

SITE DATA

PARCEL DATA
PARCEL ID: L-12-21-300-020

EXISTING SITE ZONING	PUD (PLANNED UNIT DEVELOPMENT)		
EXISTING LAND USE	VACANT		
PROPOSED LAND USE	RETAIL		
SITE AREA:			
GROSS AREA	±5.94 ACRES	258,597	SF
STATE STREET ROW	±1.12 ACRES	48,830	SF
TEXTILE ROAD ROW	±0.40 ACRES	17,641	SF
WETLANDS	±0.00 ACRES	0	SF
UTILITY EASEMENTS	±0.00 ACRES	0	SF
NET AREA	±4.42 ACRES	209,767	SF

RETAIL:

	PROPOSED	PREVIOUS
RETAIL A	6,300 SF	8,100 SF
RETAIL B	6,300 SF	5,400 SF
RETAIL C	6,300 SF	5,400 SF
RETAIL D	6,300 SF	10,000 SF
RETAIL E	6,300 SF	–
TOTAL FLOOR AREA	31,500 SF	28,900 SF
LOT COVERAGE	16.4%	16.2%
FLOOR AREA RATIO	0.16	0.16
MAXIMUM BLDG HEIGHT	30'	30'
IMPERVIOUS SURFACE *	2.96 AC	2.81 AC
	128,820 SF	122,250 SF
IMPERVIOUS SURFACE RATIO	67.1%	63.6%

* EXCLUDES PERIMETER WALK ALONG STATE ST AND TEXTILE RD.

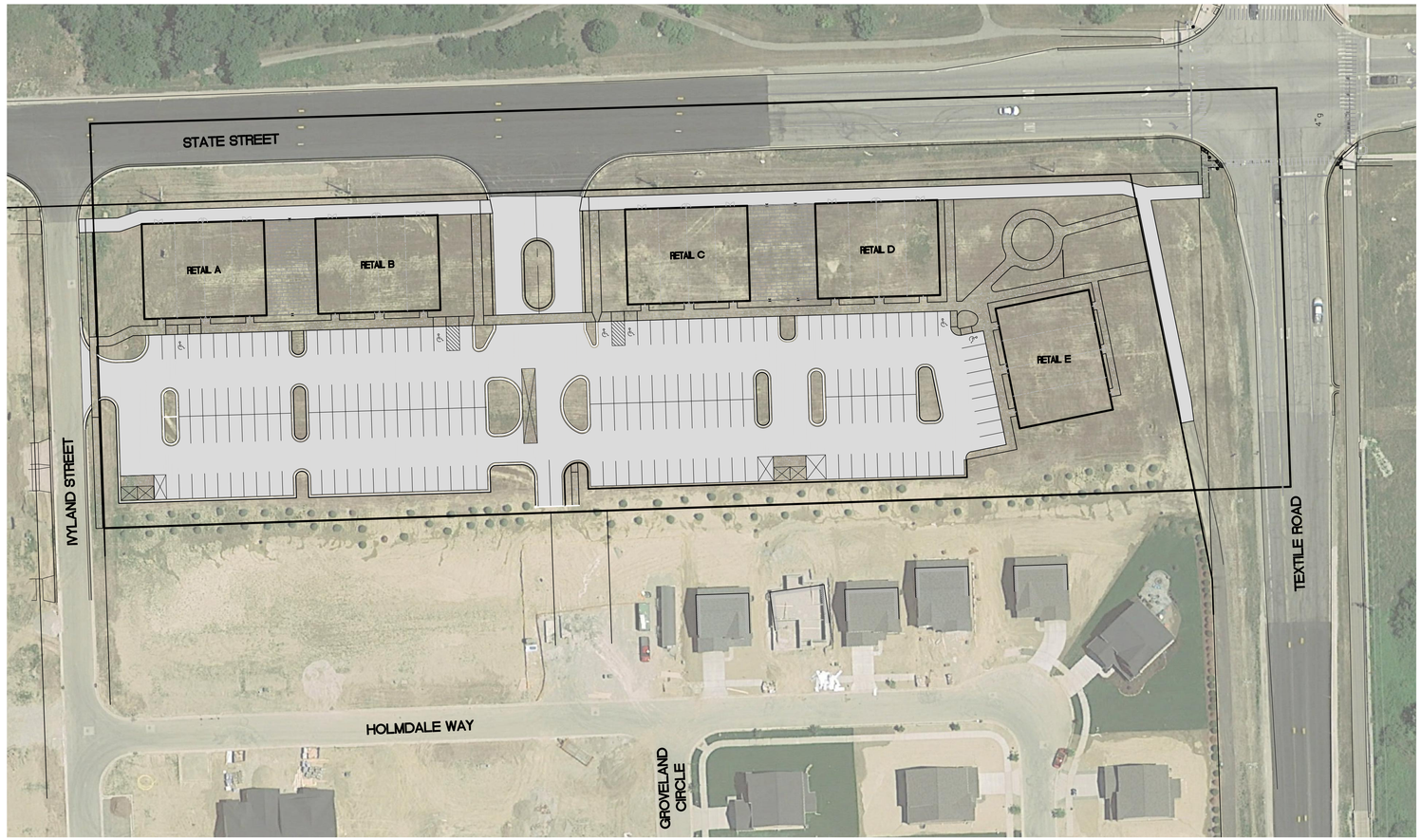
PARKING:

	REQUIRED	PROPOSED
RETAIL (31,500 SF) *	126 SPACES	191
TOTAL	126 SPACES	191 SPACES
ADA ACCESSIBLE SPACES **	6	6
ADA VAN ACCESSIBLE ***	1	2

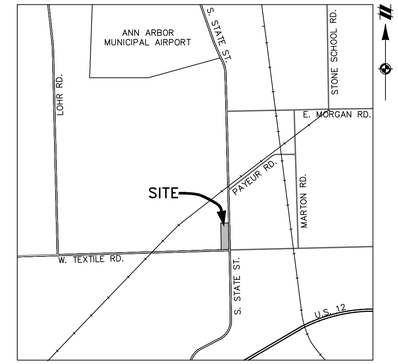
* ONE (1) SPACE PER 250 SF GROSS FLOOR AREA
** FOR 151-200 SPACES, SIX (6) ACCESSIBLE SPACES ARE REQUIRED
*** ONE (1) OF EVERY SIX (6) ACCESSIBLE SPACES MUST BE "VAN ACCESSIBLE"

QUANTITIES:

	SIZE	TYPE	QUANTITY
STORM			
PIPE	12"	RCP CLIV	864 LF
	4"	SUMP LEAD	73 LF
STRUCTURE	2'	INLET	5 EA
	4'	CATCH BASIN	2 EA
	12"	END SECTION	2 EA
SANITARY			
PIPE	10"	SDR26 PVC	487 LF
	6"	SDR26 PVC	420 LF
STRUCTURE	48"	MANHOLE	4 EA
WATER			
PIPE	8"	D.I.P. CL54	815 LF
	6"	D.I.P. CL54	59 LF
	4"	D.I.P. CL54	122 LF
STRUCTURE	–	HYDRANT ASSEMBLY	4 EA
	8"x16"	TSV&W	1 EA



DEVELOPMENT MAP
SCALE: 1" = 40'



VICINITY MAP
NOT TO SCALE

SHEET INDEX

1 COVER SHEET
2 EXISTING CONDITIONS SHEET
3 LAYOUT PLAN
4 UTILITY PLAN
5 GRADING & DRAINAGE PLAN
6 SANITARY & WATER PLAN & PROFILE
7 SANITARY & WATER LEADS PLAN & PROFILE
8 STORM PLAN & PROFILES & STORM SEWER CALCS
9 DETENTION BASIN – PHASE 1 (EAST)
10 SOIL EROSION & SEDIMENT CONTROL PLAN
11 FIRE PROTECTION PLAN
12 LANDSCAPING PLAN
13 STANDARD DETAILS SHEET
14 STATE ROAD PEDESTRIAN CROSSING PLAN
15 PITTSFIELD TOWNSHIP SOIL EROSION DETAILS AND NOTES
16 PITTSFIELD TOWNSHIP STORM SEWER DETAILS AND SPECIFICATIONS
17 PITTSFIELD TOWNSHIP WATER MAIN DETAILS
18 PITTSFIELD TOWNSHIP WATER MAIN SPECIFICATIONS
19 PITTSFIELD TOWNSHIP SANITARY SEWER DETAILS
20 PITTSFIELD TOWNSHIP SANITARY SEWER SPECIFICATIONS
21 PITTSFIELD TOWNSHIP EARTHWORK SPECIFICATIONS
22 ARCHITECTURAL DESIGN – FLOOR PLAN
23 ARCHITECTURAL DESIGN – BLDG ELEVATIONS
24 LIGHTING PLAN

DEVELOPMENT SUMMARY

- THE PROPOSED DEVELOPMENT CONSISTS OF FIVE (5) RETAIL BUILDINGS WITH GROSS FLOOR AREA OF APPROXIMATELY 31,500 SF.
- DUMPSTER ENCLOSURES ARE PROPOSED.
- PROPOSED UTILITY AND INFRASTRUCTURE SERVICES FOR THE DEVELOPMENT ARE AS FOLLOWS:

SANITARY SEWER (PUBLIC)
CONNECTION TO THE PUBLIC SANITARY SEWER CONSTRUCTED FOR THE INITIAL DEVELOPMENT PHASE IS PROPOSED FOR THIS PORTION OF THE DEVELOPMENT. SEWERS WILL BE WITHIN PUBLIC EASEMENTS.

WATER MAIN (PUBLIC)
CONNECTION TO THE EXISTING WATER MAIN STUB FROM IVYLAND STREET AS CONSTRUCTED IN THE INITIAL DEVLOPMENT PHASE, LOOPED SOUTH TO A NEW CONNECTION WITHIN TEXTILE ROAD. WATER MAIN WILL BE WITHIN A PUBLIC EASEMENT.

STORM WATER MANAGEMENT
STORM SEWER WILL BE INSTALLED TO CONVEY SITE RUNOFF INTO THE EXISTING STORM SEWER NETWORK CONSTRUCTED AS PART OF THE INITIAL DEVELOPMENT PHASE. THE STORM SEWER SYSTEM WILL BE DESIGNED PER WCWRC AND TOWNSHIP STANDARDS.

GAS, TELEPHONE, ELECTRIC AND CABLE
EXISTING FRANCHISE UTILITIES CURRENTLY SERVICING THE TOWNSHIP WILL BE EXTENDED TO SERVICE THE PROPOSED DEVELOPMENT.

ACCESS/PARKING
ACCESS WILL BE PROVIDED FROM EXISTING CURB CUTS ON IVYLAND STREET AND STATE STREET. AN ASPHALT PAVED PARKING LOT WILL BE PROVIDED.

PERMITS/REVIEWS

* T.B.A. = TO BE APPLIED FOR

PERMITS/REVIEWS	STATUS	APPLICATION/PERMIT NUMBER
PITTSFIELD TWP FSP	UNDER REVIEW	
PITTSFIELD TWP SESC	TBA	
WCRC	UNDER REVIEW	
WCWRC	UNDER REVIEW	
MDEQ – WATERSUPPLY	TBA	
MDEQ – WASTEWATER	TBA	
NPDES CONSTRUCTION STORMWATER DISCHARGE	TBA	

LEGAL DESCRIPTION

DESCRIPTION OF TAX PARCEL
L-12-21-300-020 PER WASHTENAW COUNTY TAX RECORDS:

COM AT SW COR SEC 21, TH N 87-59-52 E 1039.01 FT TO A POB, TH N 01-59-59 W 873.84 FT, TH N 88-00-01 E 297.99 FT, TH S 01-43-44 E 873.84 FT, TH S 87-59-52 W 293.87 FT, TH N 01-59-59 W 293.87 FT TO THE POB. PT OF SW 1/4 SEC 21, T3S-R6E. 5.94 AC.

CSPA 19-01
Inglewood Park Commercial - Phase 4

Rec'd 2019-05-03

PART OF INGLEWOOD PARK (PHASE 4)
C.S.P.A. #19-01

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

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NOTICE:
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SECTION 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN

COVER SHEET

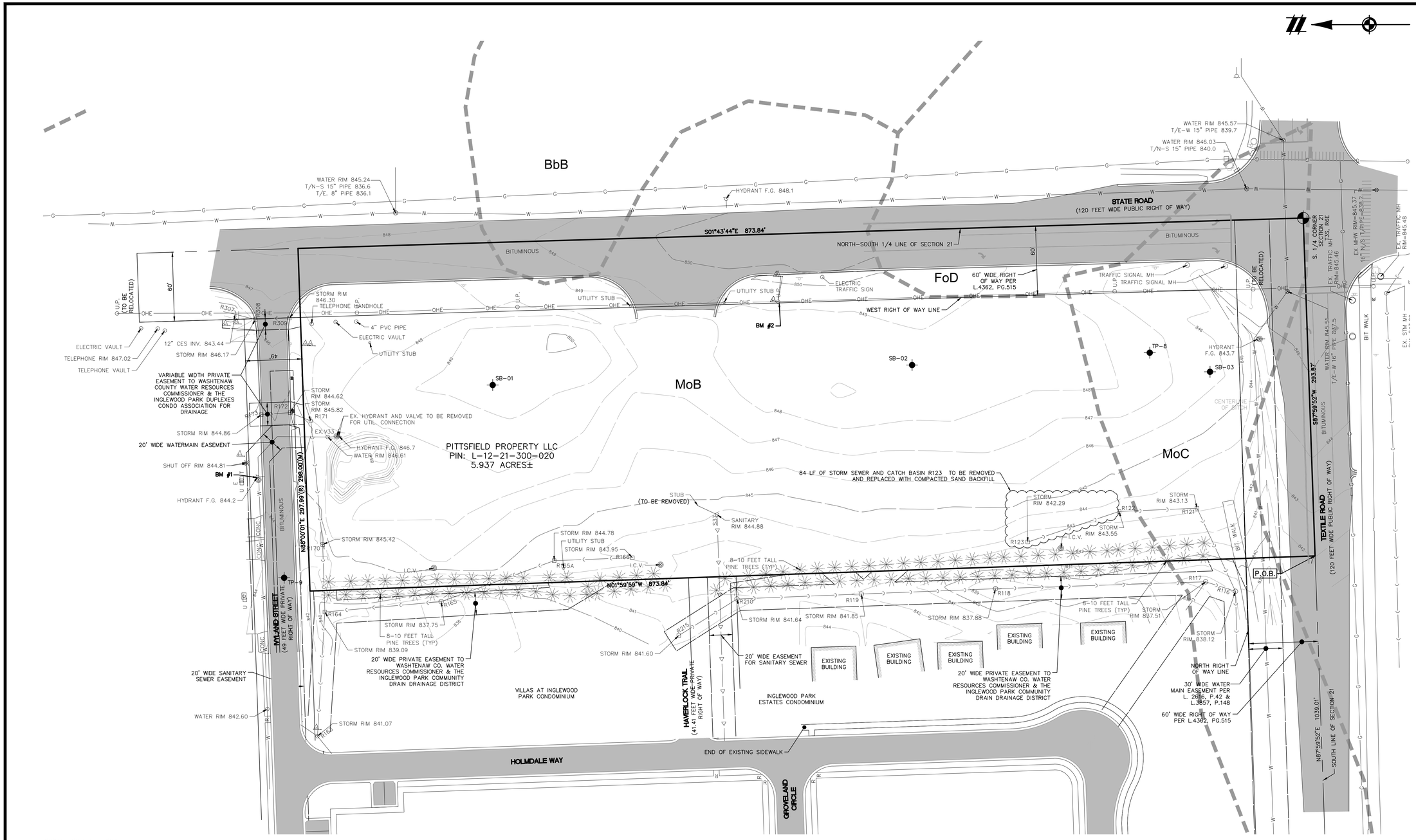
DATE
DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 25 50
1" = 50 FEET

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 1	



SOIL SUMMARY

Map unit symbol	Map unit name	Rating	Rating reasons (1.00 being severe limitation)
BbB	Blount loam, 2 to 6 percent slopes	Very limited	Depth to saturated zone (1.00)
			Shrink-swell (0.50)
			Depth to saturated zone (1.00)
			Shrink-swell (0.50)
			Depth to saturated zone (1.00)
			Shrink-swell (0.50)
			Ponding (1.00)
			Depth to saturated zone (1.00)
			Shrink-swell (0.93)
FoD	Fox sandy loam, 12 to 18 percent slopes	Very limited	Slope (1.00)
			Slope (1.00)
			Depth to saturated zone (1.00)
			Slope (1.00)
			Slope (1.00)
			Large stones (0.11)
			Depth to saturated zone (1.00)
MoB	Morley loam, 2 to 6 percent slopes	Somewhat limited	Shrink-swell (0.42)
			Depth to saturated zone (0.35)
			Shrink-swell (0.07)

Map unit symbol	Depth to Water Table Rating	Flood Frequency	Ponding Frequency
BbB	23	none	none
FoD	>200	none	none
MoB	137	none	none
MoC	>200	none	none

Map unit symbol	Map unit name	Rating	Rating reasons (1.00 being severe limitation)
MoC	Morley loam, 6 to 12 percent slopes	Somewhat limited	Shrink-swell (0.42)
			Slope (0.04)
			Slope (0.04)
			Shrink-swell (0.07)
			Slope (0.04)
MoD	Morley loam, 12 to 18 percent slopes	Very limited	Slope (1.00)
			Shrink-swell (0.42)
			Depth to saturated zone (1.00)
			Shrink-swell (1.00)
			Slope (1.00)
			Depth to saturated zone (1.00)
			Shrink-swell (0.50)
			Slope (1.00)

NOTES:

1. BEARINGS ARE BASED ON THE SOUTH LINE OF SECTION 21, BEING N87°59'52"E. VERTICAL DATUM IS BASED ON NAVD88.
2. THE SITE SHOWN HEREON IS LOCATED WITHIN ZONE X (AREAS DETERMINED TO BE OUTSIDE OF THE 0.2% ANNUAL CHANCE FLOODPLAIN) ACCORDING TO MAP NUMBER 26161C0405E OF THE FLOOD INSURANCE RATE MAP, EFFECTIVE DATE APRIL 3, 2012.
3. WATER MAIN, STORM SEWER, SANITARY SEWER AND FRANCHISE UTILITY STRUCTURES HAVE BEEN FIELD LOCATED WHERE VISIBLE. NO GUARANTEE CAN BE MADE TO THE COMPLETENESS, EXACTNESS OR CORRECTNESS OF LOCATIONS.
4. FOR INFORMATION REGARDING SOIL BORINGS AND TEST PITS, REFER TO GEOTECHNICAL INVESTIGATION LETTER PREPARED BY G2 CONSULTING GROUP, UPDATED JANUARY 22, 2015.

SITE BENCHMARKS:

BM #1: ARROW ON FIRE HYDRANT
ELEVATION: 847.02 (NAVD88)

BM #2: SET MAG NAIL ON WEST FACE OF UTILITY POLE
ELEVATION: 850.32 (NAVD88)

LEGEND

- BOUNDARY LINE
- BOUNDARY ADJACENT LINE
- EASEMENT LINE
- SECTION LINE
- EXISTING CENTERLINE OF DITCH
- OHE — OVERHEAD UTILITY LINE
- G — APPROXIMATE UNDERGROUND GAS LINE
- UNDERGROUND STORM LINE
- UNDERGROUND SANITARY LINE
- W — APPROXIMATE UNDERGROUND WATER LINE
- EXISTING CURB AND GUTTER
- 845 — EXISTING GROUND CONTOUR
- EXISTING BUILDING
- EXISTING ASPHALT
- EXISTING SOIL TYPE BOUNDARY
- MoB — EXISTING SOIL TYPE
- SECTION CORNER
- EXISTING MAILBOX
- EXISTING SIGN
- EXISTING TREE
- U — EXISTING UNIDENTIFIED RISER
- T — EXISTING TELEPHONE RISER
- EXISTING UTILITY POLE
- EXISTING VALVE
- EXISTING HYDRANT WITH SHUTOFF
- EXISTING MANHOLE/CATCH BASIN
- E — EXISTING ELECTRIC TRANSFORMER
- EXISTING CULVERT
- E — EXISTING ELECTRIC RISER
- G — UNDERGROUND GAS MARKER
- E — UNDERGROUND ELECTRIC MARKER
- T — UNDERGROUND TELEPHONE MARKER

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CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN

EXISTING CONDITIONS SHEET

DATE
DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 2	

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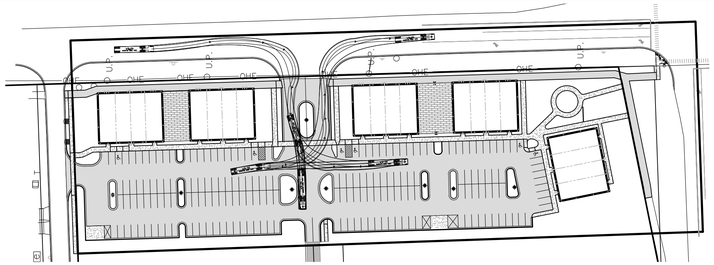
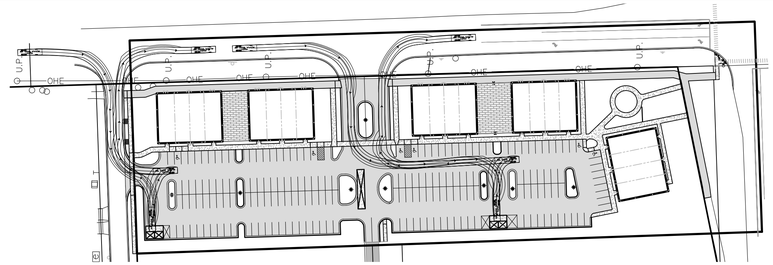


WB-50 TRUCK TURNING
1" = 100'

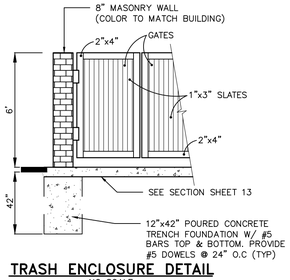


WASTE TRUCK TURNING
1" = 100'

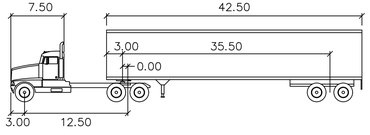
R1-1 SIGN DETAIL
NO SCALE

SP-2 SIGN DETAIL
NO SCALE

R5-1 SIGN DETAIL
NO SCALE



TRASH ENCLOSURE DETAIL
NO SCALE

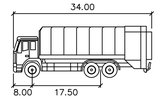


WB-50

feet

Tractor Width	: 8.00	Lock to Lock Time	: 6.0
Trailer Width	: 8.50	Steering Angle	: 17.7
Tractor Track	: 8.00	Articulating Angle	: 70.0
Trailer Track	: 8.50		

WB-50 TRUCK TEMPLATE
NO SCALE



SOLID WASTE feet

Width	: 8.50
Track	: 8.20
Lock to Lock Time	: 6.0
Steering Angle	: 40.0

WASTE TRUCK TEMPLATE
NO SCALE

NOTES
1. ALL SIDEWALKS AND SIDEWALK RAMPS SHALL BE ADA COMPLIANT.
2. DUE TO REVISED LAYOUT SHIFTING ENTRANCE SLIGHTLY WEST, DRIVE APPROACH WILL REQUIRE EXISTING CURB TO BE CUT WITH NEW RADII.
3. SAWCUT EXISTING PAVEMENT TO PROVIDE CLEAN JOINT FOR NEW PAVING. PROVIDE BUTT JOINT AT CONNECTION TO MINIMIZE POTENTIAL FOR WATER SEEPAGE INTO PAVEMENT BASE.
4. SEE SHEET 13 FOR PAVEMENT DETAILS

LEGEND

BOUNDARY LINE	BOUNDARY/PROPERTY LINE
BOUNDARY ADJACENT LINE	PROPOSED SETBACK
EASEMENT LINE	PROPOSED EASEMENT
SECTION LINE	PROPOSED R.O.W.
EXISTING CENTERLINE OF DITCH	PROP. BUILDING
OVERHEAD UTILITY LINE	PROPOSED BACK/EDGE CURB
APPROXIMATE UNDERGROUND GAS LINE	PROPOSED CENTERLINE
UNDERGROUND STORM LINE	PROP. ASPHALT
UNDERGROUND SANITARY LINE	PROP. WALK
APPROXIMATE UNDERGROUND WATER LINE	PROP. SIDEWALK RAMP
EXISTING CURB AND GUTTER	PROPOSED "NO PARKING" SIGN / FIRE LANE
EXISTING BUILDING	PROPOSED SIGN
EXISTING ASPHALT	

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CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN

LAYOUT PLAN

DATE
DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR.	MB	CH.	CK
P.M.	MB		
BOOK			
JOB	13001886.10		
SHEET NO.	3		

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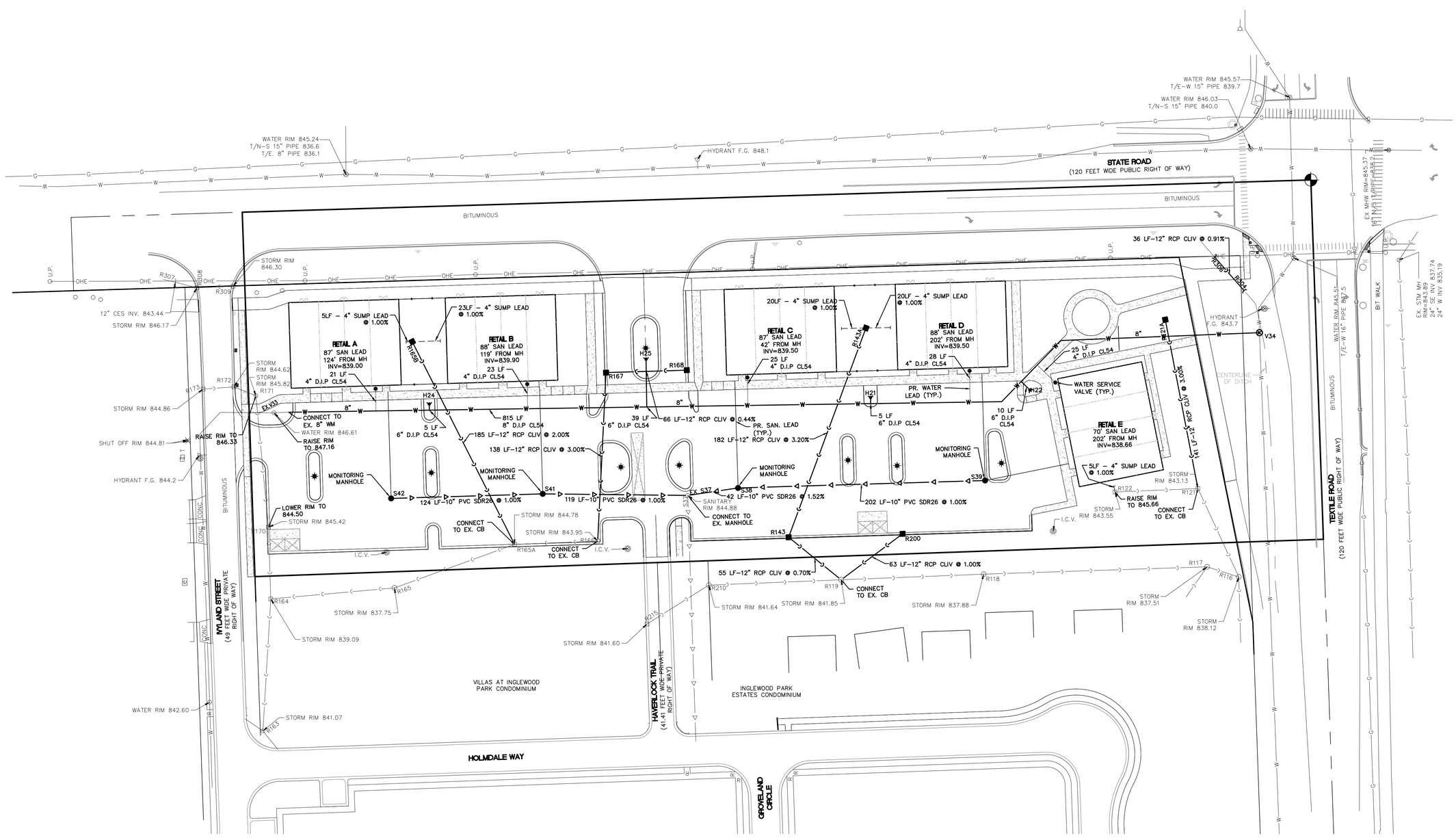

UTILITY NOTES

1. ALL WORK SHALL CONFORM TO THE CURRENT PITTSFIELD TOWNSHIP STANDARDS AND SPECIFICATIONS.

2. WATER SUPPLY
   - 2.1. WATER LEAD SIZES TO BE AS SPECIFIED BY ARCHITECT FOR EACH PROPOSED BUILDING.
   - 2.2. MAXIMUM WATER MAIN DEFLECTION IS FIVE (5) DEGREES WITHOUT FITTINGS.
   - 2.3. ALL HYDRANTS TO BE PLACED WITH A MINIMUM THREE (3) FEET CLEARANCE FROM SIDEWALKS.

3. SANITARY SERVICE
   - 3.1. SANITARY MAINS ARE TO BE 10-INCHES AND SHALL BE A MINIMUM SDR 26.
   - 3.2. SANITARY LEADS ARE TO BE 6-INCHES AND SHALL BE A MINIMUM SDR 26.
   - 3.3. SANITARY LEADS WILL BE BURIED AT LEAST 5 FEET DEEP WHEN UNDER THE INFLUENCE OF PAVEMENT.

4. COMPACTED SAND BACKFILL IS REQUIRED FOR TRENCHES WITHIN A 1:1 INFLUENCE OF PAVED AREAS.

5. DEWATERING IS NOT ANTICIPATED. IF DEWATERING IS NEEDED DURING CONSTRUCTION, A DEWATERING PLAN MUST BE SUBMITTED TO THE ENGINEERING DEPARTMENT FOR REVIEW.

6. MAXIMUM LIGHT POLE FOUNDATION DEPTH SHALL BE 48" DEEP IN ORDER TO AVOID UNDER GROUND UTILITY CONFLICTS.

7. LIGHT POLES SHALL BE LOCATED TO AVOID CONFLICTS WITH UNDERGROUND UTILITIES.

8. NO FOOD SERVICE USES ARE PROPOSED AT THIS TIME, BUT IF FOOD SERVICE IS PROPOSED LATER, EXTERNAL GREASE TRAPS MUST BE PROVIDED.

LEGEND

	BOUNDARY LINE
	EXIST. EASEMENT
	SECTION LINE
	BOUNDARY/PROPERTY LINE
923	EXIST. CONTOUR
	EXIST. CURB AND GUTTER
X	EXIST. FENCE
	EXIST. GRAVEL
	EXIST. BUILDING
OHE	EXIST. OVERHEAD ELEC. LINE
OHT	EXIST. OVERHEAD TELE. LINE
U	EXIST. UNSPECIFIED UTILITIES
G	EXIST. GAS
C	EXIST. STORM
W	EXIST. WATER MAIN
	EXIST. SANITARY
	EXIST. CULVERT
	EXIST. CATCH BASIN/INLET
	EXIST. HYDRANT
	EXIST. VALVE
	EXIST. SANITARY SEWER
	PROPOSED EASEMENT
	PROPOSED R.O.W.
	PROP. SETBACK
	PROP. BUILDING
	PROP. CURB AND GUTTER
	PROP. ASHPALT
C	PROP. STORM SEWER
	PROP. STORM SEWER (ROOF)
	PROP. SANITARY
W	PROP. WATER MAIN
	PROP. END SECTION
	PROP. CATCH BASIN/INLET
	PROP. WATER VALVE
	PROP. FIRE HYDRANT
	PROP. MANHOLE
	PROP. LIGHT POLE

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

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN

UTILITY PLAN

DATE
DECEMBER 14, 2018

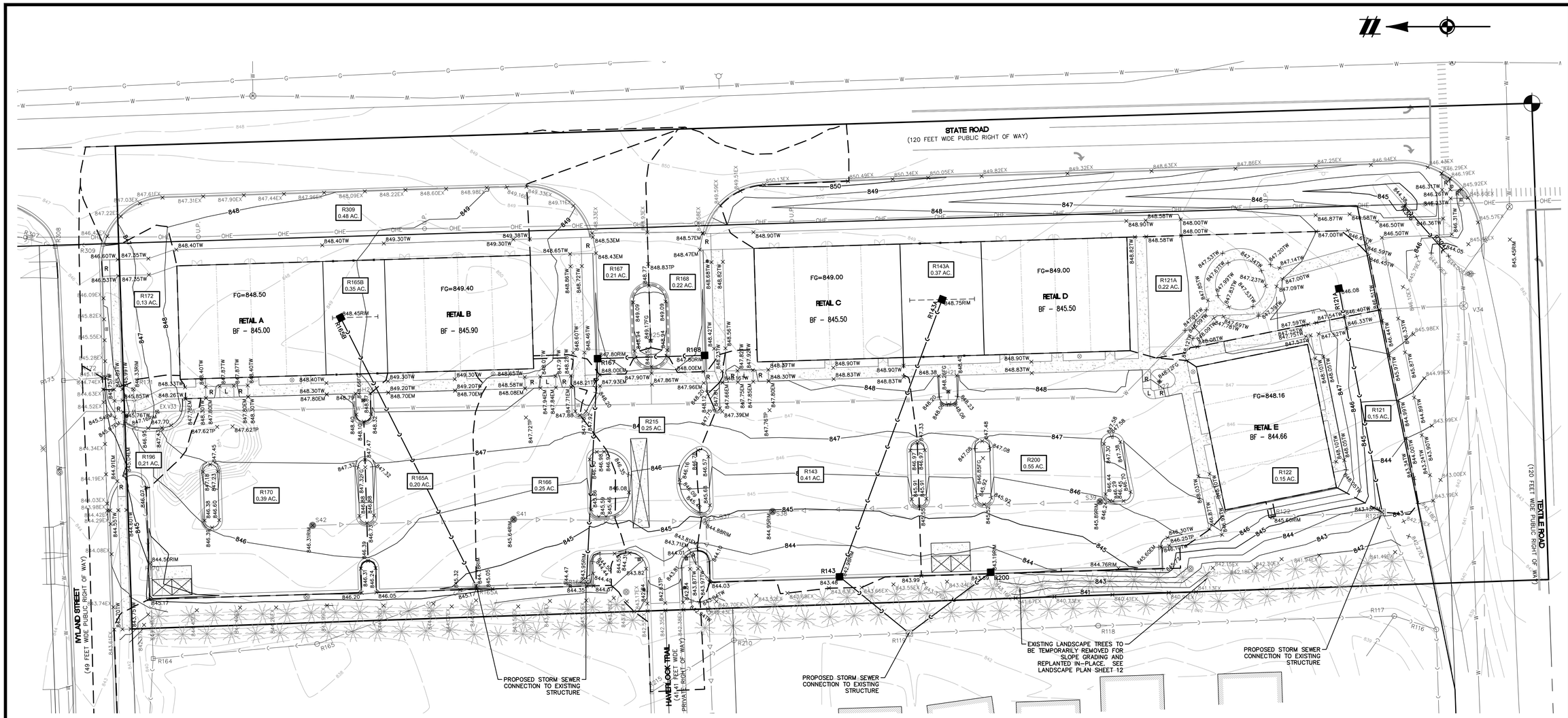
3/11/19 PER TWP
5/02/19 PER TWP

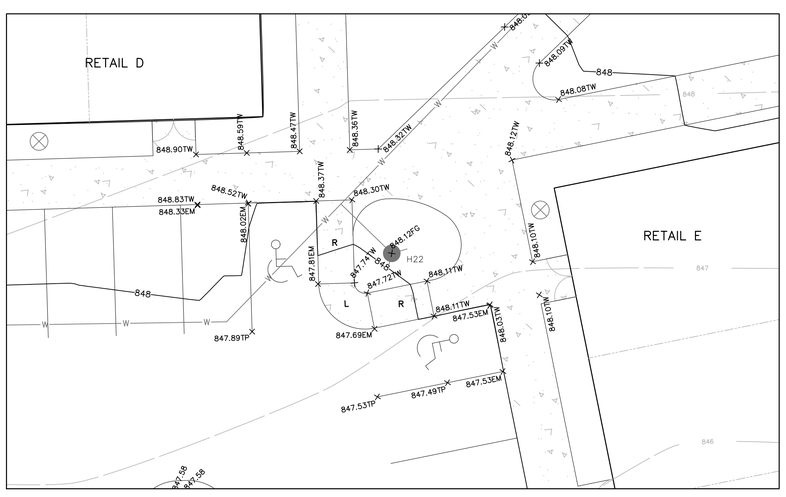
REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 4	

P:\13001886\DWG\PLAN SET\SITE PLAN - RETAIL\13001886SP-04-02.DWG 5/2/2019 10:34 AM MICHAEL BAKER





ADA PARKING GRADING DETAIL (FOR BUILDINGS D AND E)

SCALE: 1" = 10'

GRADING NOTES:

1. SPOT GRADES SHOWN ARE BACK OF CURB GRADES UNLESS OTHERWISE NOTED.
2. PROPOSED GRADING GENERALLY CONFORMS TO GRADING PROPOSED IN OVERALL PUD PLAN SET, REVISED AS NECESSARY TO SUIT THE PROPOSED SITE LAYOUT.

DRAINAGE/STORMWATER NOTES

1. STORMWATER QUALITY TREATMENT AND FLOOD VOLUME CONTROL FOR THIS SITE ARE PROVIDED WITHIN THE STORMWATER BASINS CONSTRUCTED IN THE INITIAL DEVELOPMENT PHASE OF THE PROJECT.
2. THE PROPOSED STORMWATER COLLECTION SYSTEM GENERALLY CONFORMS TO THE CONFIGURATION PROPOSED IN THE OVERALL PUD PLAN SET, REVISED AS NECESSARY TO SUIT THE PROPOSED SITE LAYOUT.
3. ROOF DRAINAGE SHALL BE DIRECTED TO THE STORM SEWER WATER MANAGEMENT SYSTEM.

LEGEND

BOUNDARY LINE	PROPOSED EASEMENT
EXIST. EASEMENT	PROPOSED R.O.W.
SECTION LINE	PROP. BUILDING
BOUNDARY/PROPERTY LINE	PROP. BACK OF CURB
EXIST. CONTOUR	PROP. SPILL OUT CURB
EXIST. CURB AND GUTTER	PROP. ASHPALT
EXIST. FENCE	PROP. WALK
EXIST. GRAVEL	PROP. CONTOUR
EXIST. BUILDING	PROP. STORM SEWER
EXIST. OVERHEAD ELEC. LINE	PROP. SANITARY
EXIST. OVERHEAD TELE. LINE	PROP. WATER MAIN
EXIST. UNSPECIFIED UTILITIES	PROP. END SECTION
EXIST. GAS	PROP. CATCH BASIN/INLET
EXIST. STORM	PROP. WATER VALVE
EXIST. WATER MAIN	PROP. FIRE HYDRANT
EXIST. SANITARY	PROP. MANHOLE
EXIST. CULVERT	PROPOSED DRAINAGE AREA
EXIST. CATCH BASIN/INLET	
EXIST. HYDRANT	
EXIST. VALVE	
EXIST. SANITARY SEWER	

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GRADING & DRAINAGE PLAN

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DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 15 30
1" = 30 FEET

DR. MB	CH. CK
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BOOK	
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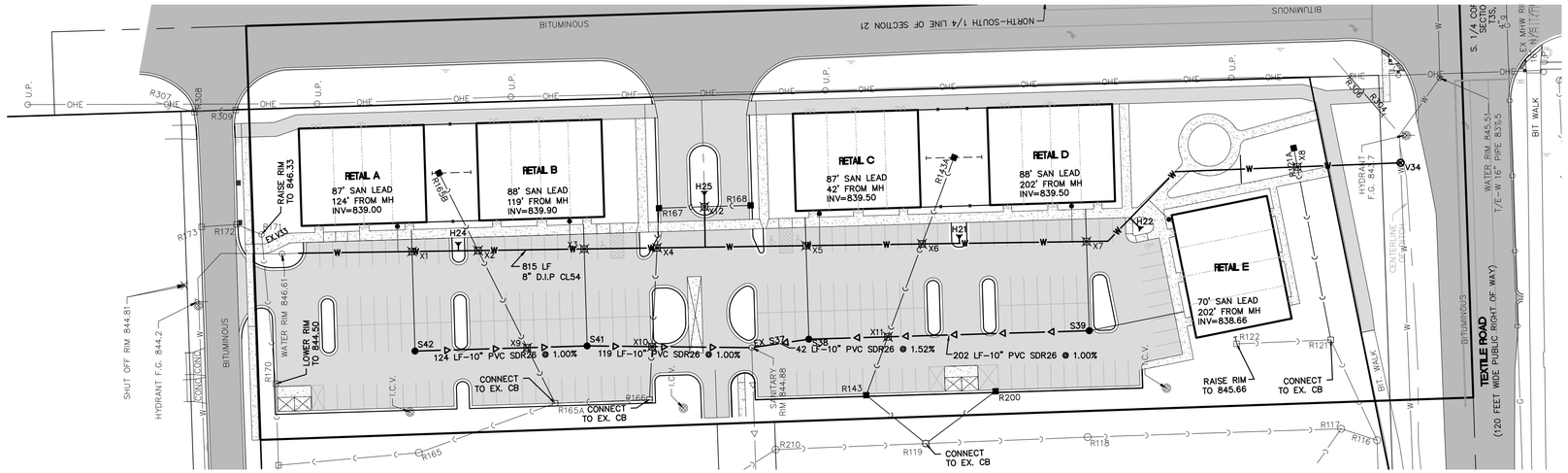
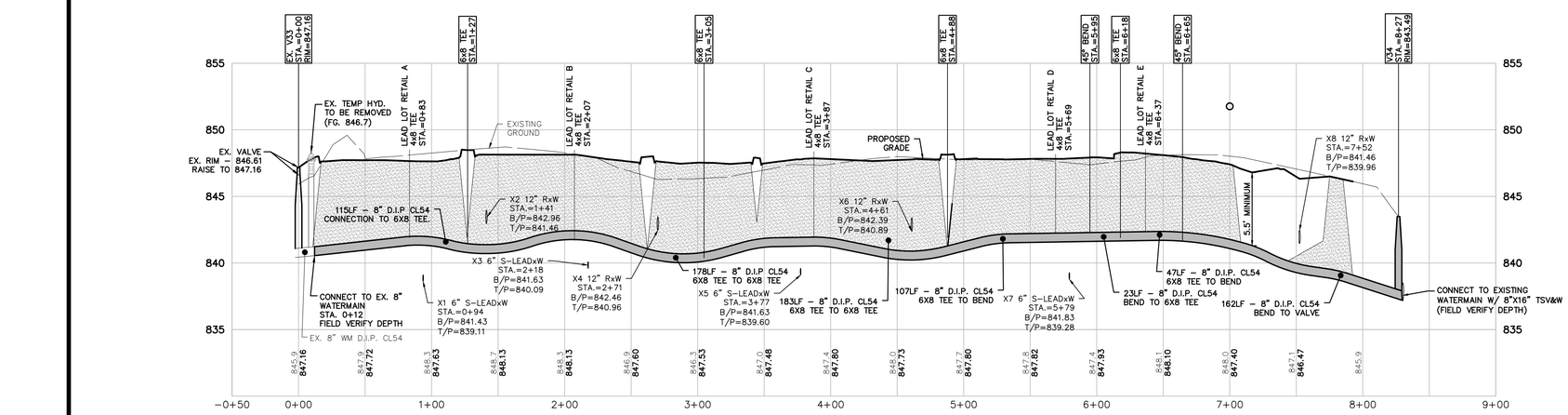
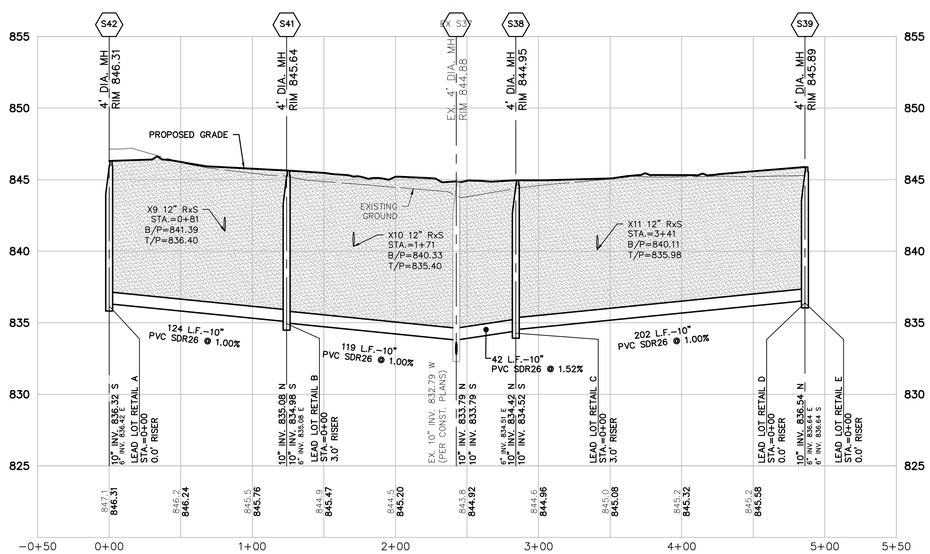
SHEET NO. 5	





WATERMAIN PROFILE
VERT: 1"=5'
HORZ: 1"=50'



SANITARY PROFILE
VERT: 1"=5'
HORZ: 1"=50'

SANITARY SEWER CALCULATIONS

From MH	To MH	Pipe Length (LF)	Pipe Dia. (IN)	Pipe Material	Pipe Slope %	Ground / Rim Elev	U/S Invert Elev	D/S Invert Elev	Drop
Phase 1									
S42	S41	124	10"	SDR-26	1.00%	846.31	836.32	835.08	0.10
S41	EX S37	119	10"	SDR-26	1.00%	845.64	834.98	833.79	1.00
EX S37			10"			844.88	832.79		
S39	S38	202	10"	SDR-26	1.00%	845.89	836.54	834.52	0.10
S38	EX S37	42	10"	SDR-26	1.50%	844.95	834.42	833.79	1.00

SANITARY SEWER STRUCTURE SCHEDULE

STR	TYPE	CASTING	RIM	DEPTH FROM RIM TO T/P	PIPE OUT	PIPE IN
S42	4 FT. MH	EJIW 1040Z	RIM 846.31	9.1	10" S INV. 836.32	
S41	4 FT. MH	EJIW 1040Z	RIM 845.64	9.8	10" N INV. 834.98	10" N INV. 835.08
S39	4 FT. MH	EJIW 1040Z	RIM 845.89	8.5	10" N INV. 836.54	
S38	4 FT. MH	EJIW 1040Z	RIM 844.95	9.6	10" N INV. 834.42	10" S INV. 834.52

SANITARY SEWER BASIS OF DESIGN

Residential

Number of Single family lots = 106 lots
Number of Multi-family units = 68 units
174 E.R.U.

Non-Residential

Retail = 31500 s.f.
ERU = 0.35 units/1000 sf 31500 units = 11.0 E.R.U.

TOTAL = 185.0 E.R.U.

Number of Persons per lot = 3.5 persons/ERU

Design Population = 185.0 units x 3.5 units = 647.5 people

Average Discharge Rate = 100 GPCPD

Average Discharge =
(748 People x 100 GPCPD)/(1440 min/day)(448.8 gpm/cfs)= 0.100 cfs

Peaking Factor = $(18 + (\text{Population}/1000)^{0.5})/(4 + (\text{Population}/1000)^{0.5})$ = 3.91

Peak Flow = Average Discharge x Peaking Factor = 0.392 cfs

Capacity of 8 " pipe @ 0.50 %= 0.86 cfs > 0.392 cfs

WATERMAIN STRUCTURE SCHEDULE

STR	NORTHING	EASTING	FG	CASTING
H24	256535.0379'	13294776.6268'	848.66	
H25	256357.8428'	13294813.3231'	849.17	
H21	256174.3137'	13294781.9814'	848.26	
H22	256044.1084'	13294788.1433'	848.12	
V34	255828.0075'	13294875.7725'	845.45	EJIW 1040A
EX V33	256662.0147'	13294769.4562'	847.16	-

LEGEND

BOUNDARY LINE
EXIST. EASEMENT
SECTION LINE
BOUNDARY/PROPERTY LINE
EXIST. CONTOUR
EXIST. CURB AND GUTTER
EXIST. FENCE
EXIST. GRAVEL
EXIST. BUILDING
EXIST. OVERHEAD ELEC. LINE
EXIST. OVERHEAD TELE. LINE
EXIST. UNSPECIFIED UTILITIES
EXIST. GAS
EXIST. STORM
EXIST. WATER MAIN
EXIST. SANITARY
EXIST. CULVERT
EXIST. CATCH BASIN/INLET
EXIST. HYDRANT
EXIST. VALVE
EXIST. SANITARY SEWER
PROPOSED EASEMENT
PROPOSED R.O.W.
PROP. SETBACK
PROP. BUILDING
PROP. CURB AND GUTTER
PROP. ASHPALT
PROP. STORM SEWER
PROP. STORM SEWER (ROOF)
PROP. SANITARY
PROP. WATER MAIN
PROP. END SECTION
PROP. CATCH BASIN/INLET
PROP. WATER VALVE
PROP. FIRE HYDRANT
PROP. MANHOLE

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SCALE 0 25 50
1" = 50 FEET

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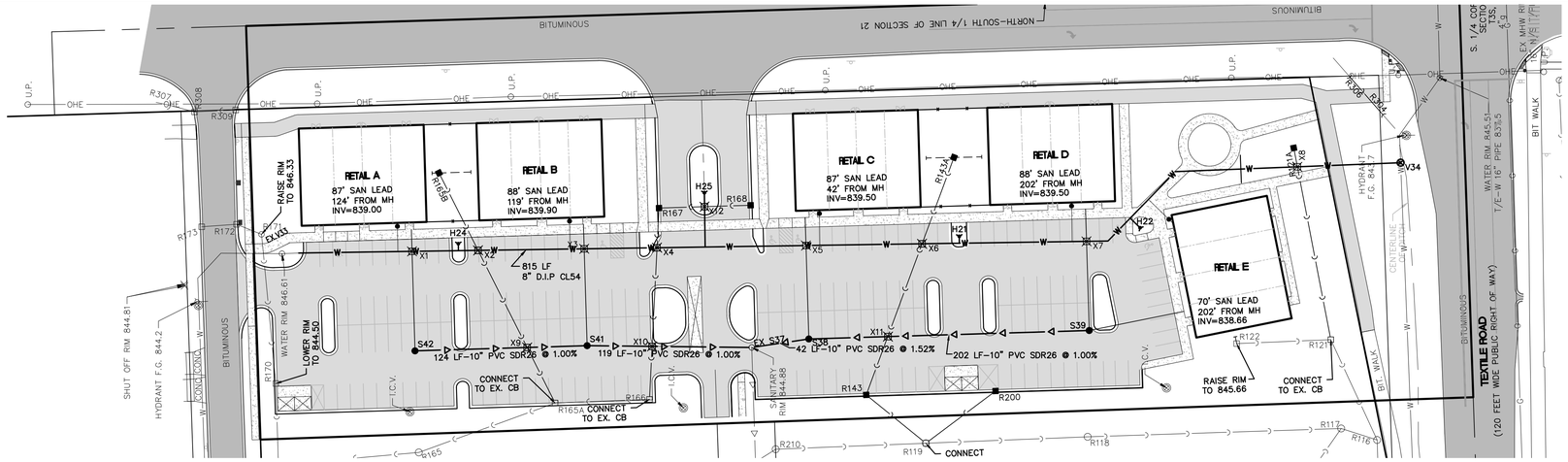
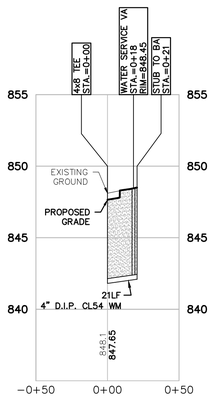
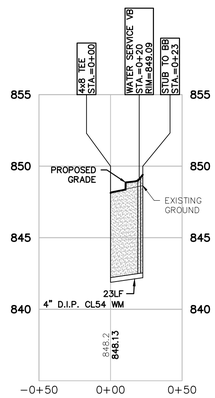
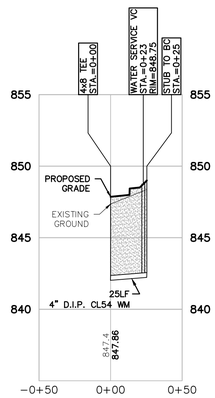




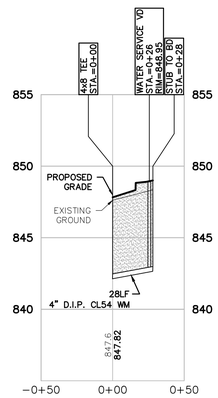
BUILDING A – WATER LEAD
VERT: 1"=5'
HORZ: 1"=50'



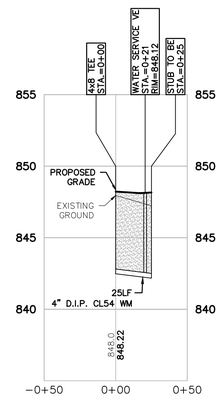
BUILDING B – WATER LEAD
VERT: 1"=5'
HORZ: 1"=50'



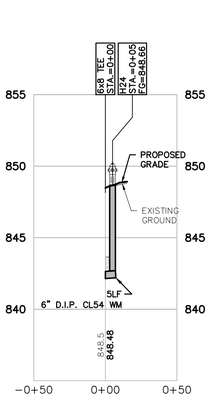
BUILDING C – WATER LEAD
VERT: 1"=5'
HORZ: 1"=50'



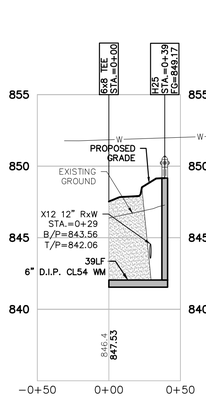
BUILDING D – WATER LEAD
VERT: 1"=5'
HORZ: 1"=50'



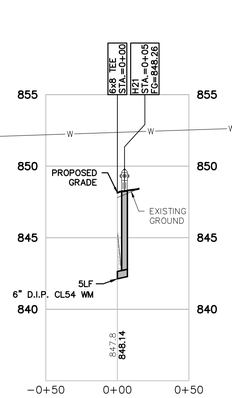
BUILDING E – WATER LEAD
VERT: 1"=5'
HORZ: 1"=50'



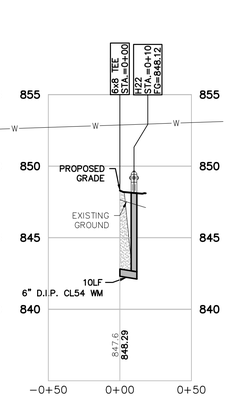
H24 – PROFILE
VERT: 1"=5'
HORZ: 1"=50'



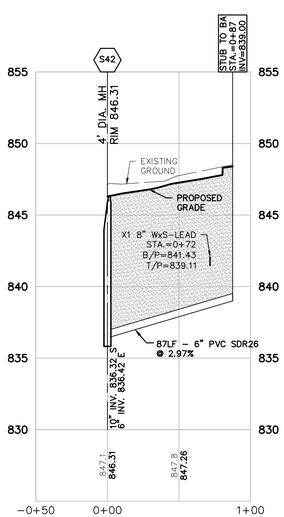
H25 – PROFILE
VERT: 1"=5'
HORZ: 1"=50'



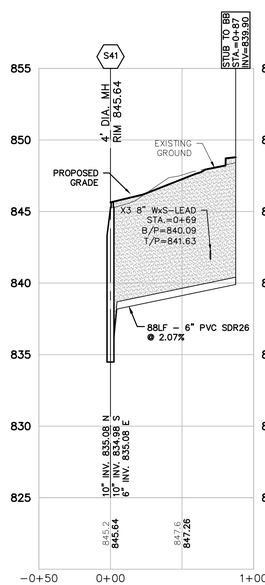
H21 – PROFILE
VERT: 1"=5'
HORZ: 1"=50'



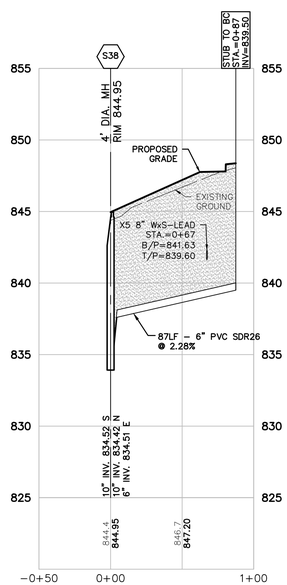
H22 – PROFILE
VERT: 1"=5'
HORZ: 1"=50'



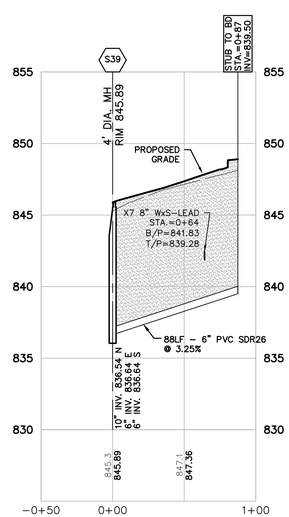
BUILDING A – SANITARY LEAD
VERT: 1"=5'
HORZ: 1"=50'



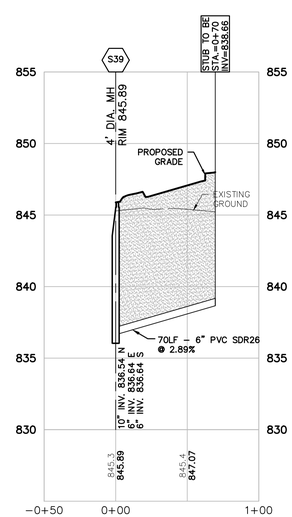
BUILDING B – SANITARY LEAD
VERT: 1"=5'
HORZ: 1"=50'



BUILDING C – SANITARY LEAD
VERT: 1"=5'
HORZ: 1"=50'



BUILDING D – SANITARY LEAD
VERT: 1"=5'
HORZ: 1"=50'



BUILDING E – SANITARY LEAD
VERT: 1"=5'
HORZ: 1"=50'

SANITARY LEAD TABLE

Lot No.	Size	Sta	Riser	Length	Slope	Invert	F.G.
RETAIL A	6" SDR 26	STA 0+00	0.0' RISER	87 LF	2.97%	839.00	848.50
RETAIL B	6" SDR 26	STA 0+00	3.0' RISER	88 LF	2.07%	839.90	849.40
RETAIL C	6" SDR 26	STA 0+00	3.0' RISER	87 LF	2.28%	839.50	849.00
RETAIL D	6" SDR 26	STA 0+00	0.0' RISER	88 LF	3.25%	839.50	849.00
RETAIL E	6" SDR 26	STA 0+00	0.0' RISER	70 LF	2.89%	838.66	848.16

LEGEND

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EXIST. EASEMENT
SECTION LINE
BOUNDARY/PROPERTY LINE
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EXIST. FENCE
EXIST. GRAVEL
EXIST. BUILDING
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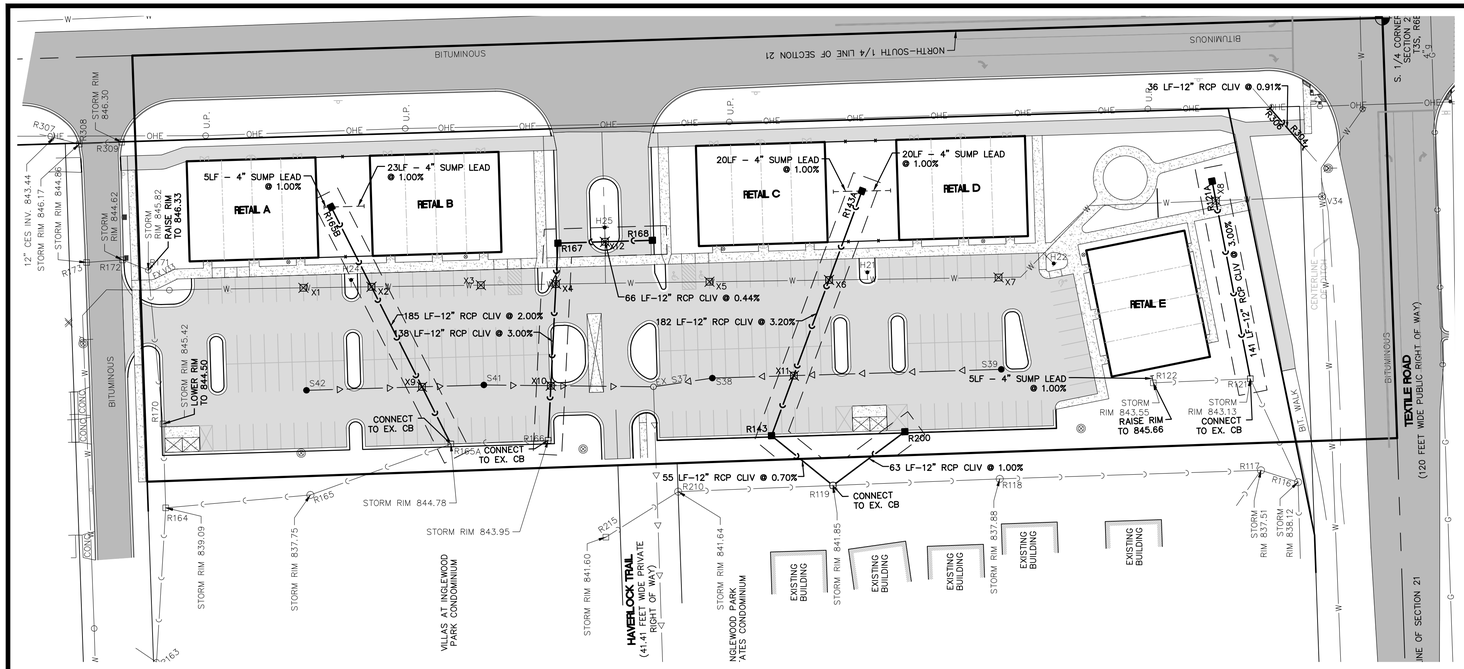
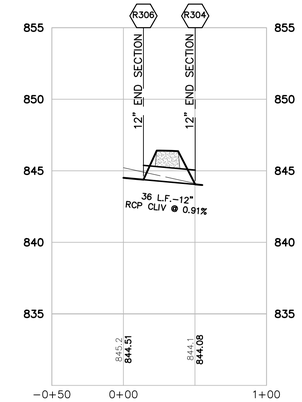
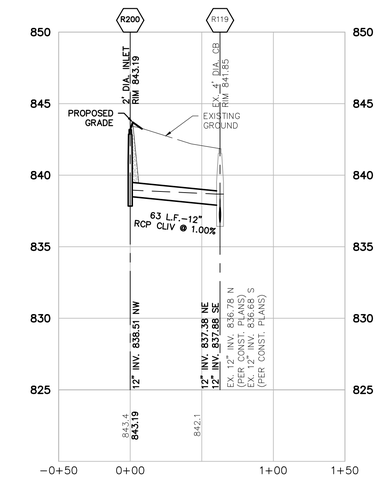


STORM SEWER STRUCTURE SCHEDULE

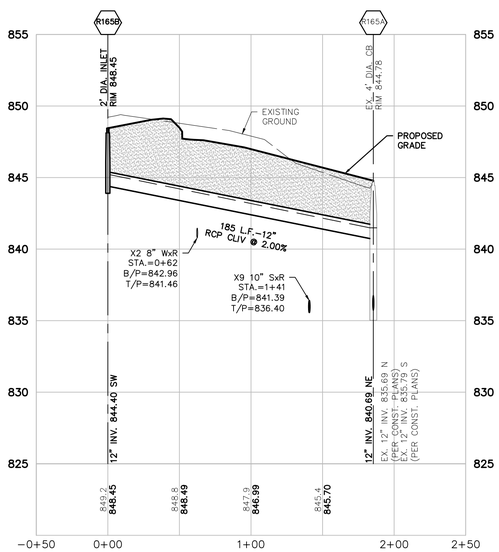
STR	TYPE	CASTING	RIM	DEPTH FROM RIM TO T/P	PIPE OUT	PIPE IN	SUMP
R165B	2' INLET	EJIW 1045Z	RIM 848.45	3.1	12" SW. INV. 844.40	-	NO
R168	2' INLET	EJIW 7045-K	RIM 847.80	2.9	12" N. INV. 843.90	-	NO
R167	4' CB	EJIW 7045-K	RIM 847.80	3.3	12" W. INV. 843.51	12" S. INV. 843.61	YES
R143A	2' INLET	EJIW 1045Z	RIM 848.75	3.1	12" W. INV. 844.70	-	NO
R143	4' CB	EJIW 7045-K	RIM 842.98	4.2	12" SW. INV. 837.77	12" E. INV. 838.87	YES
R200	2' INLET	EJIW 7045-K	RIM 843.19	3.7	12" NW. INV. 838.51	-	NO
R121A	2' INLET	EJIW 1040Z	RIM 846.08	3.0	12" W. INV. 842.07	-	NO
R306	12" END SECTION	BAR GRATE	-	-	12" SW. INV. 844.38	-	NO
R304	12" END SECTION	BAR GRATE-	-	-	12" NE. INV. 844.05	-	NO



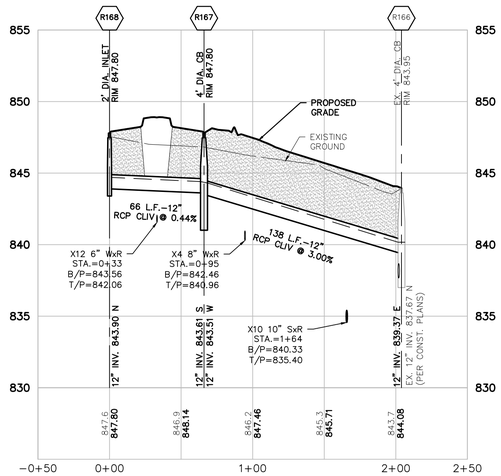
R304–R306
VERT: 1"=5'
HORZ: 1"=50'



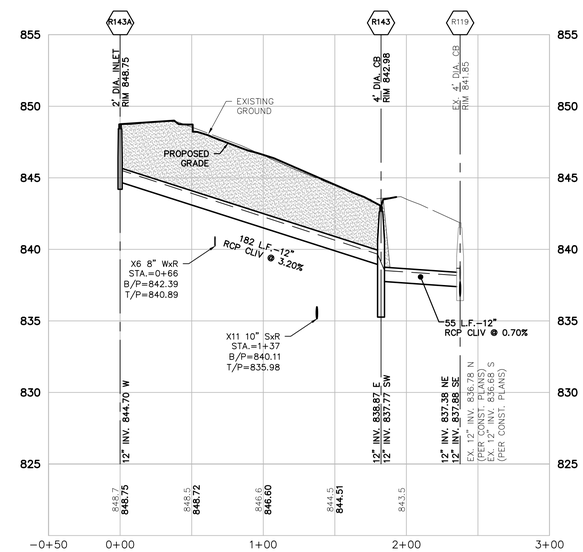
R119–R200
VERT: 1"=5'
HORZ: 1"=50'



R165A–R165B
VERT: 1"=5'
HORZ: 1"=50'



R166–R168
VERT: 1"=5'
HORZ: 1"=50'



R119–R143A
VERT: 1"=5'
HORZ: 1"=50'

R121–R121A
VERT: 1"=5'
HORZ: 1"=50'

STORM SEWER CALCULATIONS

I = B/(T+D)^E B = 175.0 D = 25.0 E = 1
C = Varies Tmin = 20 n = 0.013 Vmin = 3.0

* = Check Rim-HGL clearance

FROM STRUCT INPUT	TO STRUCT	A TRIB AREA (AC)	C RUNOFF COEFF	AxC EQUIV AREA (AC)	CA DESIGN SUM AxC (AC)	T TIME CONC. (MIN)	I INTEN-SITY (IN/HR)	Q FLOW CAxI (CFS)	Qc PIPE CAPAC. (CFS) * see above	D PIPE DIAM. (IN)	L PIPE LENGTH (FT)	S PIPE SLOPE (%)	HGq MIN HG for Q (%)	HGv MIN HG for Vmin (%)	HG HGL SLOPE (%)	Vf VEL. FULL (FPS)	Tf TIME OF FLOW (MIN)	H.G.L. ELEV. UPPER END	H.G.L. ELEV. LOWER END	RIM/GROUND ELEV. UPPER END	RIM/GROUND ELEV. LOWER END	INVERT ELEV. UPPER END	INVERT ELEV. LOWER END
BASIN 1 (EAST BASIN)																							
R165B	R165A	0.35	0.95	0.33	0.33	20.0	3.89	1.28	5.04	12	185	2.00	0.13	0.44	0.44	6.4	0.5	845.20	841.49	848.45	844.78	844.40	840.69
R168	R167	0.22	0.80	0.18	0.18	20.0	3.89	0.70	2.36	12	66	0.44	0.04	0.44	0.44	3.0	0.4	844.50	844.21	847.80	847.80	843.70	843.41
R167	R166	0.21	0.70	0.15	0.33	20.4	3.85	1.27	6.17	12	138	3.00	0.13	0.44	0.44	7.9	0.3	844.21	840.07	847.80	843.95	843.41	839.27
R166	R165A	0.25	0.90	0.22	0.55	20.7	3.83	2.11	5.92	12	68	2.76	0.35	0.44	0.44	7.5	0.2	838.47	836.59	843.34	844.73	837.67	835.79
R143A	R143	0.37	0.95	0.35	0.35	20.0	3.89	1.36	6.37	12	182	3.20	0.15	0.44	0.44	8.1	0.4	845.40	839.57	848.75	842.98	844.60	838.77
R143	R119	0.41	0.89	0.37	0.72	20.4	3.85	2.78	2.98	12	55	0.70	0.61	0.44	0.61	3.8	0.2	838.52	838.18	842.98	841.85	837.77	837.38
R200	R119	0.55	0.89	0.49	0.49	20.0	3.89	1.91	3.56	12	63	1.00	0.29	0.44	0.44	4.5	0.2	838.95	838.68	843.19	841.85	838.51	837.88
R121A	R121	0.22	0.40	0.09	0.09	20.0	3.89	0.35	6.17	12	141	3.00	0.01	0.44	0.44	7.9	0.3	842.87	838.65	846.08	843.13	842.07	837.85

LEGEND

BOUNDARY LINE
EXIST. EASEMENT
SECTION LINE
BOUNDARY/PROPERTY LINE
EXIST. CONTOUR
EXIST. CURB AND GUTTER
EXIST. FENCE
EXIST. GRAVEL
EXIST. BUILDING
EXIST. OVERHEAD ELEC. LINE
EXIST. OVERHEAD TELE. LINE
EXIST. UNSPECIFIED UTILITIES
EXIST. GAS
EXIST. STORM
EXIST. WATER MAIN
EXIST. SANITARY
EXIST. CULVERT
EXIST. CATCH BASIN/INLET
EXIST. HYDRANT
EXIST. VALVE
EXIST. SANITARY SEWER
PROPOSED EASEMENT
PROPOSED R.O.W.
PROP. SETBACK
PROP. BUILDING
PROP. CURB AND GUTTER
PROP. ASHPALT
PROP. STORM SEWER
PROP. STORM SEWER (ROOF)
PROP. SANITARY
PROP. WATER MAIN
PROP. END SECTION
PROP. CATCH BASIN/INLET
PROP. WATER VALVE
PROP. FIRE HYDRANT
PROP. MANHOLE

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

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

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ANN ARBOR, MI 48104
734.994.4000

SECTION 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN

STORM PLAN & PROFILES & STORM SEWER CALCS

DATE
DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 25 50
1" = 50 FEET

DR. MB | CH. CK
P.M. MB
BOOK
JOB 13001886.10
SHEET NO. 8

Z:\13001886\DWG\PLAN SETS\SITE PLAN – RETAIL\13001886SP-05-SUMC 5/2/2019 8:59 AM MICHAEL BAKER

W1 Determining Post-Development Cover Types, Areas, Curve Numbers and runoff coefficients

Total Contributing Drainage Area = 28.7 Acres

Rational Method Variables

Cover Type	Soil Type	Area (sf)	Area (ac)	Runoff Coef	(c)(Area)
Paved Parking Lots, roofs, driveways	C	589,377	13.5	0.95	559,908
Water Surfaces	C	74,052	1.7	1.00	74,052
Developed Open Space, Good Condition	C	588,458	13.5	0.35	205,960

Total - Sum (c)(Area) = 839,920
Area Total (sf)= 1,251,887
Weighted C-Sum(c)(Area)/Sum(ac) or Sum(sf)= **0.67**

NRCS Variables

Pervious Cover Type	Soil Type	Area (sf)	Area (ac)	Curve Number	(CN)(Area)
Developed Open Space, Good Condition	C	588,458	13.5	71	41,780,518
			0.0		0
			0.0		0

Total - Sum (CN)(Area) = 41,780,518
Area Total - Sum(ac) of Sum(sf)= 588,458
Weighted CN-Sum(CN)(Area)/Sum(ac) or Sum(sf)= **71**

Impervious Cover Type	Soil Type	Area (sf)	Area (ac)	Curve Number	(CN)(Area)
Paved Parking Lots, roofs, driveways	C	589,377	13.5	98	57,758,946
Impervious, Ponds	C	74,052	1.7	98	7,257,096
			0.0		0

Total - Sum (CN)(Area) = 65,016,042
Area Total - Sum(ac) of Sum(sf)= 663,429
Weighted CN-Sum(CN)(Area)/Sum(ac) or Sum(sf)= **98**

W2 First Flush Runoff Calculations (Vff)

A. Vff = (1") (1/12) (43560/1) (C) AC = **69,801** cf

W3 Predevelopment Bankfull Runoff Calculations (Vbf-pre)

A.	2 year/24 hour storm event	P =	2.35	in
B.	Pervious Cover CN *(pasture, grassland or range, fair)*	CN =	71	
C.	S = (1000/CN)-10	S =	4.08	in
D.	Q = (P-0.2S)^2/(P+0.8S)	Q =	0.42	in
E.	Pervious Cover Area	Area =	1,251,887	sf
F.	V_{bf-pre} = Q(1/12)Area	V_{bf-pre} =	**43,649**	cf

W4 Pervious Cover Post-development Bankfull Runoff Calculations (Vbf-per-post)

A.	2 year/24 hour storm event	P =	2.35	in
B.	Pervious Cover CN	CN =	71	
C.	S = (1000/CN)-10	S =	4.08	in
D.	Q = (P-0.2S)^2/(P+0.8S)	Q =	0.42	in
E.	Pervious Cover Area	Area =	588,458	sf
F.	$V_{bf-per-post}$ = Q(1/12)Area	$V_{bf-per-post}$ =	**20,517**	cf

W5 Impervious Cover Post-development Bankfull Runoff Calculations (Vbf-imp-post)

A.	2 year/24 hour storm event	P =	2.35	in
B.	Impervious Cover CN	CN =	98	
C.	S = (1000/CN)-10	S =	0.20	in
D.	Q = (P-0.2S)^2/(P+0.8S)	Q =	2.12	in
E.	Pervious Cover Area	Area =	663,429	sf
F.	$V_{bf-imp-post}$ = Q(1/12)Area	$V_{bf-imp-post}$ =	**117,298**	cf

W6 Pervious Cover Post-development 100-year Storm Runoff Calculations (V100-per-post)

A.	100 year storm event	P =	5.11	in
B.	Pervious Cover CN	CN =	71	
C.	S = (1000/CN)-10	S =	4.08	in
D.	Q = (P-0.2S)^2/(P+0.8S)	Q =	2.20	in
E.	Pervious Cover Area	Area =	588,458	sf
F.	$V_{100-imp-post}$ = Q(1/12)Area	$V_{100-imp-post}$ =	**107,884**	cf

W7 Impervious Cover Post-development 100-year Storm Runoff Calculations (V100-imp-post)

A.	100 year storm event	P =	5.11	in
B.	Pervious Cover CN	CN =	98	
C.	S = (1000/CN)-10	S =	0.20	in
D.	Q = (P-0.2S)^2/(P+0.8S)	Q =	4.87	in
E.	Pervious Cover Area	Area =	663,429	sf
F.	$V_{100-imp-post}$ = Q(1/12)Area	$V_{100-imp-post}$ =	**269,407**	cf

W8 Determine Time of Concentration (Tc-hrs)

User specified; assume 15 minutes

Total Time of Concentration (hrs) = 0.25

W9 Runoff Summary & Onsite Infiltration Requirement

A. Runoff Summary from Previous Worksheets

V_{ff} =	**69,801**	cf*	
V_{bf-pre} =	43,649	cf	
$V_{bf-per-post}$ =	20,517	cf	**Total BF Volume ($V_{bf-post}$)**
$V_{bf-imp-post}$ =	117,298	cf	137,816 cf
$V_{100-per-post}$ =	107,884	cf	**Total 100-year Volume (V_{100})**
$V_{100-imp-post}$ =	269,407	cf	377,291 cf

B. Determine Onsite Infiltration Requirement

$V_{bf-post}$ = 137,816 cf
V_{bf-pre} = 43,649 cf
Bankfull Volume Difference = **94,167 cf***

Onsite Infiltration Requirement (V_{inf}) = **94,167** cf

W10 Detention / Retention Requirement

A.	Q_o = 238.6 (T_c) ^ -0.82	743.63	cfs/in-mi^2
B.	Total Site Area	28.7	ac
C.	Q_{100} = $Q_{100-per}$ + $Q_{100-imp}$	7.07	in
D.	Peak Flow (PF) = (Q_o-Q_{100}-A)/640	235.866	cfs
E.	Delta = PF - 0.15A	231.561	cfs
F.	V_{det} = (Delta/PF) x V_{100} *	**370,405**	cf

* Refer to 'Summary' below for detention requirement factoring in infiltration provided.

W11 Determine Applicable BMPs and Associated Volume Credits

Proposed BMP	Area (ft²)	Storage Depth (ft)	Storage Volume (ft³)	Ave. Design Infil. Rate (in/hr)	Infil. During Storm (ft³)	Total Volume Reduction (ft³)
Infiltration Basin	29,353	2.0	58,706	23.5 *	344,898	403,604

Total Volume Reduction Credit by Proposed Structural BMPs (Vinf) = **403,604** cf

* Per Geotechnical investigation, includes a factor of safety of 2. Another factor of safety of 2 added due to high rate.

Proposed BMP	Ave. Design Infil. Rate (ft/hr)*	Volume Rate (cf/hr)	Estimated Drawdown Time (hrs)
Infiltration Basin	1.9583	57,483	1.02

W12 *Not Used*

W13 *Determine Reduced Infiltration Volume during Design Storm and Overflow Volume for Rim Grade*

Due to the volume of infiltration provided per W11, there are no outlet holes required in the standpipe riser to satisfy first flush, bankfull, and 100-year storage requirements. A reasonable overflow elevation is required in the event when the storage and infiltration capacity of the basin is exceeded. To determine a reasonable volume of storage, a reduced infiltration rate is assumed and the associated infiltration volume during the storm event at that rate is used below to determine the remaining volume to be stored in the basin, with the overflow standpipe rim then set at the resulting elevation.

Proposed BMP	*Area (ft²)*	*Storage Depth (ft)*	*Storage Volume (ft³)*	*Reduced Infil. Rate (in/hr)*	*Infil. During Storm (ft³)*	
(Same Basin as per W11 above)	*29,353*	*-*	*-*	*8.0 ***	*117,412*	*= Vinf'*

*** Reduced infiltration rate used to compute conservative infiltration volume during the design storm.*

Subtract Vinf' from Vdet to determine volume (cf) at which to set overflow rim elev: 252,993 = Vover

Summary Infiltration / Detention Summary

Total Infiltration Required per WCWRC Rules:	94,167	cf
Total Infiltration Provided:	403,604	cf
Difference:	309,437	cf
% Deficiency:	0.0%	
Pro-Rated 20% Detention Penalty:	**0.0%**	
Total Detention Required, Considering Infiltration Provided	0	cf
Total Detention Required w/ Penalty:	**0**	cf
Total Volume Provided to Overflow Rim per W13 (Vover):	*252,993*	*cf*

Basin Stage-Storage Summary:

Elev.	Area	Avg. Area	Depth	Total Vol.	Vol exclud Infil	
825.0	70,815	68,311	1.0	322,478	260,286	
824.0	65,807	63,436	1.0	254,167	191,975	
823.0	61,065	51,687	1.0	190,731	128,539	
822.0	42,308	40,346	1.0	139,044	76,852	
821.0	38,384	36,506	1.0	98,698	36,506	Detention
820.0	34,628	32,839	1.0	62,192	0	Infiltration
819.0	31,050	29,353	1.0	29,353		
818.0	27,656	0	0.0	0		

Total Volume Provided: **322,478** cf

Vff =	69,801 cf	Elev. =	820.21	
Vbf =	137,816 cf	Elev. =	821.97	
Vover =	252,993 cf	Elev. =	823.98	>>> Set rim at 824.00

Forebay Sizing

Required Volume (Vfb)=0.05*V100 **18,865 cf**

Forebay Stage-Storage Summary:

Elev.	Area	Avg. Area	Depth	Volume
822.0	13,093	11,878	1.0	21,428
821.0	10,662	9,550	1.0	9,550
820.0	8,438			

Vfb Elev.= 821.78

Outlet Control Structure Sizing

1. Standpipe outlet holes sizing - "first flush" runoff
First Flush discharge should be released from in 24 hours

Note: First Flush volume provided by infiltration - no outlet holes are proposed.

Qff = Vff / 24 hrs / 3600 sec	Qff=	0.808	cfs	
hff(ave) = 2/3 x (Xff - Xo)	hff(ave) =	0.139	ft	
Aff(required) = Qff / 0.62 x sqrt(2*32.2*h)	A(required) =	0.436	sf	
Selected Orifice Diameter =		0	in	
Area of each orifice =		0.000	sf	
Number of orifice holes required =		0	holes at elev.	820.00

2. Standpipe outlet holes sizing - "Bankfull flood" discharge
Bankfull should discharge within 36 to 48 hours

Note: Bankfull volume provided by infiltration - no outlet holes are proposed.

Selected Orifice Diameter =		0	in	
Area of each orifice =		0.0000	sf	
Number of orifice holes required =	=	0	holes at elev.	820.21

3. Standpipe outlet holes sizing - "100-yr flood" discharge

Note: Detention volume provided by infiltration - proposed outlet holes are provided for the 100-year rate and storage volume (Vover) using the reduced infiltration rate in W13 above.

Q100 = Qa	Q100 =	4.305	cfs	
Release from above holes				
hff = (X100-Xo)	hff =	3.983	ft	
hbf = (X100-Xff)	hbf =	3.774	ft	
Q = A x 0.62 x sqrt(64.4*hff) + A x 0.62 x sqrt(64.4*hbf) =		0.000	cfs (no holes provided)	
Remaining flow =	Q100-Q=	4.305	cfs	
A = Q100 /(.62 x sqrt(2*32.2*h))	A(required) =	0.610	sf	
Selected Orifice Diameter =		2	in	
Area of each orifice =		0.0218	sf	
Number of orifice holes required =	=	27	holes at elev.	821.97

4. Riser Outlet Pipe Design
Outlet pipe designed to handle the 100-year restricted flow

100-year restricted flow =	Q =	4.31	cfs
Choose outflow pipe diameter =	d =	18	in
Choose outflow pipe slope =	S =	0.18	%
Assume roughness factor	n =	0.013	
Flow velocity at 100-yr restricted flow (Mannings) =	V =	2.52	fps
Design Pipe Capacity =	=	4.46	cfs

Basin Overflow Weir

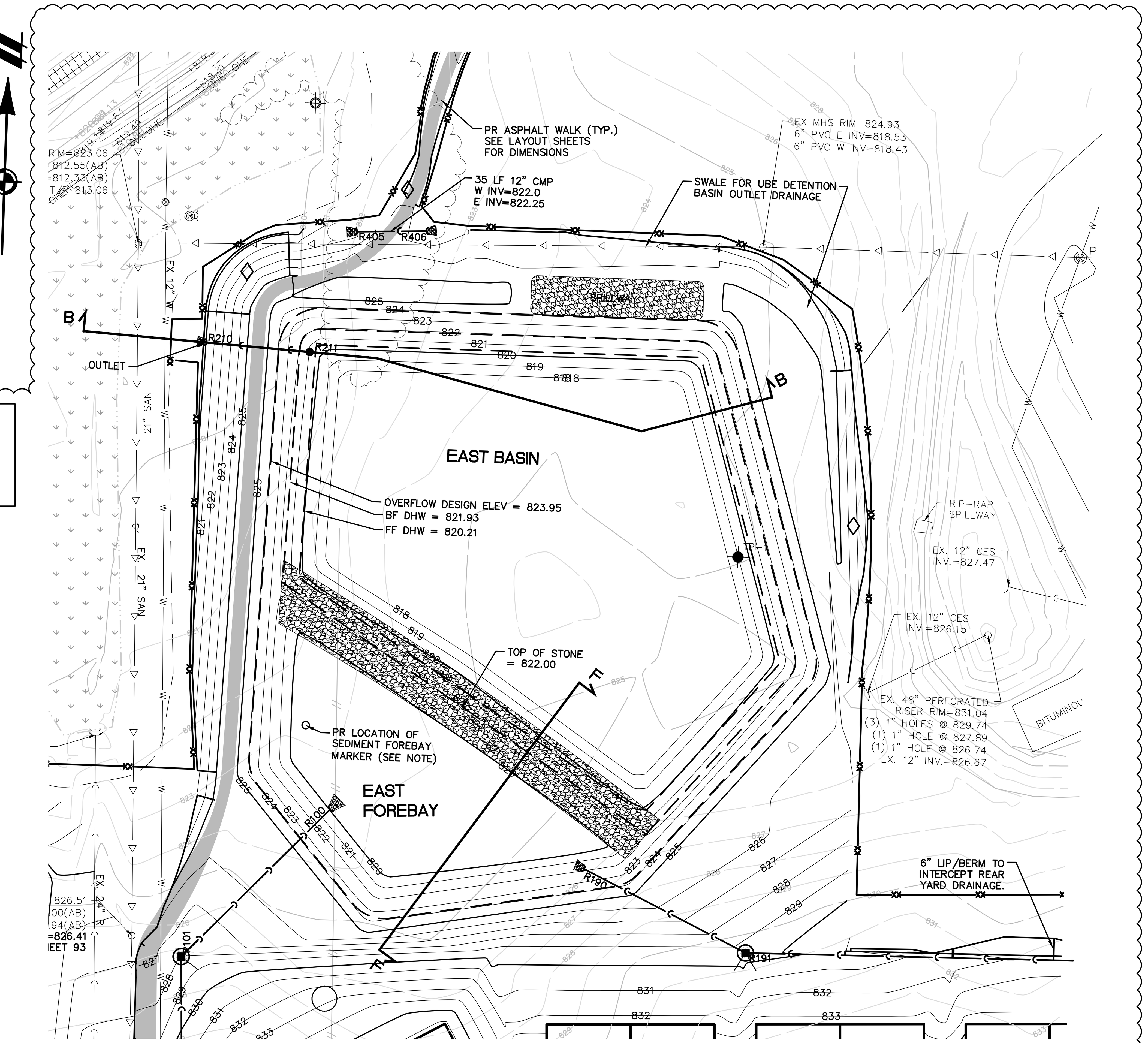
Drainage Area, A =		28.7	ac
C-Factor (C) =		0.67	
Time of Conc. (T) =		31	min
Intensity (I)	I = 275/(T+25)	4.91	in/hr
Design Flow (Q) =	C x I x A	94.43	cfs
Weir Coef (C)=		3.367	
Invert of Weir =		824.5	
Height of Weir (H) =		0.5	
Min. Width of Weir (B) =		79.3	ft
L = Q/(C x H^(3/2))			

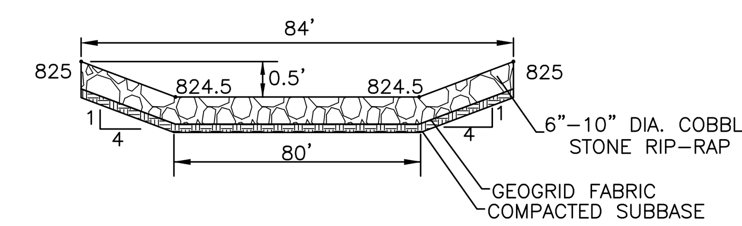
LEGEND

Symbol	Description
801	EXISTING 1' CONTOUR
800	EXISTING 5' CONTOUR
	EXISTING WETLAND LINE
	BOUNDARY LINE
C	EXISTING STORM
W	EXISTING WATER MAIN
▷	EXISTING SANITARY
G	EXISTING GAS
	EXISTING RAILROAD
801	PROPOSED 1' CONTOUR
800	PROPOSED 5' CONTOUR
	PROPOSED STORM SEWER
■	PROPOSED CATCH BASIN/INLET
	PROPOSED OUTLET
890	PROPOSED ELEVATION
	PROPOSED SILT FENCE
□	EXISTING CATCH BASIN/INLET
	EXISTING WETLAND
	PROPOSED RIP-RAP

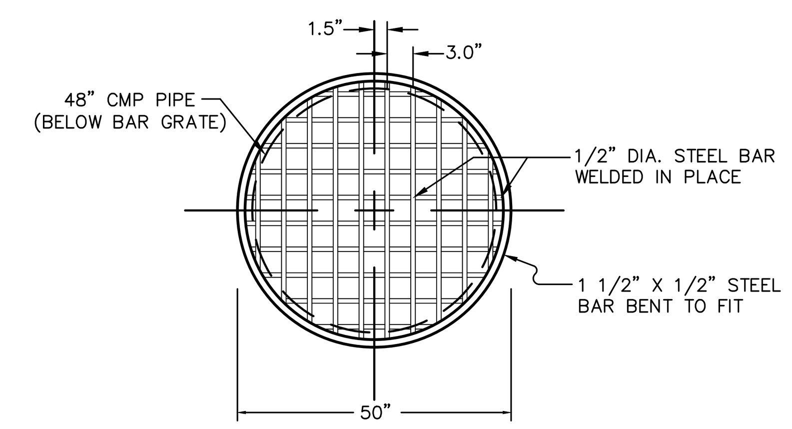
PHASE 4 NOTE: ORIGINAL APPROVED DESIGN PROVIDED FOR REFERENCE, NO CHANGE PROPOSED

NOTE:
PROVIDE PERMANENT VERTICAL DEPTH MARKER (NON-CORROSIVE) TO MEASURE SEDIMENT DEPOSITION WITHIN FOREBAY. PLACE HORIZONTAL MARKING AT EL 821.0 (LESSER OF 12-INCHES AND FOREBAY VOLUME ELEVATION) TO INDICATE SEDIMENT REMOVAL IS NECESSARY.





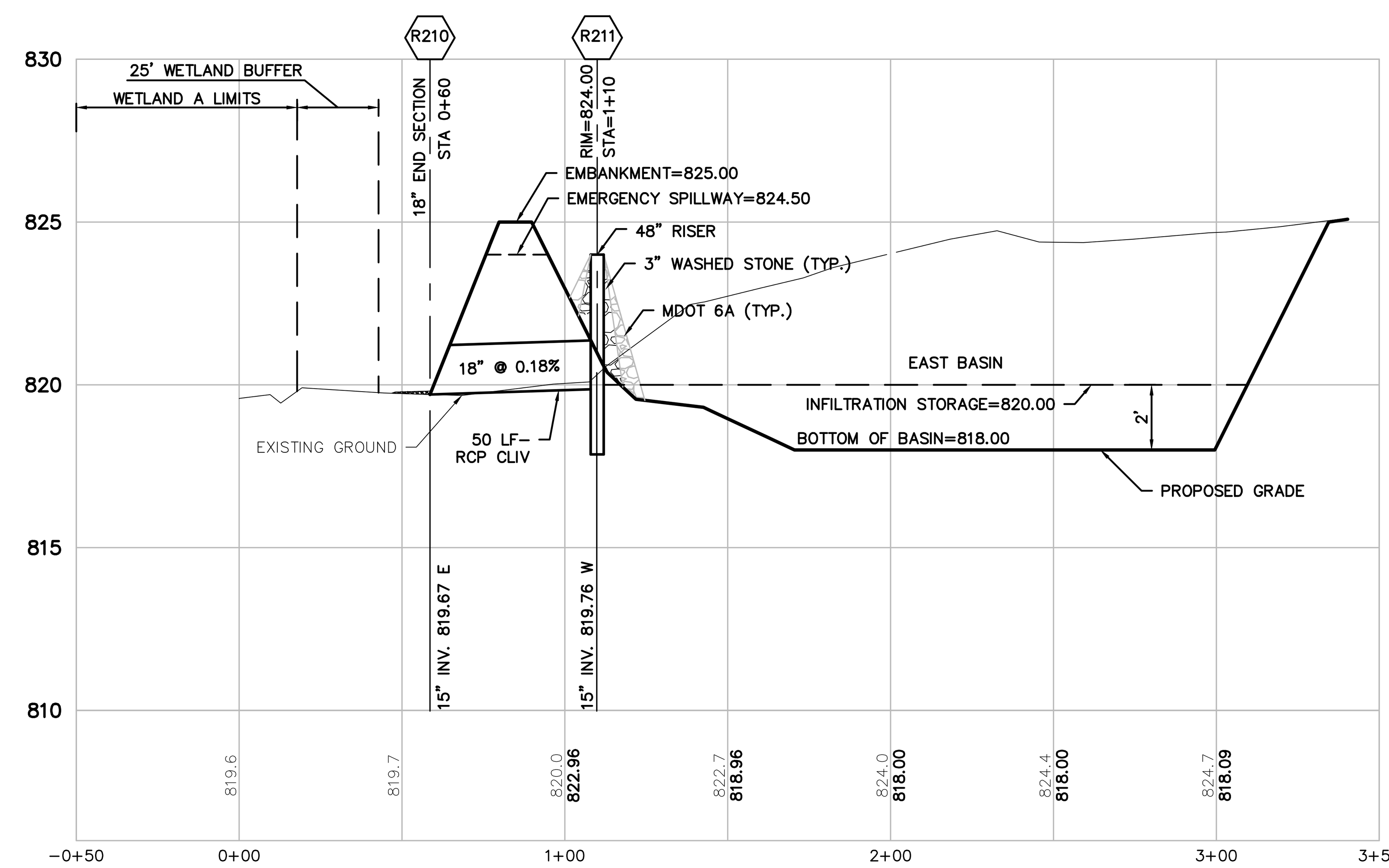
ARMORED BASIN OVERFLOW WEIR
NO SCALE



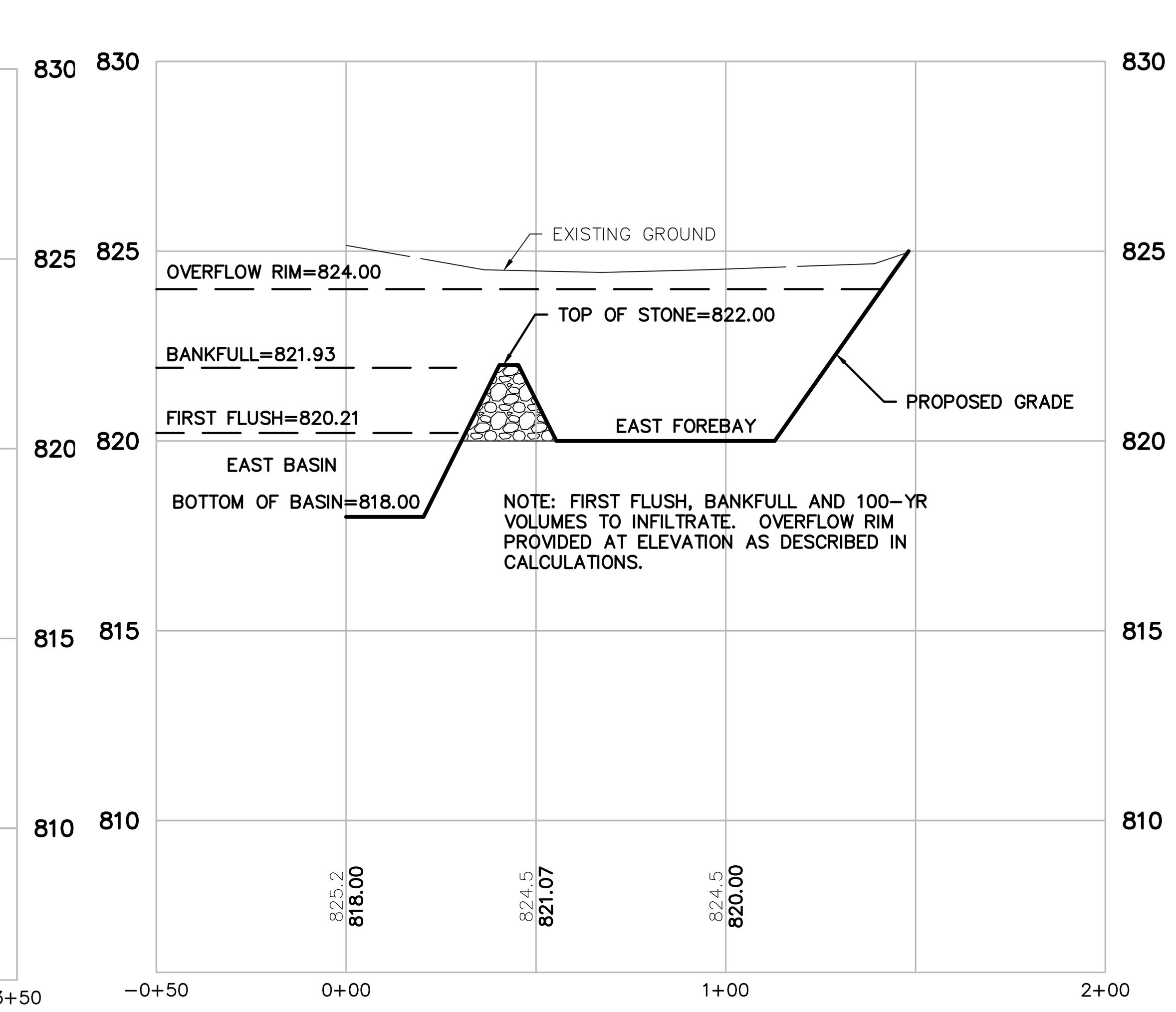
NOTE:
1. BAR GRATE IS TO BE REMOVABLE
2. APPROXIMATE WEIGHT OF GRATE IS 70 LBS.

BAR GRATE DETAIL
NO SCALE

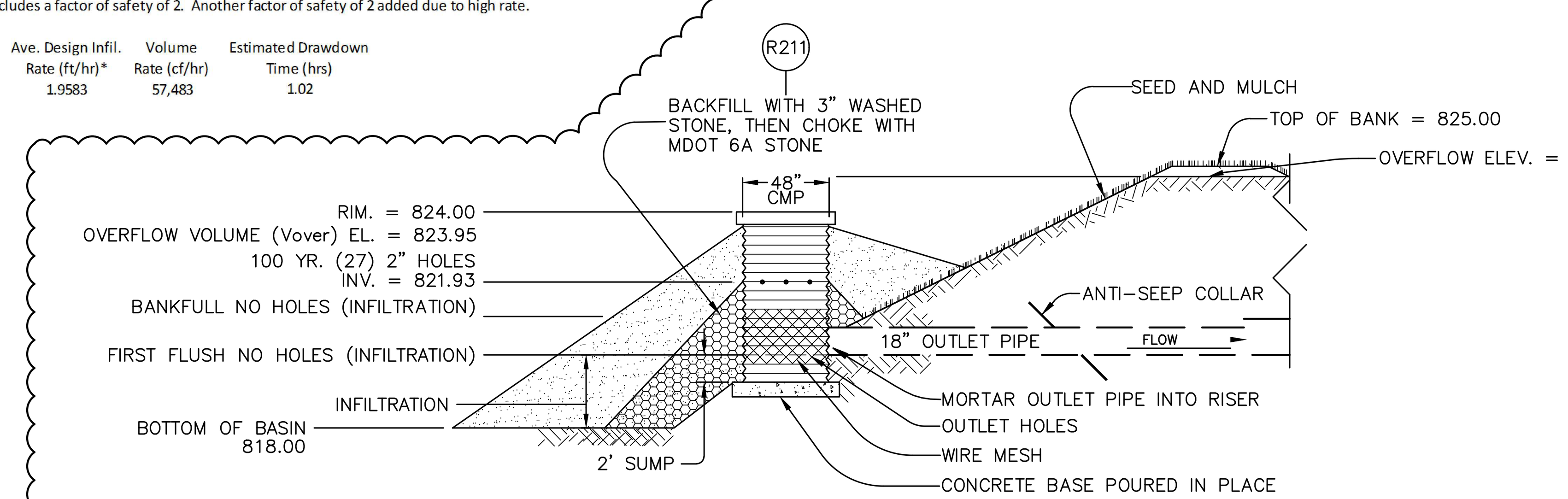
NOTE:
EAST BASIN/FOREBAY CONSTRUCTED IN PHASE 1



SECTION B-B
VERT: 1"=4'
HORZ: 1"=40'



SECTION F-F
VERT: 1"=4'
HORZ: 1"=40'



EAST BASIN OUTLET SCHEMATIC
NO SCALE

PHASE 4 NOTE: ORIGINAL APPROVED DESIGN PROVIDED FOR REFERENCE, NO CHANGE PROPOSED

DETENTION BASIN – PHASE 4 SUMMARY:
THE ORIGINAL APPROVED PHASE 1 DETENTION BASIN WAS DESIGNED TO MANAGE STORMWATER FROM THE FIRST FLUSH, BANK FULL, AND 100-YEAR STORM EVENTS VIA INFILTRATION INTO THE GROUND DUE TO THE GRANULAR SOILS AND DESIGN INFILTRATION RATES RECOMMENDED BY THE GEOTECHNICAL ENGINEER AT THE BASIN LOCATION. THE PROPOSED OUTLET CONTROL STRUCTURE WAS ADDED AS A SECONDARY MEASURE TO PROVIDE A RESTRICTED OUTLET FROM THE BASIN IN EXTREME CIRCUMSTANCES. THE SLIGHT INCREASE IN IMPERVIOUS AREA FOR THE NEW PHASE 4 RETAIL AREA RESULTS IN A SLIGHT INCREASE IN COMPUTED RUNOFF VOLUME, HOWEVER THE NEW COMPUTED RUNOFF VOLUME FOR THE DETENTION BASIN AREA REMAINS LESS THAN THE COMPUTED INFILTRATION VOLUME PROVIDED AT THE BASIN. THEREFORE NO CHANGES TO THE BASIN SIZE OR OUTLET CONTROL STRUCTURE ARE PROPOSED. BELOW IS A SUMMARY TABLE SHOWING THE ORIGINAL AND REVISED VOLUMES FOR COMPARISON:

	ORIGINAL APPROVED	REVISED FOR PHASE 4	
FIRST FLUSH:	69,801 CF	69,801 CF	(COMPUTED 'C' OF 0.67 DID NOT CHANGE)
BANK FULL:	136.351 CF	137,816 CF	(1% INCREASE)
100-YEAR:	368,148 CF	370,405 CF	(0.6% INCREASE)
INFILTRATION PROVIDED:	403,604 CF	403,604 CF	(INFILTRATION PROVIDED EXCEEDS TOTAL DESIGN VOLUMES)

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SECTION 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN
DETENTION BASIN – PHASE 1 (EAST)

DATE DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR.	MB	CH.	CK
P.M.	MB		
BOOK			
JOB	13001886.10		
SHEET NO.	9		

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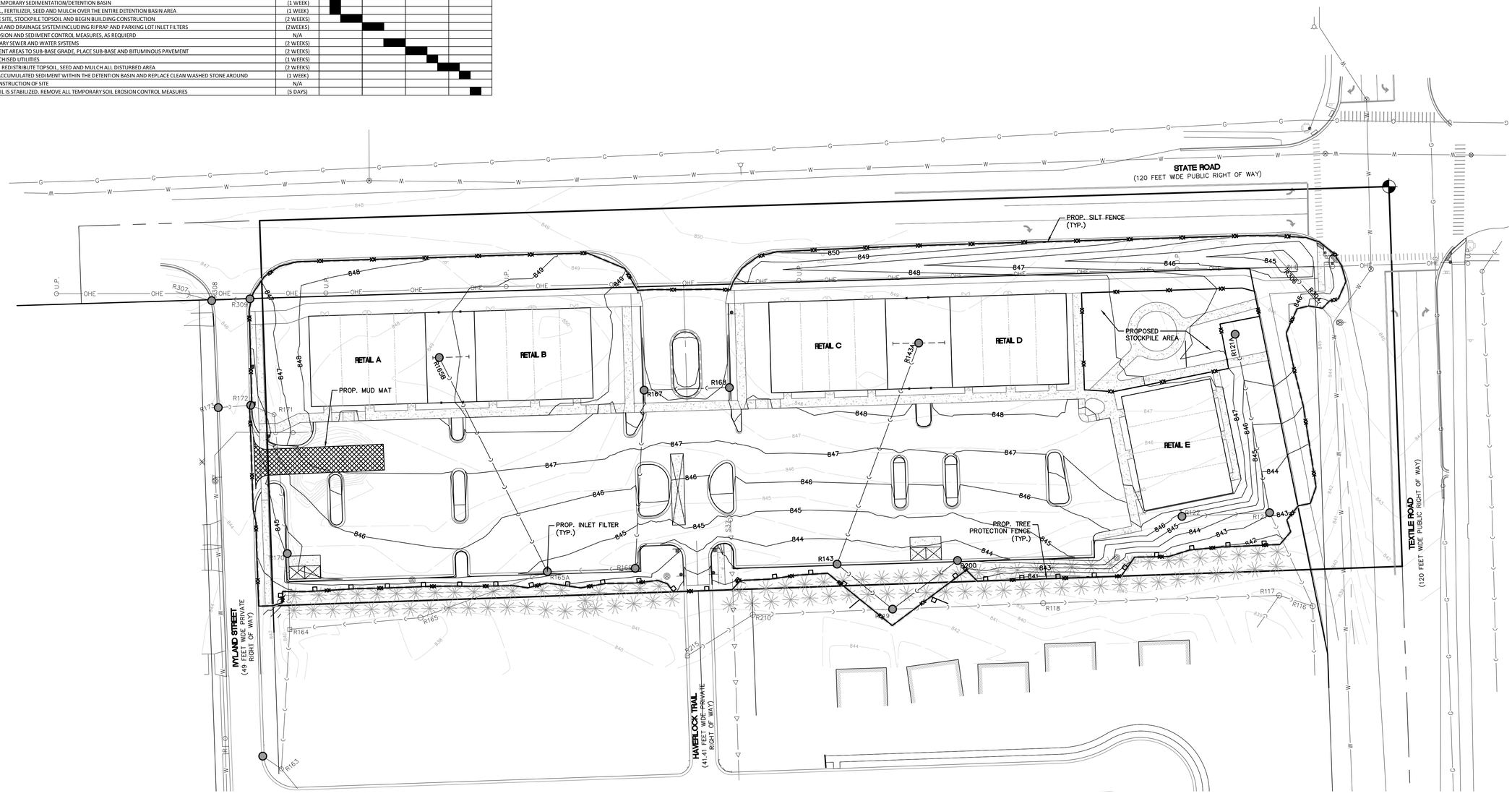
SOIL EROSION CONTROL SEQUENCE AND APPROXIMATE SCHEDULE

#	SESC SEQUENCE TASK NAME	Est. Duration	Month 1	Month 2	Month 3	Month 4
1	INSTALL SEDIMENT FENCE AND TREE PROTECTION PRIOR TO ANY GRADING OPERATION	(1 WEEK)				
2	INSTALL MUD-TRACKING PAD	(1 WEEK)				
3	CONSTRUCT TEMPORARY SEDIMENTATION/DETENTION BASIN	(1 WEEK)				
4	PLACE TOPSOIL, FERTILIZER, SEED AND MULCH OVER THE ENTIRE DETENTION BASIN AREA	(1 WEEK)				
5	ROUGH GRADE SITE, STOCKPILE TOPSOIL AND BEGIN BUILDING CONSTRUCTION	(2 WEEKS)				
6	INSTALL STORM AND DRAINAGE SYSTEM INCLUDING RIPRAP AND PARKING LOT INLET FILTERS	(2WEEKS)				
7	MAINTAIN EROSION AND SEDIMENT CONTROL MEASURES, AS REQUIERD	N/A				
8	INSTALL SANITARY SEWER AND WATER SYSTEMS	(2 WEEKS)				
9	BRING PAVEMENT AREAS TO SUB-BASE GRADE, PLACE SUB-BASE AND BITUMINOUS PAVEMENT	(2 WEEKS)				
10	INSTALL FRANCHISED UTILITIES	(1 WEEKS)				
11	FINISH GRADE, REDISTRIBUTE TOPSOIL, SEED AND MULCH ALL DISTURBED AREA	(2 WEEKS)				
12	REMOVE ANY ACCUMULATED SEDIMENT WITHIN THE DETENTION BASIN AND REPLACE CLEAN WASHED STONE AROUND	(1 WEEK)				
13	COMPLETE CONSTRUCTION OF SITE	N/A				
14	INSURE ALL SOIL IS STABILIZED. REMOVE ALL TEMPORARY SOIL EROSION CONTROL MEASURES	(5 DAYS)				



LONG TERM STORM WATER & BUDGET

1. THE CONDOMINIUM ASSOCIATION SHALL BE FIRST IN LINE OF RESPONSIBILITY FOR MAINTAINING ALL OF ROAD STORM SEWERS AND DETENTION BASINS
2. A CHAPTER 18 DRAINAGE DISTRICT WILL BE ESTABLISHED FOR THE ENTIRE PROJECT GIVING THE WCWRC STATUTORY RESPONSIBILITY FOR ULTIMATE RESPONSIBILITY

TASKS	COMPONENTS: PAVED AREAS	PERVIOUS AREAS	RIP-RAP	STORM DRAINAGE SYSTEM						SCHEDULE	ANNUAL COST
INSPECT FOR SEDIMENT ACCUMULATION	X		X	X						SEMI-ANUALLY/AS NEEDED*	$100.00
REMOVAL OF SEDIMENT ACCUMULATION	X		X	X						5-10 YRS/AS NEEDED*	$200.00
INSPECT FOR FLOATABLES AND DEBRIS				X						ANNUALLY	$100.00
CLEANING FOR FLOATABLES AND DEBRIS				X						ANNUALLY	$300.00
INSPECTION FOR EROSION		X	X							ANNUALLY/AFTER MAJOR STORMS	$100.00
REESTABLISH PERMANENT VEGETATION ON ERODED SLOPES		X								AS NEEDED	$300.00
CLEAN DRIVES AND PARKING LOTS	X									ANNUALLY	$500.00
MOWING		X								0-2 TIMES PER YEAR	$400.00
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY A PROFESSIONAL ENGINEER REPORTING TO THE OWNER)			X	X						ANNUALLY	$100.00
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED BY ANNUAL WET WEATHER INSPECTION			X	X						AS NEEDED	$100.00
KEEP RECORDS OF ALL INSPECTIONS AND MAINTENANCE ACTIVITIES AND REPORT TO PROPERTY OWNER										ANNUALLY	$50.00
KEEP RECORDS OF ALL COSTS FOR INSPECTIONS, MAINTENANCE AND REPAIRS. REPORT TO PROPERTY OWNER										ANNUALLY	$50.00
PROPERTY OWNER REVIEWS COST EFFECTIVENESS OF THE PREVENTATIVE MAINTENANCE PROGRAM AND MAKES NECESSARY ADJUSTMENTS										ANNUALLY	$50.00
OWNER TO HAVE A PROFESSIONAL ENGINEER CARRY OUT EMERGENCY INSPECTIONS UPON IDENTIFICATION OF SEVERE PROBLEMS										AS NEEDED	$150.00

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

SOIL EROSION CONTROL MAINTENANCE TASKS AND SCHEDULE

DURING CONSTRUCTION

TO BE PERFORMED BY CONTRACTOR

	COMPONENTS: PAVED AREAS	PERVIOUS AREAS	RIP-RAP/SILT FENCE	STORM DRAINAGE SYSTEM			SCHEDULE
INSPECT FOR SEDIMENT ACCUMULATION	X		X	X			WEEKLY
REMOVAL OF SEDIMENT ACCUMULATION	X		X	X			AS NEEDED* AND PRIOR TO TURNOVER
INSPECT FOR FLOATABLES AND DEBRIS				X			QUARTERLY
CLEANING FOR FLOATABLES AND DEBRIS				X			QUARTERLY AND AT TURNOVER
INSPECTION FOR EROSION		X	X				WEEKLY
REESTABLISH PERMANENT VEGETATION ON ERODED SLOPES		X					AS NEEDED* AND PRIOR TO TURNOVER
CLEAN DRIVES AND PARKING LOTS	X						WEEKLY OR AS DETERMINED BY PERMITTING AGENCY
WATER DISTURBED AREAS TO PROVIDE DUST CONTROL	ALL DISTURBED AREAS OF SITE						AS NEEDED
INSPECT STRUCTURAL ELEMENTS DURING WET WEATHER AND COMPARE TO AS-BUILT PLANS (BY A PROFESSIONAL ENGINEER REPORTING TO THE OWNER)			X	X			ANNUALLY AND AT TURNOVER
MAKE ADJUSTMENTS OR REPLACEMENTS AS DETERMINED			X	X			AS NEEDED

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

SESC NOTES:

1. FOR SESC DETAILS, SEE SHEET 15
2. FOR CURB CATCH BASINS, BEAVER DAMS ARE TO BE USED IN ADDITION TO SILT SACKS, SEE SHEET 13 FOR DETAIL
3. SILT FENCE SHALL BE INSTALLED AND MAINTAINED AROUND PERIMETER OF SUCH STOCKPILE IF THE STOCK PILE IS LARGE AND IS EXPECTED TO BE ON-SITE FOR A PERIOD OF TIME

LEGEND

BOUNDARY LINE
EXIST. EASEMENT
SECTION LINE
BOUNDARY/PROPERTY LINE
EXIST. CONTOUR
EXIST. CURB AND GUTTER
EXIST. FENCE
EXIST. GRAVEL
EXIST. BUILDING
EXIST. OVERHEAD ELEC. LINE
EXIST. OVERHEAD TELE. LINE
EXIST. UNSPECIFIED UTILITIES
EXIST. GAS
EXIST. STORM
EXIST. WATER MAIN
EXIST. SANITARY
EXIST. CULVERT
EXIST. CATCH BASIN/INLET
EXIST. HYDRANT
EXIST. VALVE
EXIST. SANITARY SEWER

PROPOSED R.O.W.
PROP. BUILDING
PROP. BACK OF CURB
PROP. SPILL OUT CURB
PROP. ASHPALT
PROP. WALK
PROP. CONTOUR
PROP. STORM SEWER
PROP. END SECTION
PROP. CATCH BASIN/INLET
PROP. LIMITS OF DISTURBANCE
PROP. SILT FENCE
PROP. TREE PROTECTION FENCE
PROP. INLET FILTER
PROP. MUD MAT

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

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CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN

SOIL EROSION & SEDIMENT CONTROL PLAN

DATE
DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 10	

Z:\13001886\DWG\PLANS SITE\SITE PLAN - RETAIL\13001886SP-07-SESC.DWG 5/2/2019 9:00 AM MICHAEL BAKER

Track	: 82.9
Lock to Lock Time	: 6.0
Steering Angle	: 45.0

T-2 FIRE TRUCK DETAIL

NO SCALE

NOTES:

PROPOSED WATER MAIN IS 8-INCH DIAMETER UNLESS OTHERWISE NOTED.

LEGEND

- BOUNDARY LINE
- EXIST. EASEMENT
- SECTION LINE
- BOUNDARY/PROPERTY LINE
- EXIST. CONTOUR
- EXIST. CURB AND GUTTER
- EXIST. FENCE
- EXIST. GRAVEL
- EXIST. BUILDING
- EXIST. OVERHEAD ELEC. LINE
- EXIST. WATER MAIN
- EXIST. HYDRANT
- EXIST. VALVE
- PROPOSED R.O.W.
- PROP. BUILDING
- PROP. PARKING STRIPE
- PROP. BACK OF CURB
- PROP. ASHPALT
- PROP. WATER MAIN
- PROP. WATER VALVE
- PROP. FIRE HYDRANT
- EX. ASPH.
- PROP. ASPH.
- PROP. HYDRANT COVER (300' RADIUS)
- PROP. BUILDING INGRESS/EGRESS

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FIRE PROTECTION PLAN

DATE
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3/11/19 PER TWP
5/02/19 PER TWP

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SCALE 0 20 40
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DR.	MB	CH.	CK
P.M.	MB		
BOOK			
JOB	13001886.10		
SHEET NO.	11		

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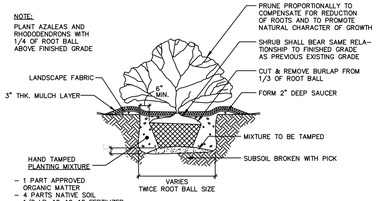
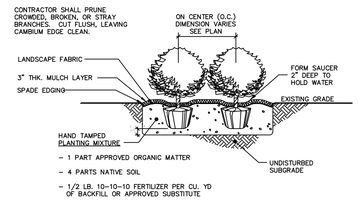


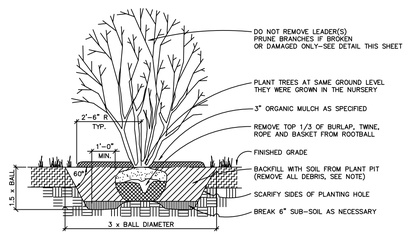
BALLED AND BURLAPPED SHRUB PLANTING DETAIL

SCALE: NTS



CONTAINER SHRUB PLANTING DETAIL

SCALE: NTS

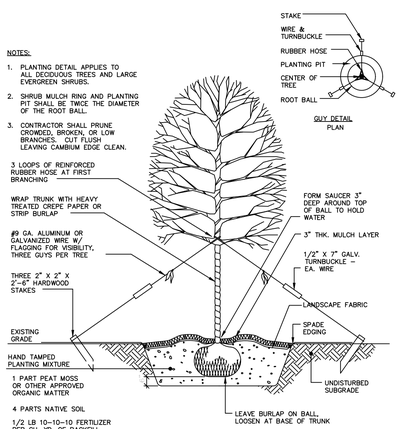


GENERAL NOTES:

IF ROOTBALL IS WRAPPED IN NON–BIODEGRADEABLE BURLAP, REMOVE ENTIRE WRAP AFTER PLACED IN PIT. WHEN BACKFILLING PLANT PIT, PLACE PLANTING SOIL IN TWO LIFTS. AFTER FIRST LIFT, PUDDLE SOIL IN WITH WATER TO REMOVE ALL AIR POCKETS. PLACE SECOND LIFT AND REPEAT. CONTINUE TO PUDDLE AND FILL AS NECESSARY.

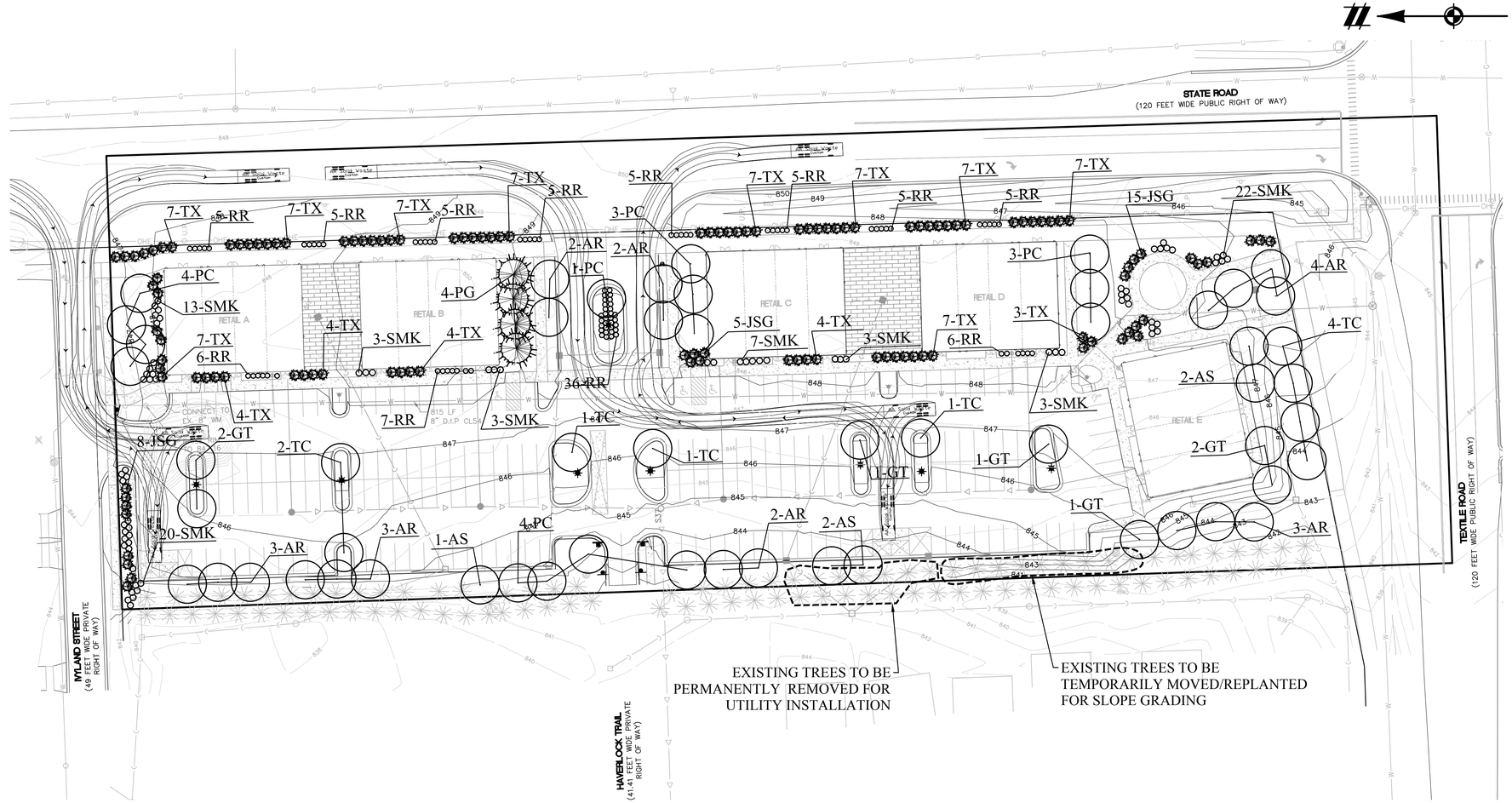
MULTI–STEMMED TREE PLANTING DETAIL

SCALE: NTS



DECIDUOUS CANOPY TREE PLANTING DETAIL (2" cal. or greater)

SCALE: NTS



LANDSCAPE NOTES

1. THE LANDSCAPE CONTRACTOR SHALL BE RESPONSIBLE FOR VERIFYING LOCATION OF ALL UNDERGROUND AND OVERHEAD UTILITIES.
2. LANDSCAPING OPERATIONS, INCLUDING PLANTING OF TREES AND SHRUBS, SHALL NOT DAMAGE ANY UTILITY OR INTERRUPT ANY UTILITY SERVICE, AND SHALL NOT DAMAGE OR CREATE A NUISANCE AFFECTING ADJACENT PROPERTY, PUBLIC STREETS, OR SIDEWALKS.
3. PLANT AND GRASS MATERIALS SHALL BE INSTALLED ACCORDING TO GENERALLY ACCEPTED PLANTING PROCEDURES.
4. ALL PARKING LOT ISLANDS, BOULEVARDS, OPEN OR OTHERWISE DISTURBED AREAS THAT ARE NOT SPECIFIED WITH OTHER PLANTING, PAVING OR SEED MIXTURES SHALL BE PLANTED WITH A STANDARD PERMANENT GRASS SEED MIXTURE TO INDUSTRY STANDARDS.
5. LANDSCAPING MATERIALS THAT ARE UNSIGHTLY, DEAD, DYING, OR THAT BECOME UNHEALTHY BECAUSE OF DAMAGE, NEGLECT, DRAINAGE PROBLEMS, DISEASE, INSECT INFESTATION, OR OTHER CAUSES SHALL BE REPLACED WITHIN ONE YEAR, OR THE NEXT PLANTING PERIOD, WHICHEVER OCCURS FIRST. REPLACEMENT MATERIALS SHALL MEET ALL STANDARDS OF THE ORIGINAL INSTALLATION.
6. ALL LANDSCAPED AREAS SHALL BE PROVIDED WITH AN ADEQUATE WATER SUPPLY. THE PROPERTY OWNER (OR ANY APPLICABLE OWNER'S ASSOCIATION) SHALL BE RESPONSIBLE TO ENSURE THE PROPER CARE AND MAINTENANCE OF LANDSCAPE AREAS, INCLUDING KEEPING ALL LANDSCAPE MATERIALS IN A HEALTHY AND GROWING STATE. ALL LANDSCAPE ELEMENTS SUCH AS, BUT NOT LIMITED TO, FENCES, SCREENS, WALLS, OR LIGHTING SHALL BE KEPT IN GOOD REPAIR.
7. TOPSOIL REMOVED DURING CONSTRUCTION SHALL BE STOCKPILED IN AN APPROPRIATE MANNER TO PREVENT EROSION, AND SHALL BE REDISTRIBUTED ON RE–GRADED SURFACES TO BE LANDSCAPED, TO PROVIDE A MINIMUM OF FOUR INCHES OF EVEN COVER. THE TOPSOIL SHALL THEN BE PERMANENTLY STABILIZED BY GRASS, GROUND COVER, OR OTHER PLANTINGS.
8. NO PLANT MATERIAL SHALL BE PLANTED CLOSER THAN 4 FEET FROM ANY PROPERTY LINE.
9. REMOVE ALL TWINE, WIRE, NURSERY GUARDS, TAGS AND INORGANIC MATERIAL FROM ROOT BALL. PEEL BACK THE BURLAP FROM EARTH BALLS AND REMOVE ANY BURLAP, TWINE OR WIRE AROUND THE TRUNK FLARE AND ABOVE.
10. ALL PLANTING AREAS ARE TO BE EXCAVATED OF ALL BUILDING / CONSTRUCTION AND FILL MATERIALS AND BACKFILLED WITH GOOD MEDIUM TEXTURED PLANTING SOIL. SEEDING AREAS ARE TO BE TREATED WITH 4" OF NEW TOPSOIL AND ROTOTILLED OR OTHERWISE SCARIFIED TO BREAK UP COMPACTION AT LEAST 8" BELOW THE TOPSOIL.
11. TOPSOIL SHALL BE SCREENED AND SUITABLE FOR GROWING VEGETATION AND MEET AT A MINIMUM ASTM D–5268 AND MDOT STANDARD SPECIFICATIONS FOR CONSTRUCTION.
12. RECOMMENDED PLANTING DATES ARE MARCH 15 TO JUNE 15 AND SEPTEMBER 15 TO NOVEMBER 15.

PLANT LIST & LANDSCAPING

CANOPY TREES

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
19	AR	ACER RUBRUM	RED MAPLE	2.5" CAL.	B & B
5	AS	ACER SCCHARUM 'LEGACY'	LEGACY SUGAR MAPLE	2.5" CAL.	B & B
15	PC	PYRUS CALLERYANA 'CHANTICLEER'	CHANTICLEER PEAR	2.5" CAL.	B & B
9	TC	TILIA CORDATA	LITTLELEAF LINDEN	2.5" CAL.	B & B
7	GT	GLEDITSIA TRIACANTHOS VINERMIS	HONEY LOCUST	2.5" CAL.	B & B

EVERGREEN TREES

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
4	PG	PICEA GLAUCA	WHITE SPRUCE	6–7' HT.	B&B

SHRUBS

QTY	KEY	BOTANICAL NAME	COMMON NAME	SIZE	NOTES
28	JSG	JUNIPERUS 'SEA GREEN'	SEA GREEN JUNIPER	24" HT.	5 GAL CONT.
89	TX	TAXUS X MEDIA 'WARDII'	WARD'S YEW	24" HT.	B&B
74	SMK	SYRINGA 'MISS KIM'	MISS KIM LILAC	24" HT.	5 GAL CONT.
95	RR	ROSA RADRAZZ	KNOCKOUT ROSE	24" O.C.	CONT.

LEGEND

BOUNDARY LINE	PROPOSED EASEMENT
EXIST. EASEMENT	PROPOSED R.O.W.
SECTION LINE	PROP. SETBACK
BOUNDARY/PROPERTY LINE	PROP. BUILDING
EXIST. CONTOUR	PROP. PARKING STRIPE
EXIST. CURB AND GUTTER	PROP. CURB AND GUTTER
EXIST. FENCE	PROP. ASHPALT
EXIST. GRAVEL	PROP. LOT LINE
EXIST. BUILDING	PROP. PARKING STRIPE
EXIST. OVERHEAD ELEC. LINE	PROP. CONTOUR
EXIST. OVERHEAD TELE. LINE	PROP. SILT FENCE
EXIST. UNSPECIFIED UTILITIES	PROP. STORM SEWER
EXIST. GAS	PROP. SANITARY
EXIST. STORM	PROP. WATER MAIN
EXIST. WATER MAIN	PROP. END SECTION
EXIST. SANITARY	PROP. CATCH BASIN/INLET
EXIST. CULVERT	PROP. WATER VALVE
EXIST. CATCH BASIN/INLET	PROP. FIRE HYDRANT
EXIST. HYDRANT	PROP. MANHOLE
EXIST. VALVE	PROP. LIGHT POLE
EXIST. SANITARY SEWER	

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

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INGLEWOOD PARK – PHASE 4
SITE PLAN

LANDSCAPING PLAN

DATE
DECEMBER 14, 2018

3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 20 40
1" = 40 FEET

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 12	

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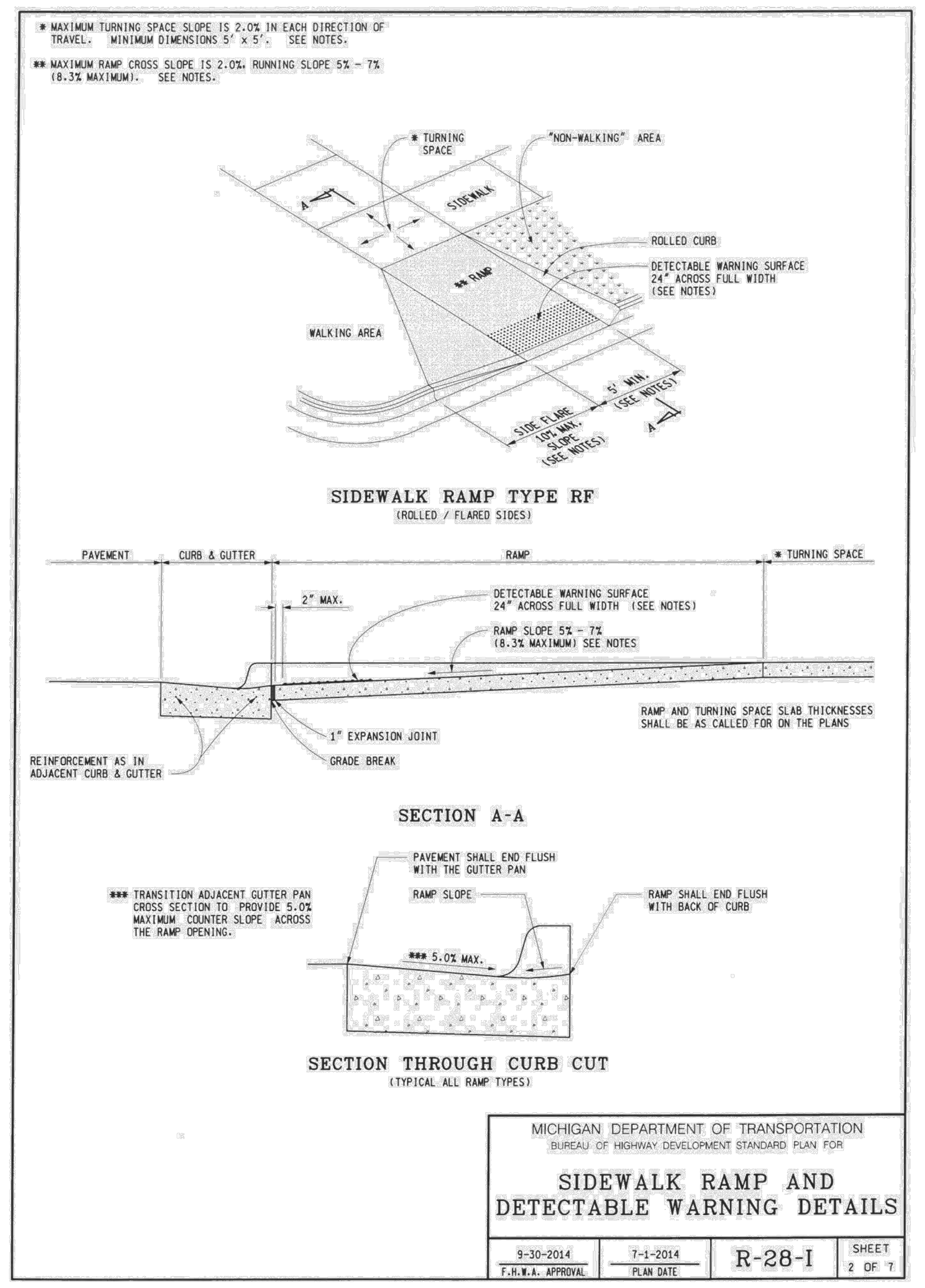
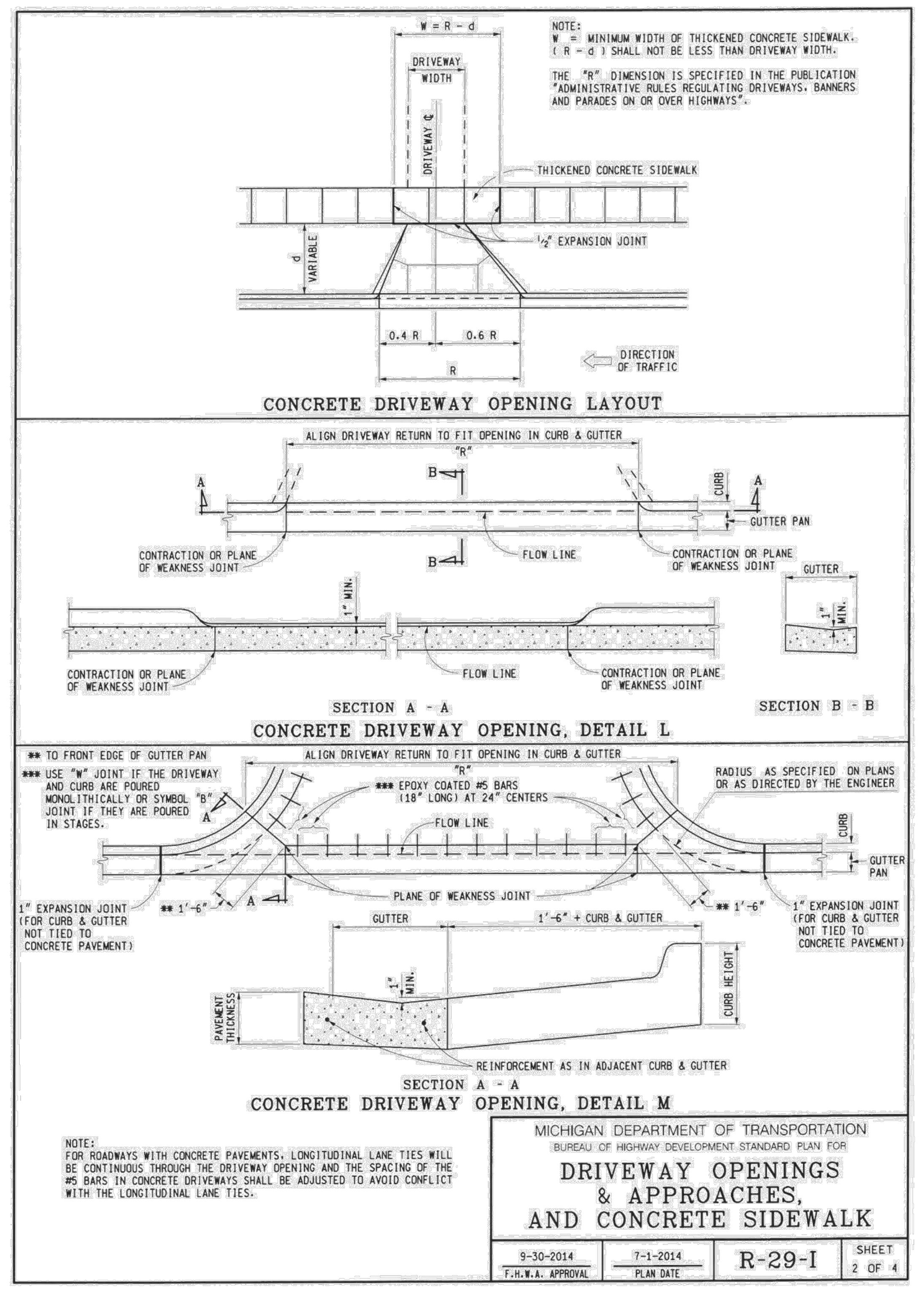
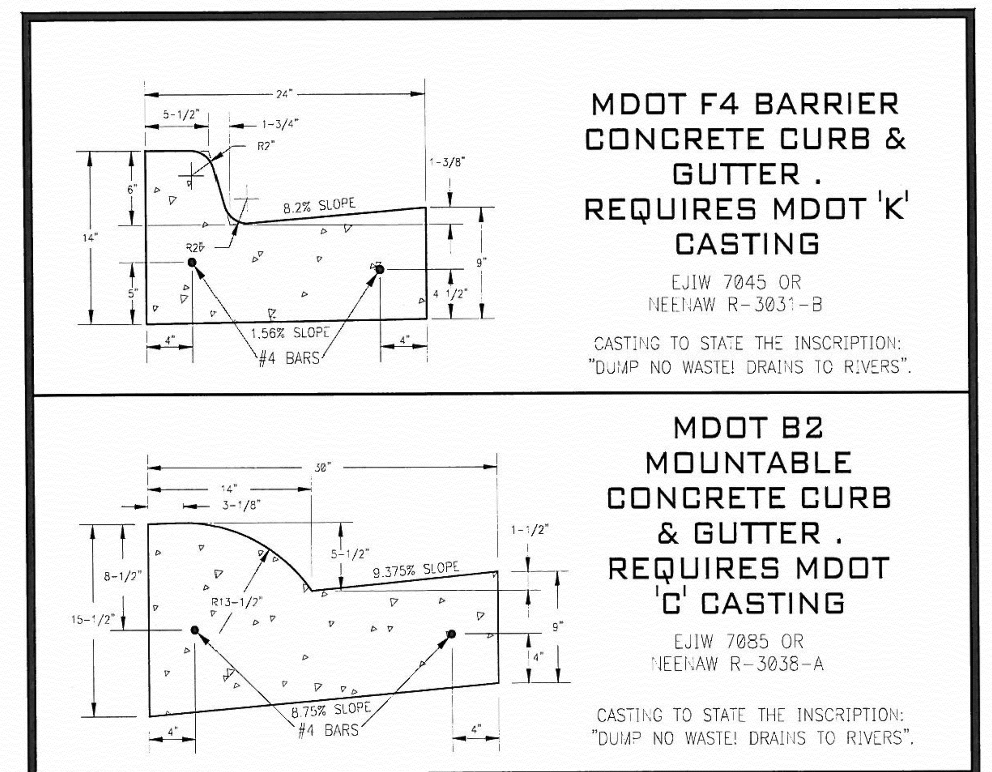






1) JOINTS SHALL BE PLACED AT RIGHT ANGLES TO THE EDGE OF CONCRETE CURB & GUTTER.

HOT MIX ASPHALT (HMA) PAVING

2) PLACE 1" FIBER JOINT FILLER AT 400' MAXIMUM INTERVALS.
3) PLACE 1" FIBER JOINT FILLER AT SPRING POINTS OR INTERSECTING STREETS.
4) PLACE 1" FIBER JOINT FILLER IN ADJACENT CONTRACTION JOINTS EACH SIDE OF INLETS AND CATCH BASINS.
5) PLACE CONTRACTION JOINTS AT 10' INTERVALS.

PORTLAND CEMENT CONCRETE (PCC) PAVING:

6) PLACE 1" FIBER JOINT FILLER OPPOSITE ALL TRANSVERSE CONTRACTION JOINTS IN PAVEMENT.
7) PLACE 1/2" FIBER JOINT FILLER IN ADJACENT CONTRACTION JOINTS ON EACH SIDE OF INLETS AND CATCH BASINS.
8) PLACE CONTRACTION JOINTS OPPOSITE ALL TRANSVERSE CONTRACTION JOINTS IN THE PAVEMENT.
9) B2 CURB & GUTTER SHALL BE USED FOR ALL ENTRANCES TO THE EXISTING ROAD, AND END AT THE INTERNAL SPRING POINT.

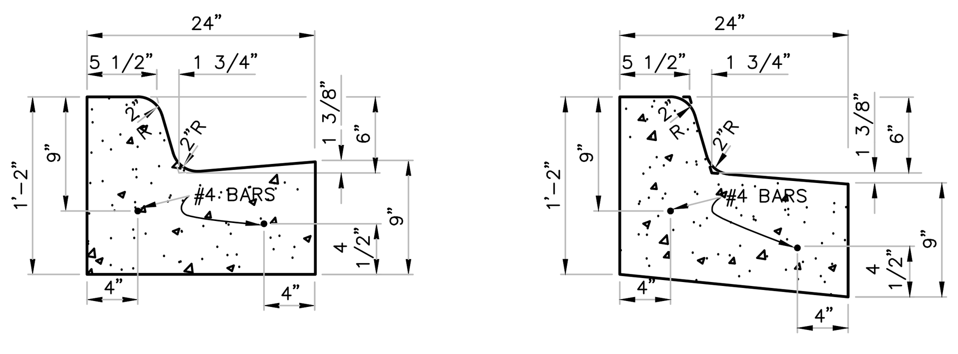
TYPICAL CURB & GUTTER CROSS-SECTION DETAILS & NOTES

WASHTENAW COUNTY ROAD COMMISSION

SCALE: N.T.S.

REV: 03-14-04

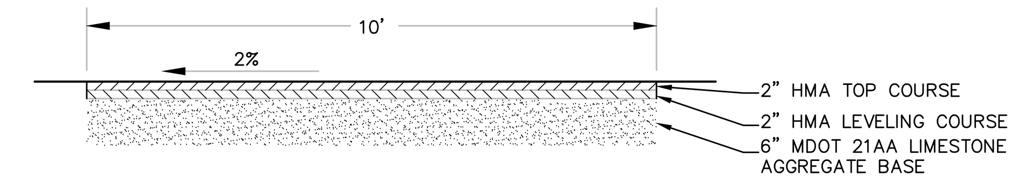
MDOT TYPE F4 CURB & GUTTER



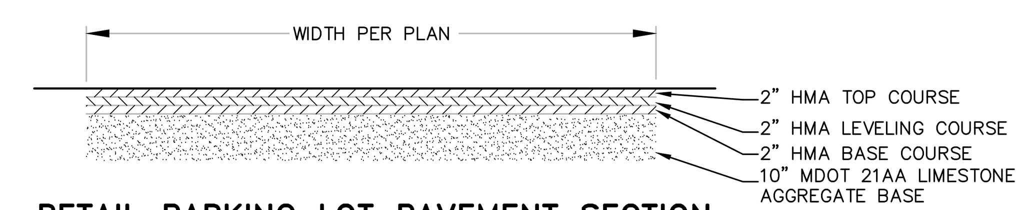
PITCH IN CURB   PITCH OUT CURB

BASE AND SUBBASE AGGREGATES TO EXTEND MINIMUM 1'-0" BEHIND BACK OF CURB.

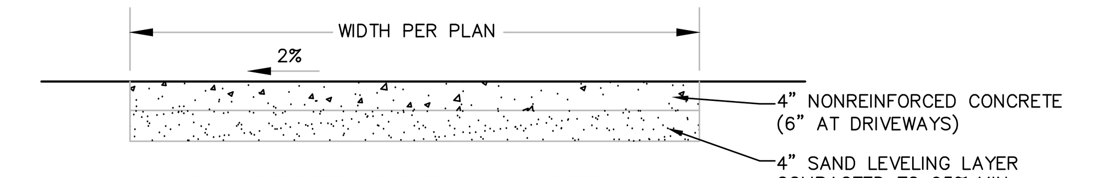
F4 CURB DETAIL
NO SCALE



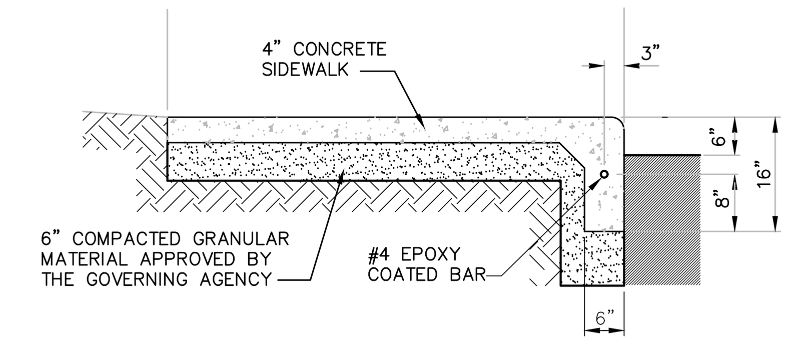
ASPHALT PATH (ALONG STATE AND TEXTILE ROADS)
NO SCALE



RETAIL PARKING LOT PAVEMENT SECTION
NO SCALE



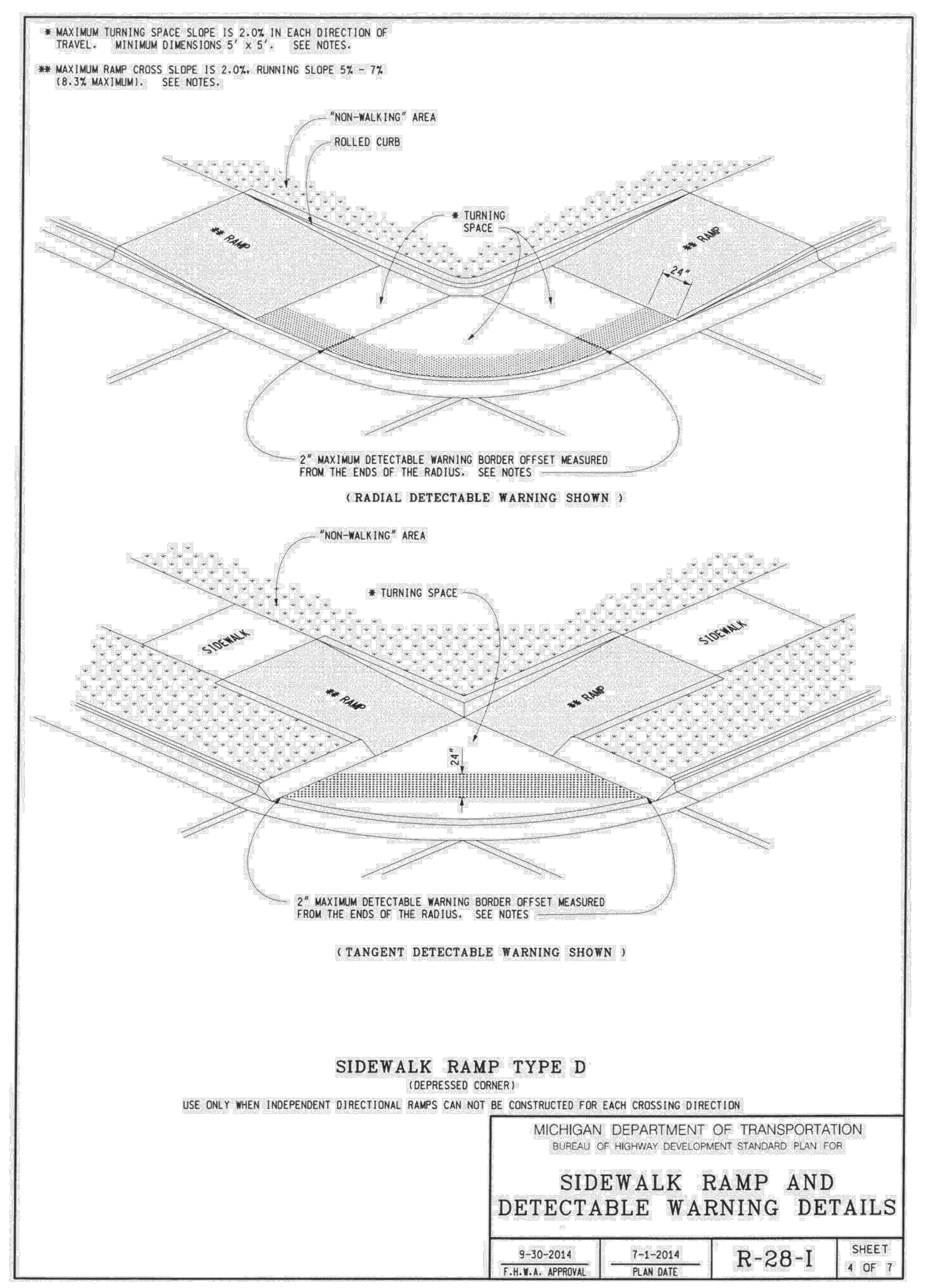
CONCRETE SIDEWALK DETAIL
NO SCALE

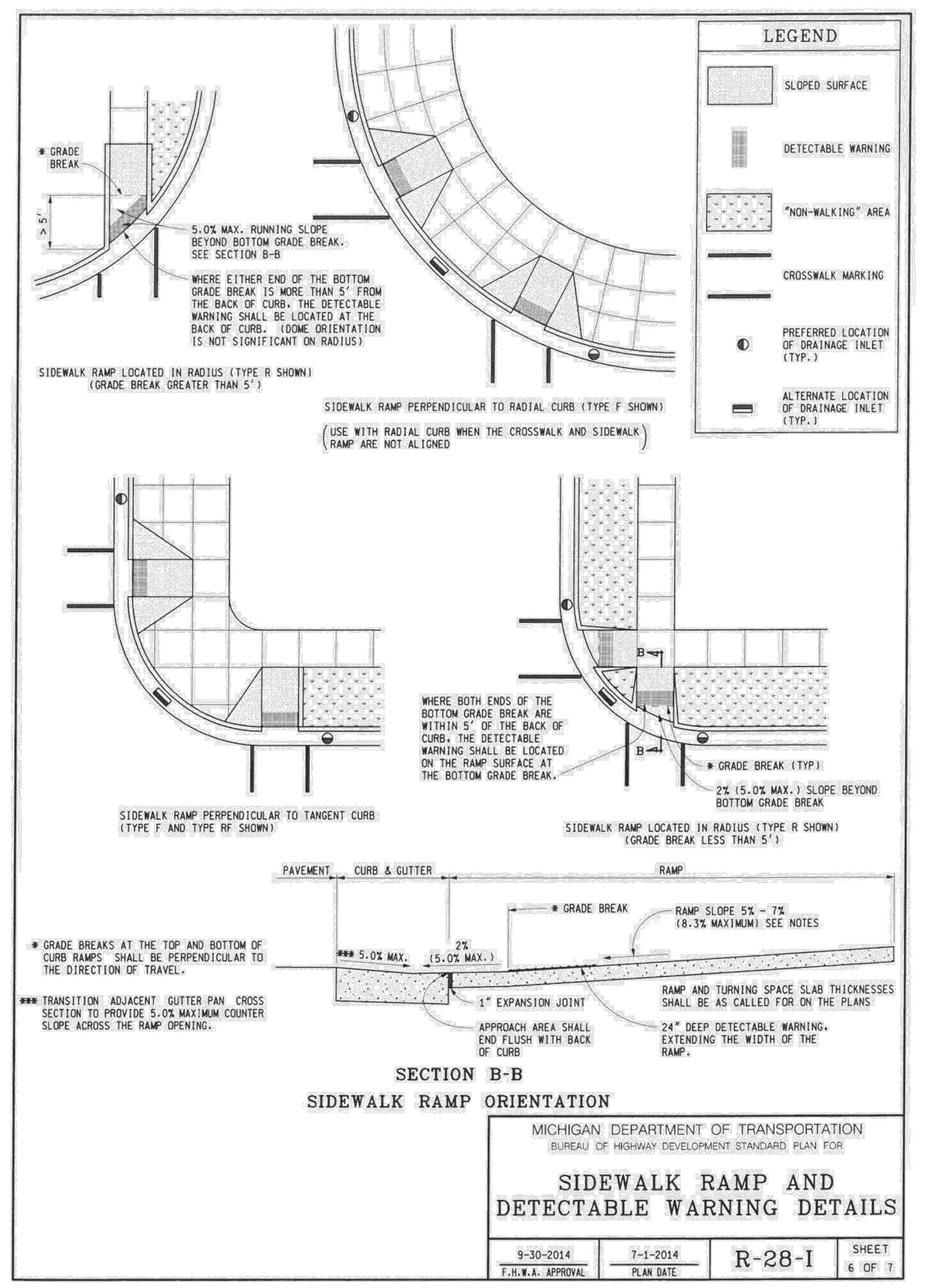


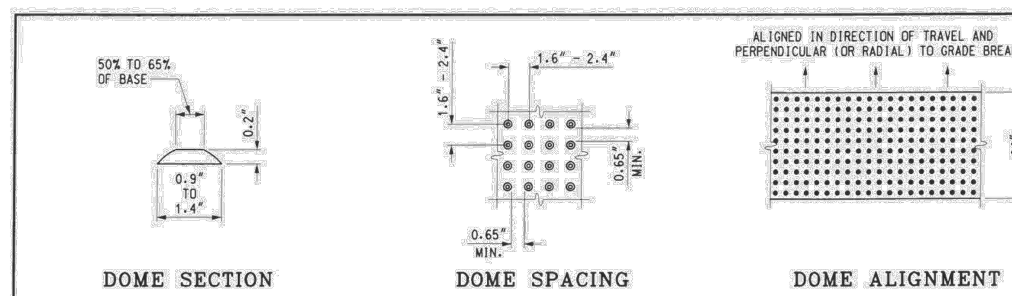
NOT APPLICABLE FOR USE WITHIN PUBLIC RIGHT-OF-WAY. FOR ONSITE USE ONLY.

WHERE THE CURB HEIGHT IS BEING REDUCED FOR ADA RAMPS THE RE-BAR SHALL HAVE A MINIMUM OF 3 INCHES OF COVER BELOW THE TOP OF CURB

INTEGRAL CURB AND SIDEWALK
NO SCALE







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.

PROVIDE TURNING SPACES WHERE PEDESTRIAN TURNING MOVEMENTS ARE REQUIRED.

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

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.

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 ½". ELONGATED OPENINGS SHALL BE PLACED SO THAT THE LONG DIMENSION IS PERPENDICULAR TO THE DOMINANT DIRECTION OF TRAVEL.

TRANSITION THE GUTTER PAN CROSS SECTION SUCH THAT THE COUNTER SLOPE IN THE DIRECTION OF RAMP TRAVEL IS NOT GREATER THAN 5.0%. MAINTAIN THE NORMAL GUTTER PAN CROSS SECTION ACROSS DRAINAGE STRUCTURES.

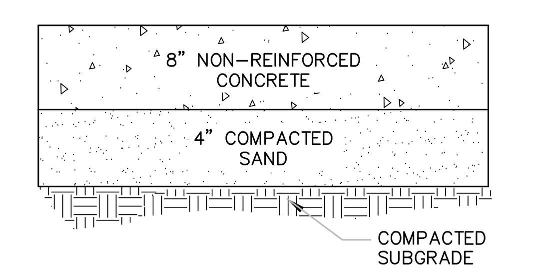
THE TOP OF THE JOINT FILLER FOR ALL RAMP TYPES SHALL BE FLUSH WITH THE ADJACENT CONCRETE.

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 OF 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.

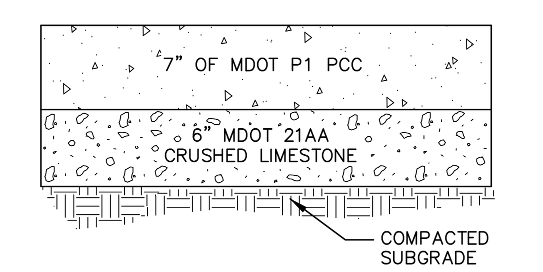
DETECTABLE WARNING PLATES MUST BE INSTALLED USING FABRICATED OR FIELD CUT UNITS CAST AND/OR ANCHORED IN THE PAVEMENT TO RESIST SHIFTING OR HEAVING.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR
SIDEWALK RAMP AND DETECTABLE WARNING DETAILS
9-30-2014 F.H.W.A. APPROVAL | 7-1-2014 PLAN DATE | R-28-I | SHEET 7 OF 7



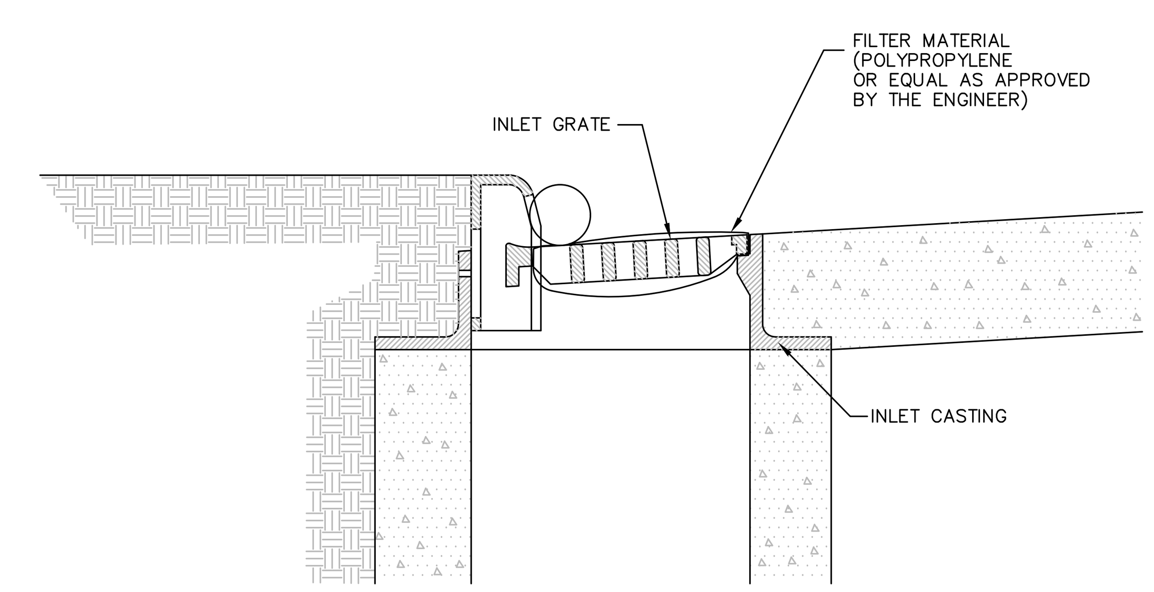
CONCRETE PAVING SECTION (LOADING AREA)
NO SCALE

CONFIRM SECTION WITH GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.



CONCRETE PAVING SECTION (DUMPSTER PADS)
NO SCALE

CONFIRM SECTION WITH GEOTECHNICAL ENGINEER PRIOR TO CONSTRUCTION.



INLET FILTER
"BEAVER DAM" OR EQUAL
NO SCALE

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

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

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

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SECTION 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK - PHASE 4
SITE PLAN

STANDARD DETAILS SHEET

DATE
DECEMBER 14, 2018

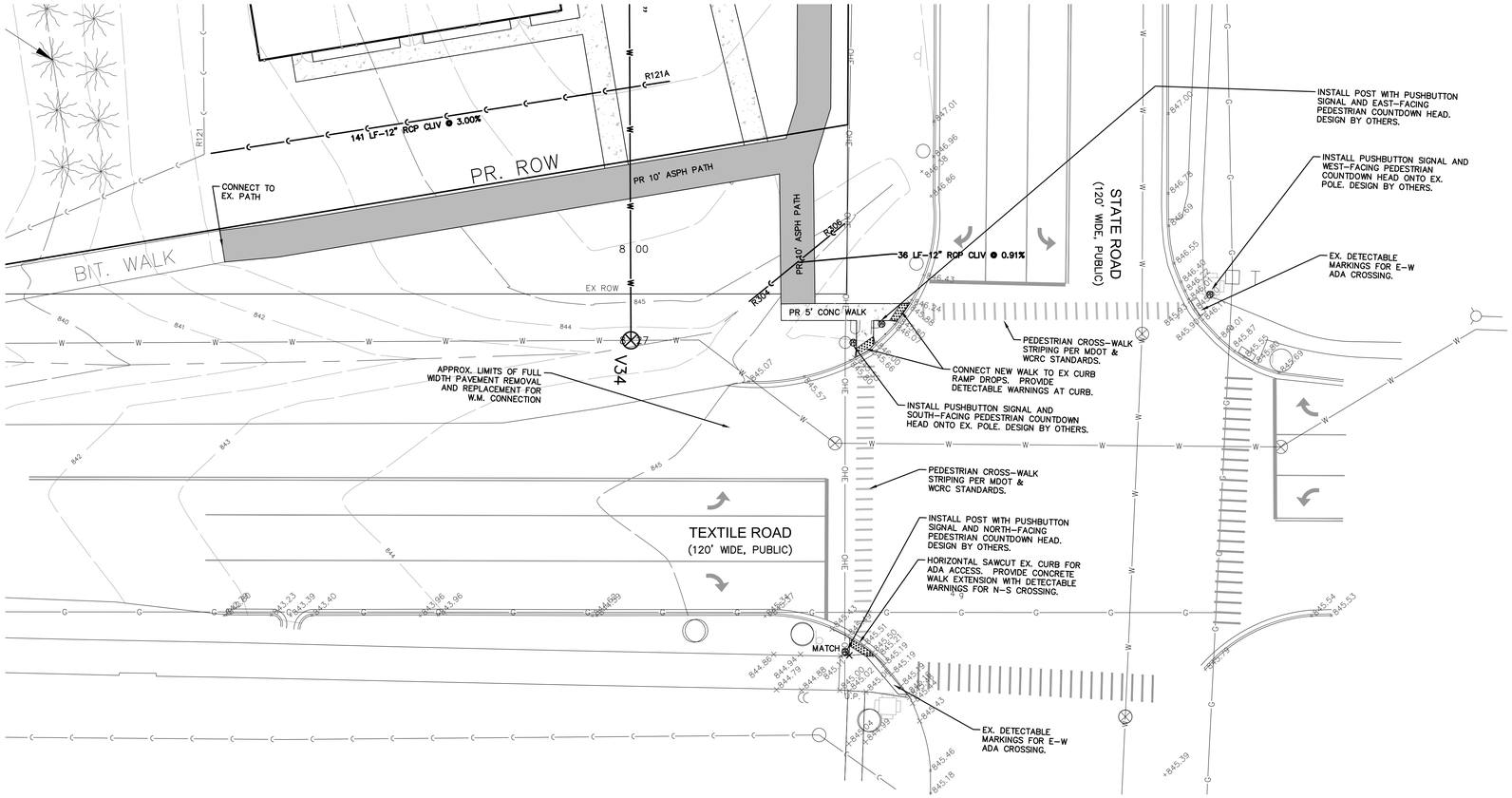
3/11/19 PER TWP
5/02/19 PER TWP

REVISIONS

SCALE 0 -- --
AS NOTED

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 13	

K:\13001886\DWG\PLAN SETS\SITE PLAN - RETAIL\13001886SP-10-DT.DWG 5/2/2019 9:01 AM MICHAEL BAKER

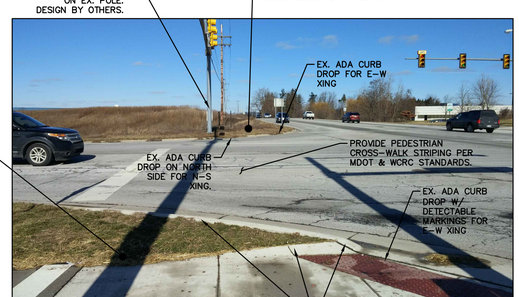


STATE AND TEXTILE INTERSECTION IMPROVEMENT PLAN

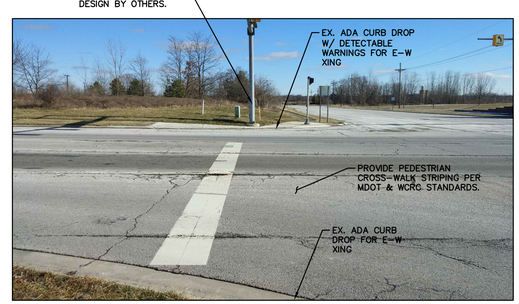
SCALE: 1" = 20 FEET

LEGEND

801	EXISTING 1' CONTOUR
800	EXISTING 5' CONTOUR
	EXISTING CURB AND GUTTER
	BOUNDARY LINE
	EXISTING RAILROAD
801	PROPOSED 1' CONTOUR
800	PROPOSED 5' CONTOUR
	PR. LOT
	PR. SETBACK
	PR. R.O.W.
	PR. BACK/EDGE CURB
	PR. CENTERLINE
	EXISTING SIGN
U.P.	EXISTING UTILITY POLE
	EXISTING FIRE HYDRANT
CATV	EXISTING CABLE MARKER
T	EXISTING TELEPHONE RISER
	SECTION CORNER
	EXISTING SANITARY MANHOLE
	EXISTING CATCH BASIN/INLET
	EXISTING WATER MANHOLE
	EXISTING WETLAND
	PR. GRAVEL SHLDR.
	PR. WALK
	PR. STRIPING



NORTH-FACING VIEW OF EXISTING CONDITIONS FOR TEXTILE ROAD CROSSING.



EAST-FACING VIEW OF EXISTING CONDITIONS FOR STATE ROAD CROSSING.

WEST-FACING VIEW OF EXISTING CONDITIONS FOR STATE ROAD CROSSING.

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

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SECTION 21
TOWN 3 SOUTH, RANGE 6 EAST
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MICHIGAN

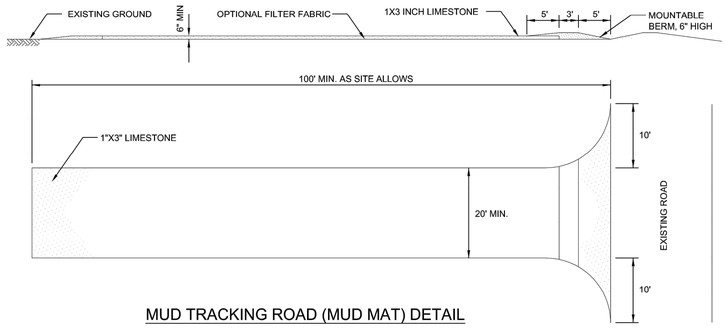
CLIENT
SCHAFER DEVELOPMENT, LLC
INGLEWOOD PARK – PHASE 4
SITE PLAN
STATE ROAD PEDESTRIAN CROSSING PLAN

DATE
DECEMBER 14, 2018
3/11/19 PER TWP
5/02/19 PER TWP

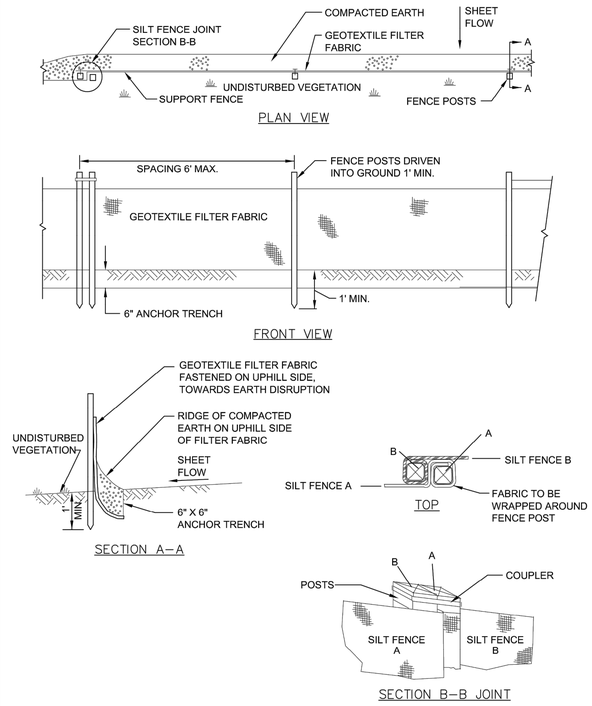
REVISIONS

SCALE 0 10 20
SCALE: 1" = 20'

DR. MB	CH. CK
P.M. MB	
BOOK	
JOB 13001886.10	
SHEET NO. 14	

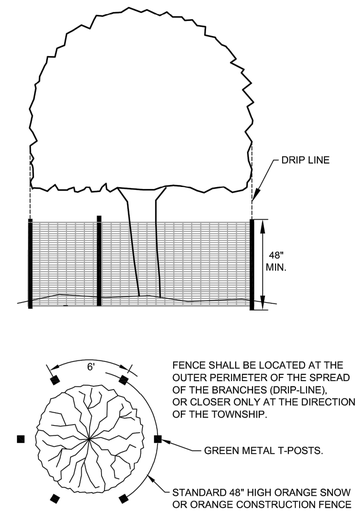


MUD TRACKING ROAD (MUD MAT) DETAIL



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.

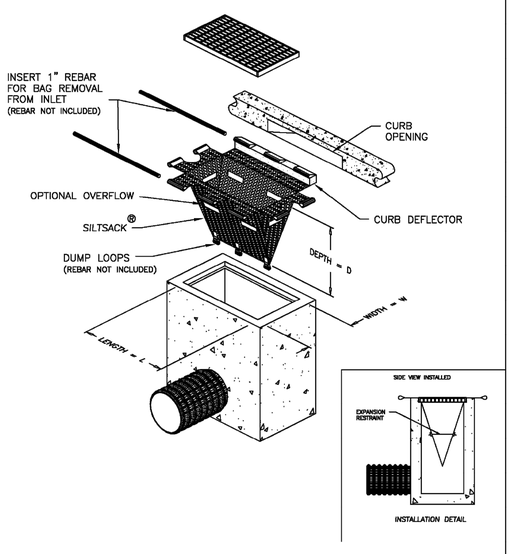
CATCH BASIN/MANHOLE PROTECTION

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

AGF 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	808 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	428 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)

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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

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.

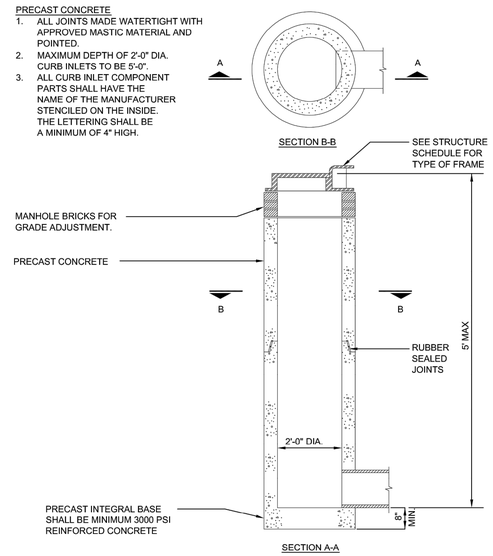
C. For connections to existing precast reinforced concrete manholes, a hole shall be cored into the concrete manhole wall to receive the pipe. Reinforcing steel shall not be cut out shall be bent and replaced in the area that is to be patched. A form shall be constructed over the area of pipe penetration.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

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

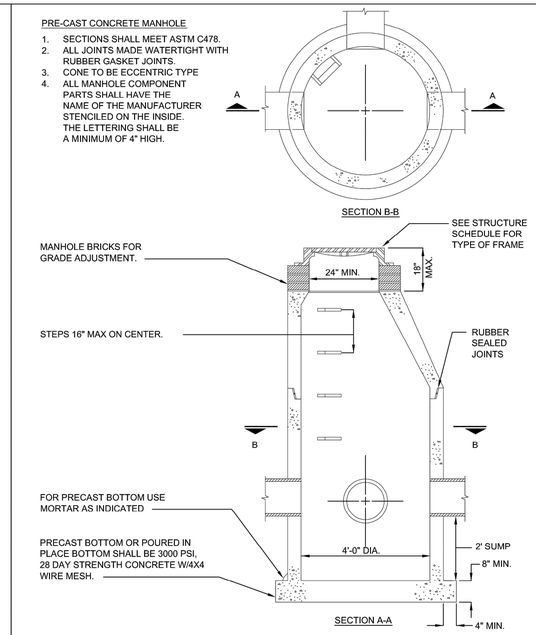
3.05 ANIMAL GRATES

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

PCT February 2008



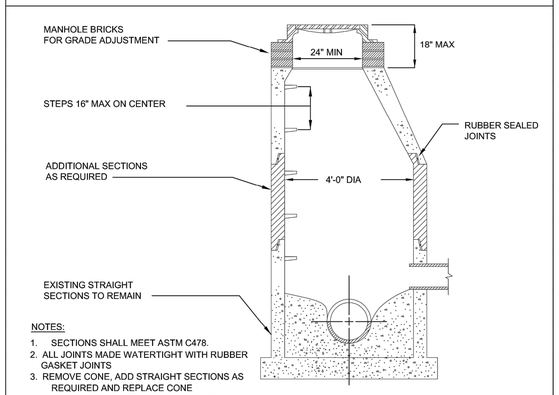
2' DIAMETER INLET



4' DIAMETER CATCH BASIN

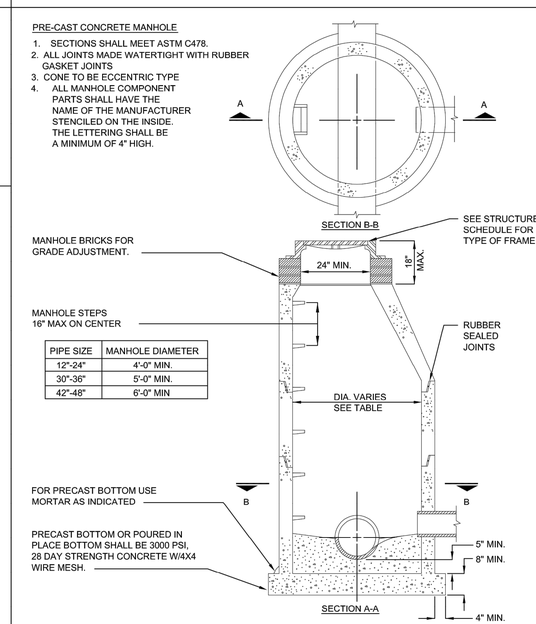
AFFIX TO SURFACE ON OR NEAR ALL DRAINAGE COVERS.

STORM DRAIN MARKER



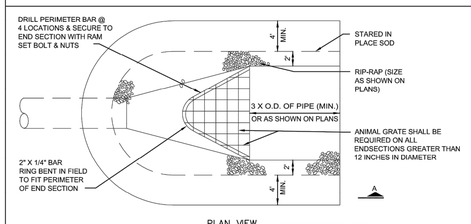
NOTES:
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. REMOVE CONE, ADD STRAIGHT SECTIONS AS REQUIRED AND REPLACE CONE
4. ADD MANHOLE STEPS AS NECESSARY
5. ADD ADJUSTMENT RINGS FOR RIM GRADE ADJUSTMENT

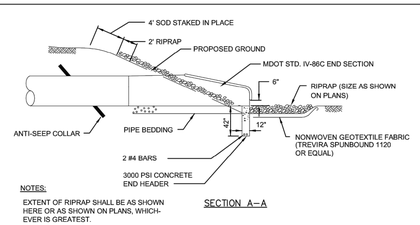
MANHOLE & CATCH BASIN RECONSTRUCTION DETAIL



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

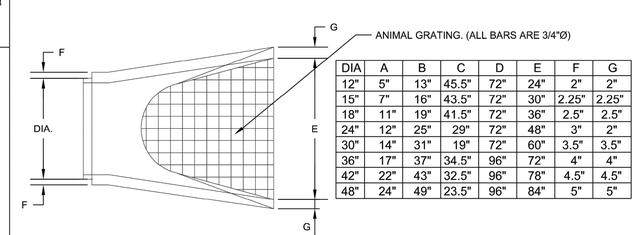
STORM SEWER MANHOLE



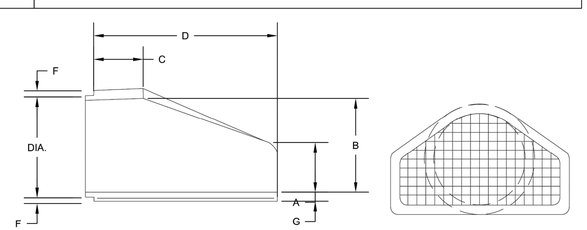


NOTES:
EXTENT OF RIPRAP SHALL BE AS SHOWN HERE OR AS SHOWN ON PLANS, WHICH-EVER IS GREATEST.

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

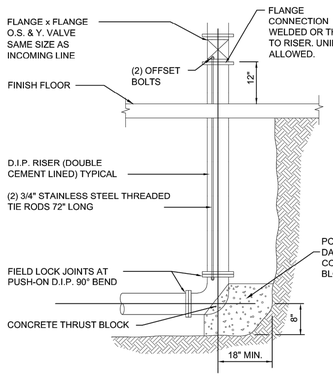
Project No. 2075001300

Scale NOT TO SCALE

Revision

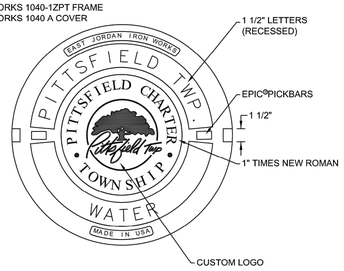
FIRST VALVE SHALL BE INSTALLED PRIOR TO FLUSHING

RISER TO BE A MAXIMUM 5 HORIZONTAL FEET FROM POINT WHERE PIPE ENTERS THE BUILDING.



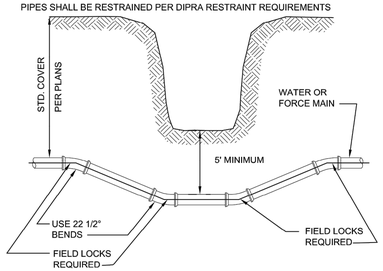
FIRE PROTECTION RISER DETAIL

EAST JORDAN IRON WORKS 1040-1ZPT FRAME
EAST JORDAN IRON WORKS 1040 A COVER

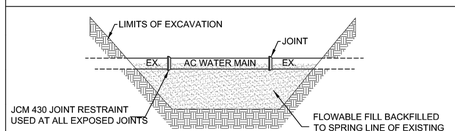


COVER DETAIL

PIPES SHALL BE RESTRAINED PER DIPRA RESTRAINT REQUIREMENTS



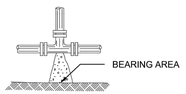
DITCH & STREAM CROSSING



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

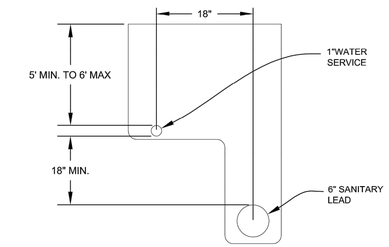
TEES, CROSSES & HYDRANTS		
PIPE DIA. INCHES		BEARING AREA SQUARE FEET
4		1.5
6		2.9
8		4.8
10		7.1
12		10.0
16		17.1
18		21.0
20		26.0

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.

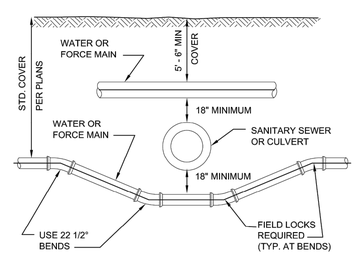
SOIL CHARACTERISTICS	FACTOR
(A) LOOSE COARSE OR MEDIUM SAND; COMPACT FINE SAND; COMPACT SAND-CLAY SOILS; STIFF CLAY	0.33
(B) FIRM FINE SAND; COMPACT INORGANIC SILT; FIRM SAND-CLAY SOILS; MEDIUM CLAY	0.50
(C) LOOSE FINE SAND; FIRM INORGANIC SILT	0.67
(D) LOOSE SAND-CLAY SOILS; LOOSE INORGANIC SILT SOFT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

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

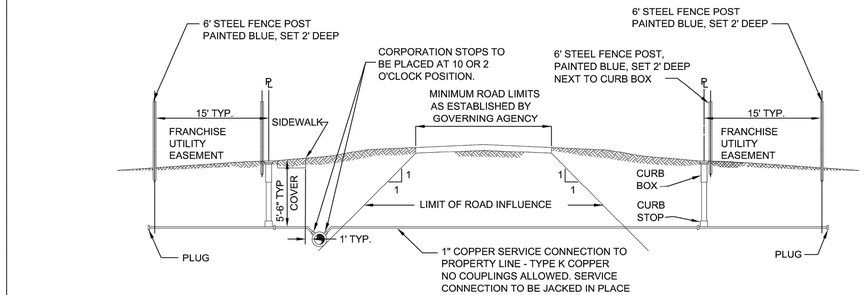
THRUST BLOCK



TYPICAL L TRENCH DETAIL HOUSE LEADS

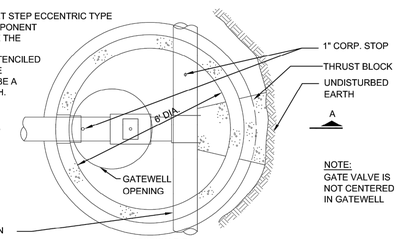


SEWER OR CULVERT CROSSING

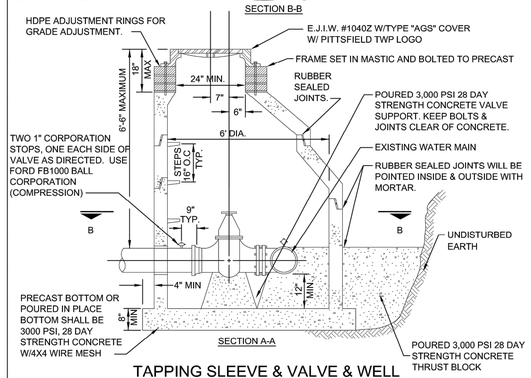


WATER MAIN CONNECTION

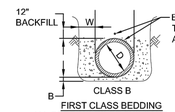
PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.



NOTE:
GATE VALVE IS NOT CENTERED IN GATEWELL



TAPPING SLEEVE & VALVE & WELL



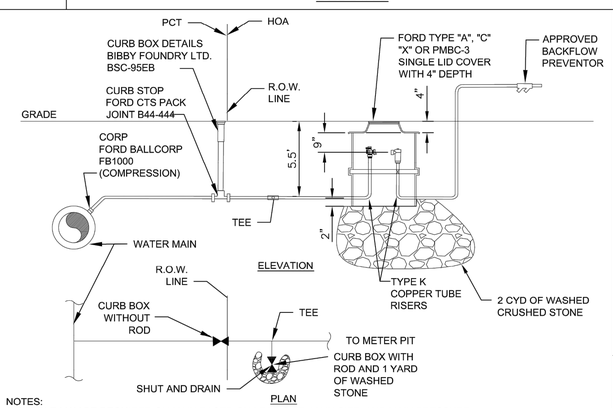
FIRST CLASS BEDDING
ALL BEDDING TO BE 2NS SAND

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

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"

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.

BEDDING



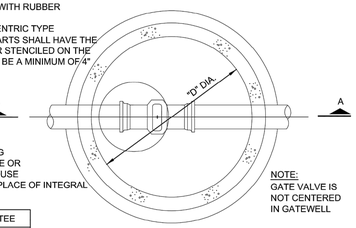
NOTES:
1. SADDLE MAY BE REQUIRED ON MAIN BASED ON LEAD SIZE, MAIN SIZE, AND MAIN PRESSURE
2. ALL WATER MAIN TAPS AND COMPONENT PARTS SHALL BE APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES DEPARTMENT PRIOR TO INSTALLATION.
3. INSTALLATION SHALL BE INSPECTED AND APPROVED BY THE PITTSFIELD TOWNSHIP UTILITIES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

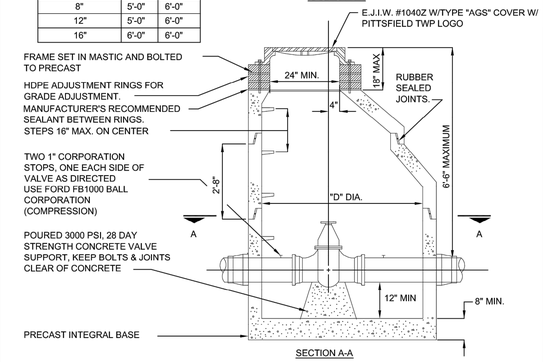
PRE-CAST CONCRETE MANHOLE
1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE OFFSET STEP ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5.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



NOTE:
GATE VALVE IS NOT CENTERED IN GATEWELL

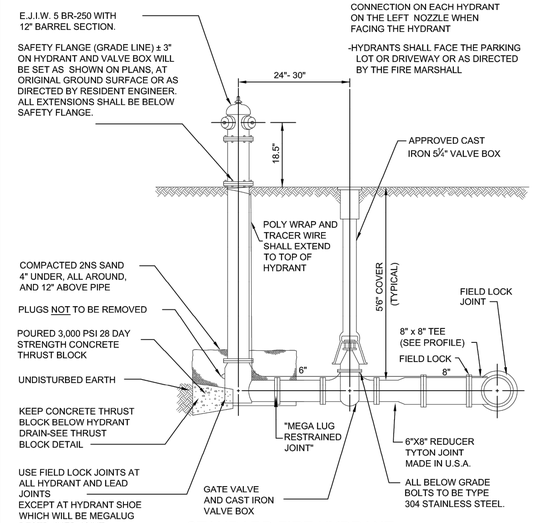
STRAIGHT THRU		TEE
VALVE SIZE	"D"	"D"
8"	5'-0"	6'-0"
12"	5'-0"	6'-0"
16"	6'-0"	6'-0"

SECTION B-B

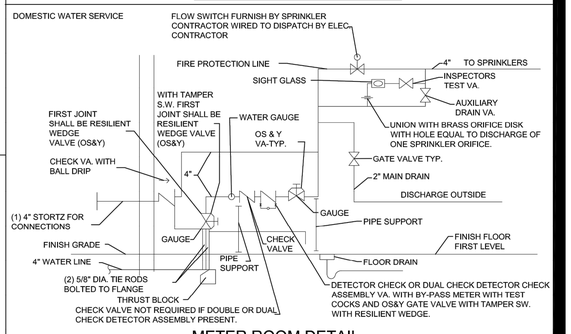


STANDARD GATE VALVE & WELL

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



STANDARD FIRE HYDRANT



METER ROOM DETAIL

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

Revision	By	Appd.	YY.MM.DD
UPDATES	MRH	DRW	14.01.24
FDC UPDATE	BWA	DRW	11.09.13
TWP REV	BWA	DRW	11.04.27
HYDRANT, MANHOLE UPDATE	BWA	DRW	10.10.25
UPDATES	TTN	DRW	10.01.20

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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 leak tightness to pipe furnished with mechanical joints as specified when installed under identical conditions, and shall meet all other requirements of these specifications. In addition to the above requirements, the gasket and lubricant shall conform to the latest revision of ANSI/AWWA C111/A21.11. When it is necessary to utilize a locking mechanism for a push-on joint upstream or downstream of a restrained mechanical joint, field-lok gaskets or equal shall be utilized and shall be used in conformance with DIPRA Standards for restraint distance from a restrained mechanical joint fitting.

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

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

2.02 VALVES

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

B. Resilient-Seated Gate Valves

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

2. Resilient Seated Gate Valves shall be manufactured by American Flow Control or Clow.

C. Tapping Sleeves and Valves

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

2. Tapping valves shall meet the specifications for gate valves except that the valve shall have a flange compatible with the tapping sleeve.

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

D. Corporation Stops

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

E. Valve Boxes

1. Valves boxes shall be 5-1/4-inch and be of cast-iron construction. They shall be of three-piece, screw-type adjustment design. All valve boxes shall be installed flush with the top of the proposed site grade. Cover shall be designed to be removed easily to provide access to the valve. The base shall not rest upon the valve assembly. Valve boxes shall be Tyler 6860 Item DD with number 6 base, or equal.

F. Valve Extensions

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

G. Post Indicators and Valves

1. Post indicators, when specified, shall be American Flow Control series A240 or Clow series 2945A with aluminum plates indicating OPEN and SHUT. Post indicators shall open left.

2. Post indicator valves shall be American Flow Control Model 2500 or Clow model F-6120. All valves shall open left.

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

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

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

2.03 GATEWELLS

A. Gatewells shall conform to the latest revision of ASTM C478 for Precast Reinforced Concrete Manhole Sections. Section joints shall be rubber gasketed and shall conform to ASTM C990. Cone sections shall be eccentric, with an offset step configuration.

B. All gatewell components shall have the name of the manufacturer stenciled on the inside. The lettering shall be a minimum of 4-inches high.

C. Gatewells constructed over an existing water main shall have a doghouse mudded to an 8-inch thick cookie. All other gatewells shall have precast integral base sections.

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

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

2.04 GATEWELL FRAMES AND COVERS

A. Gatewell frames and covers shall weigh not less than 350 lbs. Each frame and cover shall have machined bearing surfaces and shall be suitable notched for convenient removal of the cover.

B. Frames and covers shall be East Jordan Iron Works Model 1040Z frame with 1040 A cover. Each cover shall have the Pittsfield Township logo and the letters "PITTSFIELD TWP WATER" cast integrally into the cover.

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

2.05 GATEWELL CONNECTIONS

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

B. All non-rubber components including wedges, bands and pipe clamps shall be stainless steel.

2.06 GATEWELL ADJUSTMENTS

A. All final grade adjustment of gatewell cover and frame assemblies shall be completed utilizing injection molded High Density Polyethylene (HDPE) adjustment rings as manufactured by Ladtech, Inc., or approved equal. The adjustment rings shall be manufactured from polyethylene plastic meeting the requirements of ASTM D4976. Brick adjustments are not acceptable.

B. All adjustment for matching road grade shall be made utilizing a molded indexed slope ring.

C. Each adjustment ring shall be sealed with a 3/16 to 1/4-inch bead of butyl rubber sealant per the manufacturer's instructions. Sealant shall meet the requirements of ASTM C990.

D. All castings and adjustment rings shall be securely fastened to the cone of the structure with four 3/8-inch threaded rods. The rods shall be galvanized or stainless steel anchored to the structure with Redhead Trubolt concrete anchors, or equal. Stainless steel or galvanized nuts and washers shall be used to attach the casting.

E. When the depth of the gate well requires an adjustment greater than the maximum allowed, the CONTRACTOR shall provide additional pre-cast gate well barrel sections required to maintain acceptable chimney heights.

2.07 HYDRANTS

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

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

C. All nozzles shall be on a removable head with a flange so that they may be rotated by changing the position of the flange.

D. Hydrant shall be fully bronze mounted, including top of the operating stem where it passes through the double o-ring seal in the bronze packing gland. The forged operating stem in the base and the valve seat shall also be of bronze. The molded valve shall be of 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' - 6" over the top of the pipe unless otherwise noted on the Drawings or elsewhere in these specifications.

3.03 GATE VALVES AND WELLS

A. All pre-cast section joints and lift holes shall be pointed and plugged, inside and outside, with mortar.

B. Gate valves shall be of the size and installed at the location as shown on the plans. They shall be set square with the line of the main, and unless otherwise directed by the Township ENGINEER, all gate valves shall be set with stems plumb. At each side of gate valve, the CONTRACTOR shall furnish and install a 1-inch corporation stop on the main as shown on the Standard Details.

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

3.04 HYDRANTS

A. Fire hydrants shall be constructed in accordance with the details shown on the plans. Finish grade level to center of nozzle caps shall measure between 24 and 30 inches. A maximum of one hydrant barrel extension and one operating stem extension may be used to accommodate changes in grade. Under no conditions shall extended hydrant have more than one coupling in the operating stem. Pumper connections shall point toward the street.

B. Fire hydrants shall be installed with barrel vertical and properly based. Concrete thrust blocks shall be placed behind the hydrant, tee, and every bend. Care should be taken to insure the drain holes on the hydrant are not plugged by the thrust blocks. Hydrant shall be set in 1 yard of coarse gravel for drainage purposes. If ground water is encountered, the drain hole shall be plugged as directed by the manufacturer. The backfill shall be sand thoroughly tamped around the hydrant and valve box in 1 ft layers.

C. Fire hydrant and gate valve shall be set apart 24 inches. Gate valves and valve box shall be as specified under the valve paragraphs of this section.

D. Hydrant leads shall have a minimum of 5.5 feet of cover in all areas, including crossings through ditch sections.

E. Hydrants shall be carefully plumbed, braced and backfilled so they remain plumb.

F. All grade, facing, and vertical alignment adjustment of hydrants shall be completed prior to pressure testing and charging of the hydrants.

G. All hydrants shall be cleaned and painted with a rust inhibitive, oil base paint such as "rustoleum" or approved equal to the Township's color code prior to acceptance.

H. The lubricant reservoirs in all hydrants having such construction shall be filled with a lubricant acceptable to the Michigan Department of Environmental Quality and recommended by the hydrant manufacturer.

I. Backfilling around fire hydrants shall be carefully tamped sand in 12-inch layers from the centerline of the lead main to a height of 1-foot below finished grade.

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

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

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

3.05 TRACER WIRE

A. Tracer wire shall be installed along the top of all water mains. For directional drilling, the tracer wire shall be installed at the same time as the pipe. For open cut construction, the tracer wire shall be installed at a height of not more than 6 inches above the main line pipe or service leads. Wire shall be extended to all hydrants, blow-offs, dead ends, service leads and post indicator valves. Tracer wire shall be brought to grade, leaving enough excess material to avoid loss or damage to the wire during construction and subsequent activities. Wire shall be trimmed to finish grade following completion of the landscaping.

B. When tracer wire is to be run along short offsets (less than 20 feet), a loop of wire shall be utilized to loop to the end of the offset, bring the loop to grade and terminate it in an approved manner. For service leads and offsets of more than 20 feet in length, or installed by directional drilling method, a splice may be utilized to make the connection at the main. The tracer wire shall then be installed and terminated in an approved manner.

C. Tracer wire terminations shall be made by one of the following methods:

1. Tracer wire shall be terminated at hydrants by tying off the wire at the head flange, leaving excess material for future trimming following landscape activities.

2. Terminations at valve/curb boxes, post indicators, valves and blow-offs shall be made with 2 wraps of wire at grade around the box or pipe, leaving excess material for future trimming following landscaping.

3. Gatewell terminations shall be made by running the tracer wire through the pipe opening in the wall, down to and across the floor to the steps, up the wall and secure to the top step leaving the stub accessible at the casting. Wire shall be run through the gatewell such that it does not create a hazard.

4. Terminations at existing water mains without tracer wire shall be made at the nearest hydrant or gate well as outlined above. If no hydrant or gatewell is available, an upper section of valve box shall be installed with the tracer wire stubbed up inside

D. When connections are made to existing water mains which do not have tracer wire, the following method most applicable to field conditions shall be used.

1. When connection is made at/near a valve or hydrant, the connection shall be made in the same manner as the termination at said structures in Item C(2) above.

2. When connection takes place in a gatewell, the same procedure shall be used as in termination at a gatewell (see Item C(3) above).

3. If no valve or hydrant is available, the upper section only of a valve box shall be set with the tracer wire stubbed up inside.

3.06 POLYETHYLENE ENCASEMENT

A. The polyethylene encasement must be installed in accordance with the specifications and requirements of ANSI//AWWA C105/A21.5. For open cut applications a single wrap is required, and for directional drill applications a double wrap is required.

B. The polyethylene encasement must be taped and overlapped at pipe joints and must be taped in a spiral configuration along the length of the pipe.

3.07 CONNECTION TO EXISTING MAINS

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

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

C. Prior to beginning construction of the final connections, the CONTRACTOR shall provide sequence of all final connections to the existing system and coordinate a meeting between the ENGINEER, OWNER and CONTRACTOR in the field to review the procedure.

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

E. The CONTRACTOR shall make particular effort, prior to bidding, to ascertain whether or not valves in the existing mains to be connected to the new mains are so located as to provide isolation. If valves are not found to be adequate, then the CONTRACTOR shall utilize other means to make the connections with a minimum of interruption to service.

F. When making a wet tap connection to an existing main, a tapping sleeve designed for the type of pipe being tapped shall be utilized and the tap shall be made in accordance with the manufacturer of the tapping equipment.

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

3.08 BEDDING

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

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

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

PITTSFIELD CHARTER TOWNSHIP

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Revision	By	Appd.	YY.MM.DD
SPEC. UPDATES	MRH	DRW	14.01.24
TWP REV	BWA	DRW	11.04.27
SPEC. UPDATES	BWA	DRW	10.10.25
SPEC. UPDATES	TTN	DRW	10.01.19

Issued	By	Appd.	YY.MM.DD
File Name: W-02	BWA	DRW	07.10.01
Permit-Seal	Dwn.	Chkd.	Dsgn. YY.MM.DD

Client/Project
PITTSFIELD TOWNSHIP

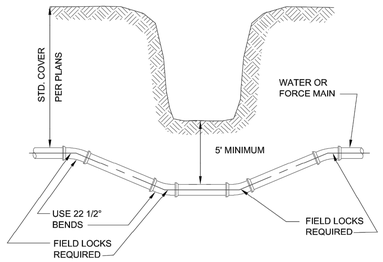
Pittsfield Township, Michigan

Title
WATER MAIN SPECIFICATIONS

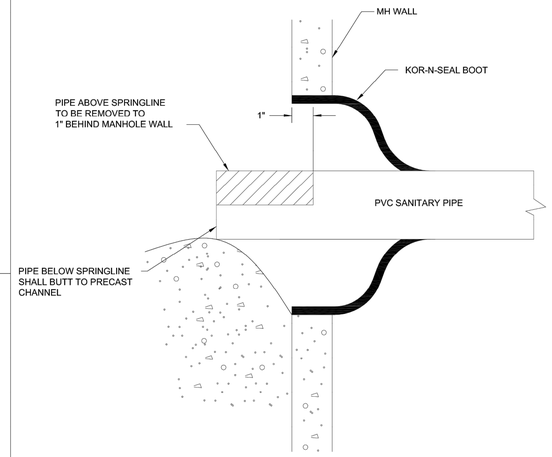
Project No. 2075001300

Scale

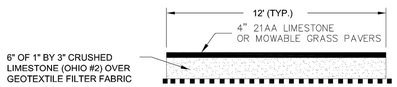
Revision



DITCH & STREAM CROSSING



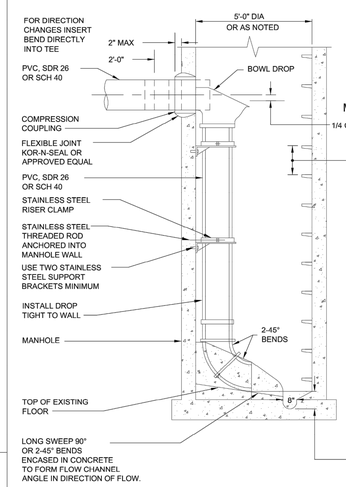
SANITARY PIPE PENETRATION

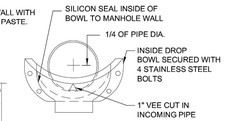


SANITARY SEWER ACCESS PATH

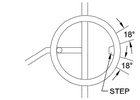
NOTES:

1. SECURE DROP PIPE TO MANHOLE WALL WITH RELINER-DURAN, INC STAINLESS STEEL ADJUSTABLE CLAMPING BRACKETS OR EQUAL.
2. ATTACH THE DROP BOWL & EACH CLAMPING BRACKET TO THE MANHOLE WALL WITH 3/8" x 3 3/4" RAMSET/RED HEAD BOLTS HELD INPLACE WITH 2 STAGE EPOXY PASTE.





DROP BOWL
MOUNTING POSITION



DROP SHALL
BE NO CLOSER
THAN 18" FROM
STEP

SIZE

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

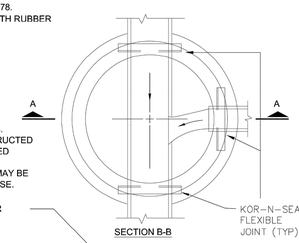
MH DIA.	MAX. DROPS
4'	2-6"
5'	4-6"
5'	2-8"
6'	3-8"

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

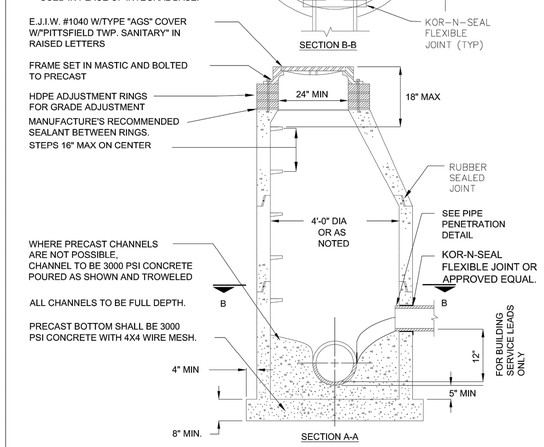
INTERIOR DROP SANITARY MANHOLE

PRE-CAST CONCRETE MANHOLE

1. SECTIONS SHALL MEET ASTM C478.
2. ALL JOINTS MADE WATERTIGHT WITH RUBBER GASKET JOINTS
3. CONE TO BE ECCENTRIC TYPE
4. ALL MANHOLE COMPONENT PARTS SHALL HAVE THE NAME OF THE MANUFACTURER STENCILED ON THE INSIDE. THE LETTERING SHALL BE A MINIMUM OF 4" HIGH.
5. PROVIDE INTEGRAL BASE WITH PRECAST CONCRETE CHANNELS.
6. WHERE MANHOLES ARE CONSTRUCTED OVER EXISTING SEWERS, POURED IN PLACE OR PRECAST COOKIE AND DOGHOUSE STRUCTURES MAY BE USED IN PLACE OF INTEGRAL BASE.



SECTION B-B

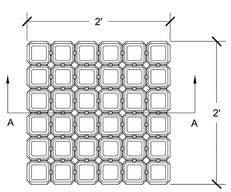


SECTION A-A

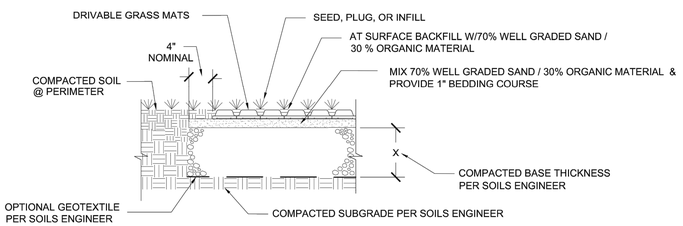
NO UTILITY STRUCTURES (ie. MANHOLES, CURB BOXES etc.) SHALL BE PLACED IN ANY DRIVEWAY OR SIDEWALK

SANITARY MANHOLE

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

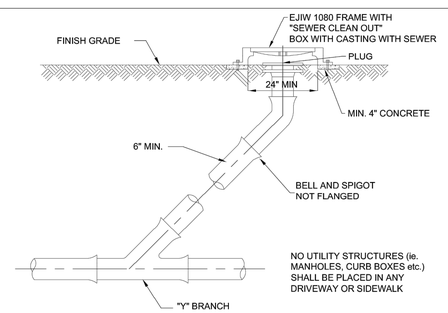


PLAN VIEW

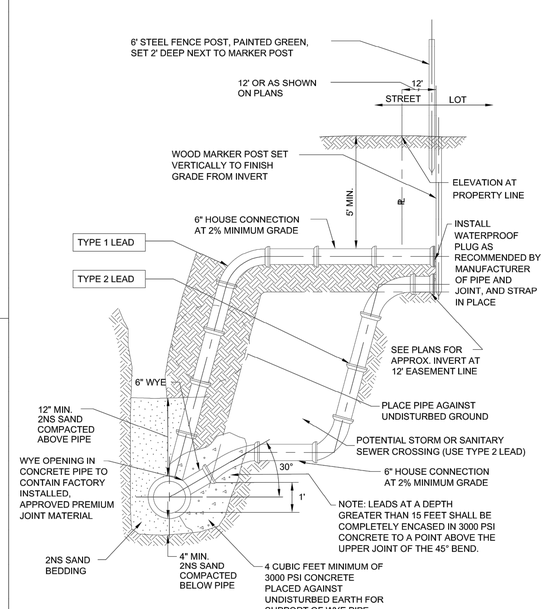


SECTION A-A

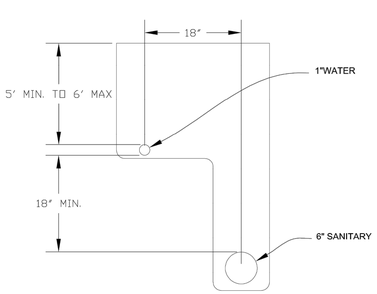
TYPICAL HEAVY TRAFFIC DRIVABLE GRASS DETAIL



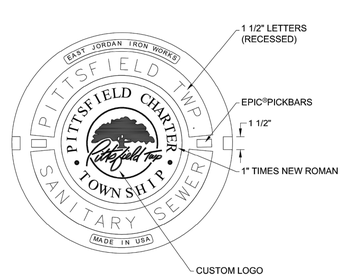
SANITARY SEWER CLEANOUT



SANITARY SEWER SERVICE & RISER CONNECTION DETAIL

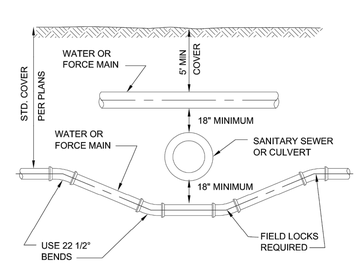


TYPICAL L TRENCH DETAIL HOUSE LEADS



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

COVER DETAIL



SEWER OR CULVERT CROSSING

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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

SANITARY SEWER AND MANHOLES

1.00 GENERAL

1.01 DESCRIPTION

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

1.02 TESTING

A. General

1. The CONTRACTOR shall furnish all equip\-ment and personnel to conduct system acceptance tests as specified herein on all completed sewers. All tests shall be conducted under the supervision of the ENGINEER. No acceptance tests shall be conducted until the entire sewer system is constructed and has been installed for not less than 30 days.

2. The CONTRACTOR may desire to make an air test prior to backfill for his own purposes but the line acceptance tests shall be conducted after backfilling or extensions.

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

4. All sewer lines shall be checked for alignment.

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

6. Sewer pipe 30 inches and smaller shall be air tested. Sewer pipe larger than 30 inches shall be tested by either infiltration or exfiltration and shall be tested in lengths of 1600 feet or less.

7. Should the results of any test fail to meet the criteria established in this Specification, the CONTRACTOR shall, at his own expense, locate and repair rejected section and retest until it is within specified allowance.

B. Test for Leakage - Air Test

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

2. After a manhole-to-manhole section of line has been backfilled and cleaned, it shall be plugged at each manhole with pneumatic plugs inflated to 35 psig internal pressure. The design of the pneumatic plugs shall be such that they will hold against the line test pressure without requiring external blocking or bracing.

3. There shall be three (3) hose connections to the pneumatic plug. One hose shall be used only for inflation of the pneumatic plug. The second hose shall be used for continuously reading the air pressure rise in the sealed line. The third hose shall be used only for introducing low pressure air into the sealed line.

4. There shall be a 0-30 psig gauge for reading the internal pressure of the line being tested. Calibrations from the 1-10 psig range shall be in tenths of lbs (not ounces) and this 0-10 portion shall cover 90% of the complete dial range.

5. Low pressure air shall be introduced into the sealed line until the internal air pressure reaches 4.0 psig greater than the average back pressure of any ground water pressure that may be over the pipe. At least two (2) minutes shall be allowed for the air pressure to stabilize. After the stabilization period, the third hose shall be disconnected.

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

a. DI, and RCP Pipes

(1) The time requirement for the pressure to decrease from 3.5 to 2.5 psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than the time given in the following table:

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

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

a. PVC Pipe

(1) The time requirement for the pressure to decrease from 3.5 to 3.O psig (greater than the average back pressure of any ground water that may be over the pipe) shall not be less than that shown in the following table:

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 man\-hole. Four hours shall be allowed for water absorption by the manhole before testing is initiated. Allowable exfiltration for 48-inch diameter manholes shall be 2 gallons per foot of depth per day.

F. Test for Alignment

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

G. Test for Deflection of PVC Pipe

1. PVC pipe sewers shall be installed in such a manner that the initial deflection of the conduit shall conform to the latest revision of ASTM D-3034.

2. Deflection of PVC pipe shall be tested by pulling a rigid pig or equivalent through the pipe. The pig shall be constructed in accordance with the following table of maximum outside diameters and shall be submitted to the ENGINEER for review before testing is initiated.

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

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

H. Material Tests

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

1.03 SUBMITTALS

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

2.00 PRODUCTS

2.01 SEWER PIPE

A. Pipe for sewer 24-inch diameter and smaller shall be polyvinyl chloride (PVC). Pipe for 30-inch diameter and larger shall be PVC truss pipe. Ductile iron pipe and reinforced concrete pipe shall be used as specified by the ENGINEER.

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

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

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UPDATES	BWA	DRW	10.10.25
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Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
SANITARY SEWER SPECIFICATIONS

Project No. 2075001300

Scale NOT TO SCALE

Revision

Earthwork

1.00 GENERAL

1.01 DESCRIPTION

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

1.02 WORK WITHIN RIGHTS-OF-WAY

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

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

1.03 WORK WITHIN EASEMENTS

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

1.04 SOIL BORINGS

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

2.00 PRODUCTS

2.01 BACKFILL MATERIAL

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

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

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

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

2.02 ENCASING PIPE

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

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

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

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

	Minimum Wall Thickness (inches)	
Nominal Diameter (Inches)	Coated or Cathodically Protected	Uncoated & Unprotected
Under 14	0.180	0.251
14-16	0.219	0.282
18	0.250	0.313
20	0.281	0.344
22	0.312	0.375
24	0.344	0.407
26	0.375	0.438
28-30	0.406	0.469
32	0.438	0.501
34-36	0.469	0.532
38-42	0.500	0.563
48	0.563	0.626

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

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

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

3.00 EXECUTION

3.01 GENERAL EXCAVATION

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

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

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

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

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

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

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

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

3.10 FILLING AND BACKFILLING FOR STRUCTURES

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

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

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

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

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

3.11 FILLING AND BACKFILLING FOR PAVED SURFACES

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

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

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

3.12 PREPARATION OF SUBGRADE FOR ROADWAY SURFACES

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

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

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

3.13 GRADING

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

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

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

3.14 RESTORATION

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

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

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

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

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

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

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

Issued	By	Appd.	YY.MM.DD

File Name: SE-02	TTN	DRW	DRW	07.10.01
	Dwn.	Chkd.	Dsgn.	YY.MM.DD

Permit-Seal

Client/Project
PITTSFIELD TOWNSHIP

Pittsfield Township, Michigan

Title
EARTHWORK SPECIFICATIONS

Project No. 2075001300

Scale NOT TO SCALE

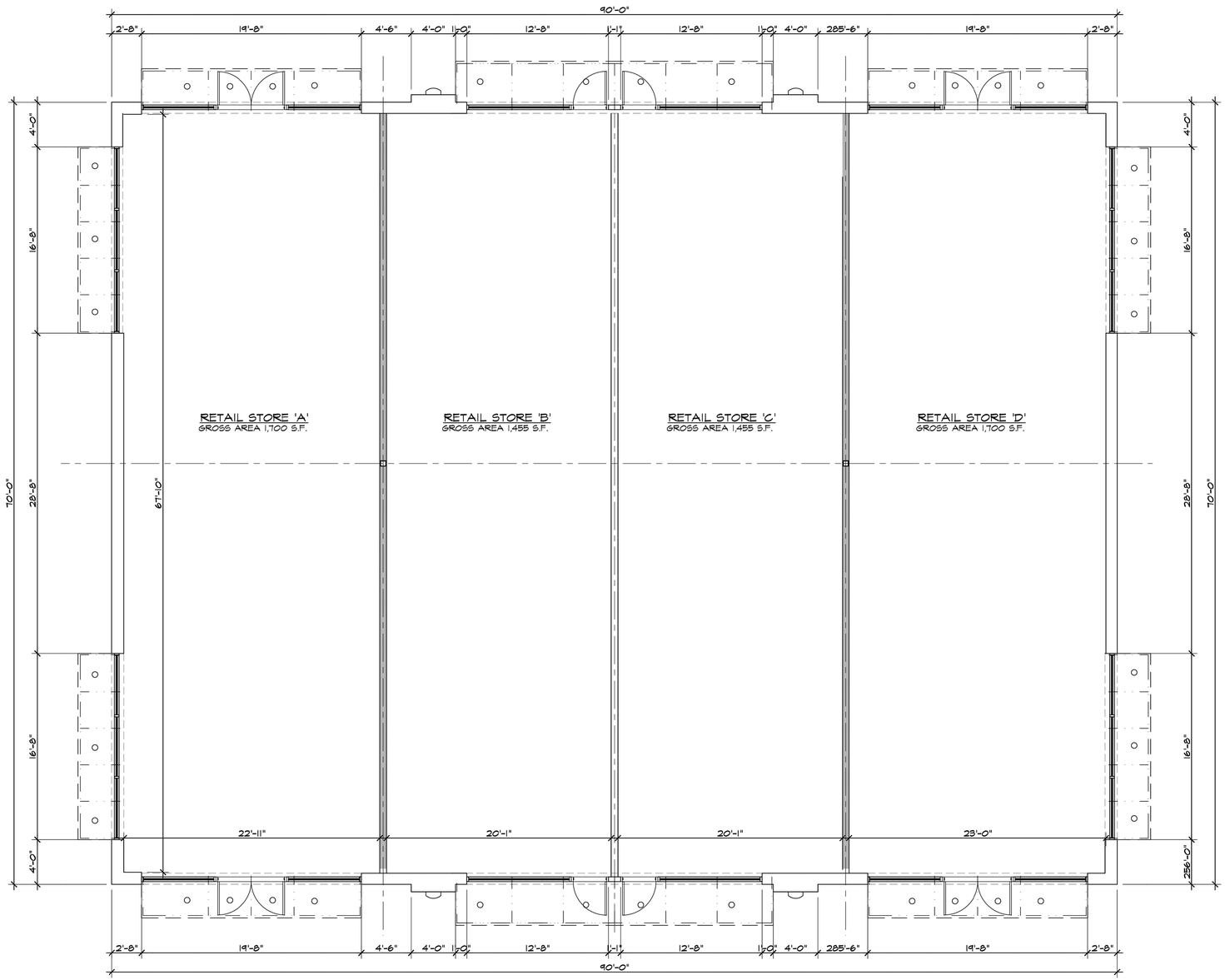
Revision 1

PROJECT DESCRIPTION

PROPOSED 1 STORY COMMERCIAL BUILDING, THE INTERIOR TO BE BUILD OUT INTO RETAIL STORES.

PROJECT DATA:

ZONING:	PUD - PLANNED UNIT DEVELOPMENT
USE GROUP:	M - MERCANTILE
CONSTRUCTION TYPE:	2B
LOT AREA:	-
GROSS FLOOR AREA:	6,310 GSF
BUILDING COVERAGE:	-
BUILDING HEIGHT:	23'-4"



NORTH

PROPOSED FLOOR PLAN FOR BUILDING A, B, C, D, & E

6,310 SQ. FT.

SCALE: 3/16" = 1'-0"

ISSUED FOR	DATE
SPA APPROVAL	04.18.2019

ARCHITECTURAL DESIGN

RESIDENTIAL
COMMERCIAL
INDUSTRIAL

G.A.V. ASSOCIATES, INC
24001 ORCHARD LAKE RD., STE. 180A
FARMINGTON, MICHIGAN 48336
PH: (248) 985-9101
WEB: WWW.GAVASSOCIATES.COM

GAV ASSOCIATES

SCHAFER DEVELOPMENT, LLC

PROPOSED BUILDING A,B,C,D & E FOR:
INGLEWOOD PARK - PHASE 4
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MI

DRAWN:	DESIGNED:	CHECKED:
MB	G.A.	G.A.

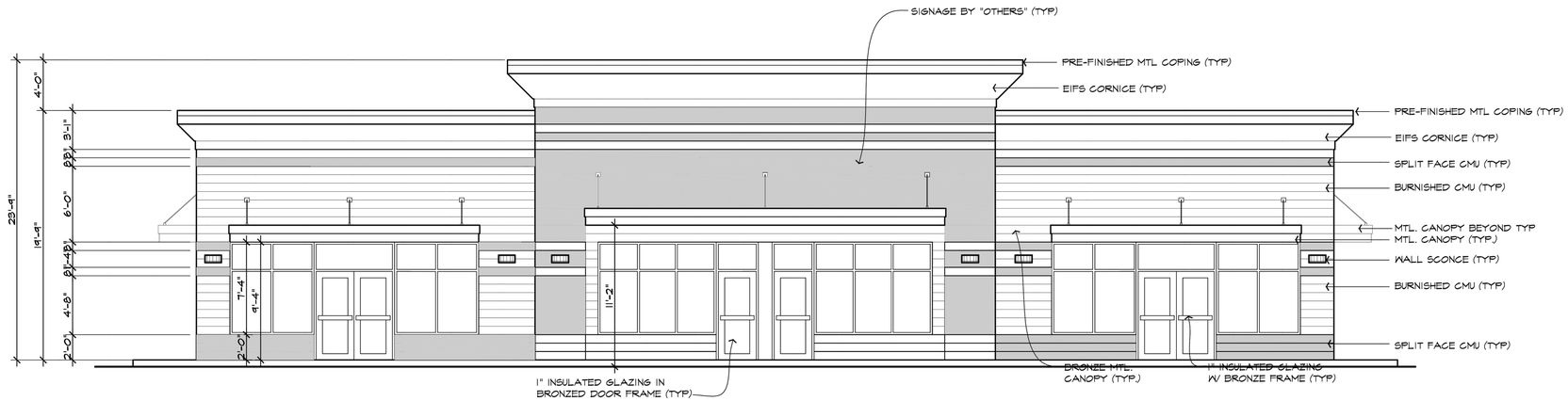
SCALE : AS NOTED

FILE NAME :

JOB #: 19045

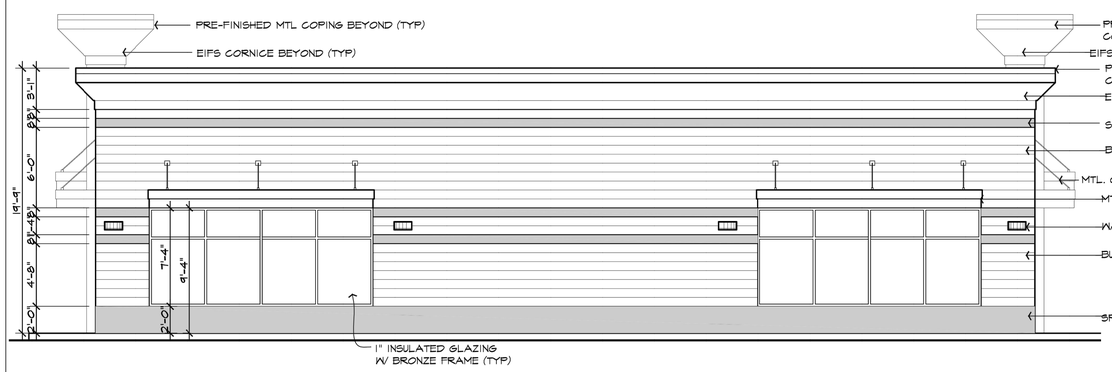
SHEET TITLE
PROPOSED
FLOOR PLAN FOR
BUILDING A,B,C,D&E

SHEET #
A.101



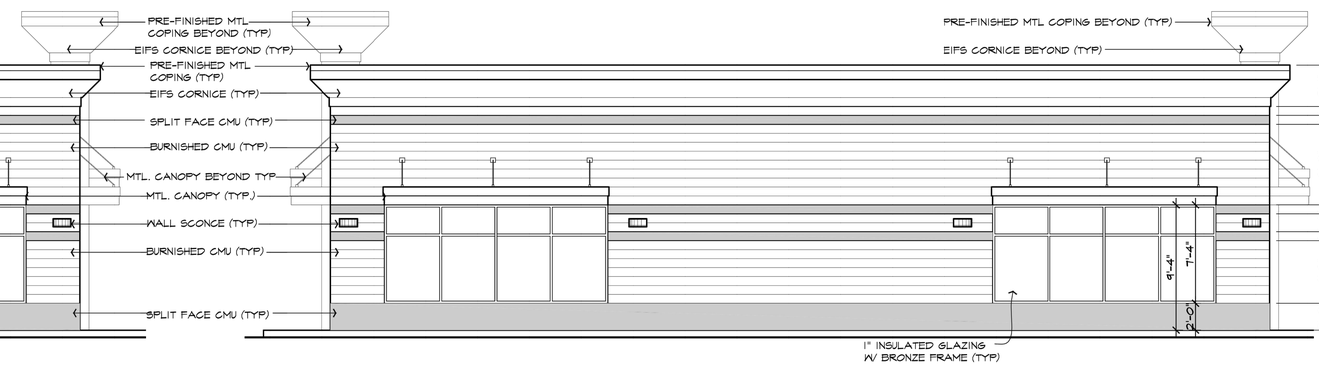
PROPOSED BACK ELEVATION FOR BUILDING A, B, C, D & E

SCALE: 3/16" = 1'-0"



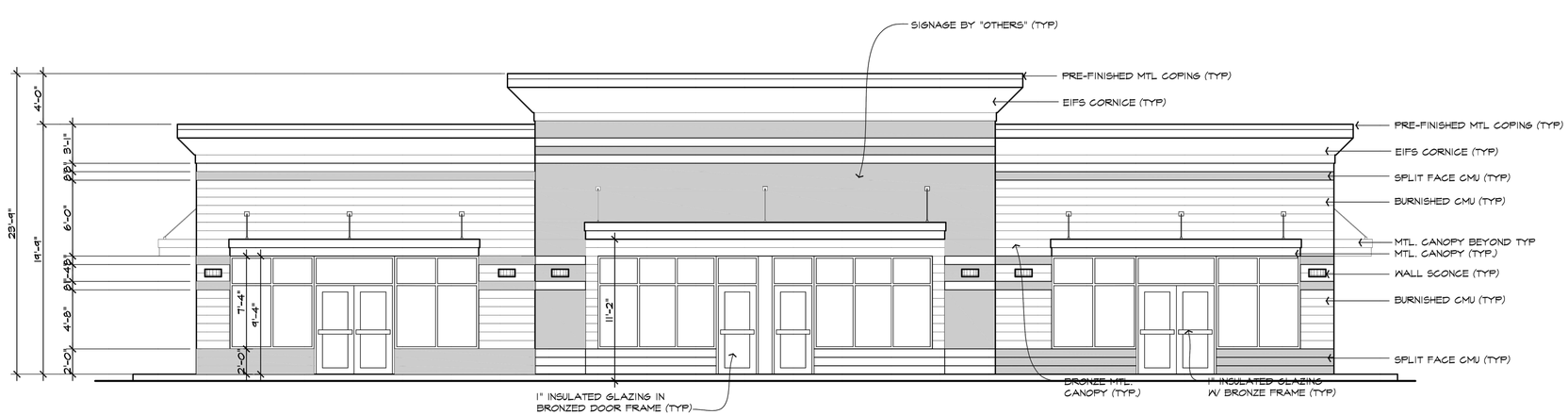
PROPOSED LEFT ELEVATION FOR BUILDING A, B, C, D, & E

SCALE: 3/16" = 1'-0"



PROPOSED RIGHT ELEVATION FOR BUILDING A, B, C, D, & E

SCALE: 3/16" = 1'-0"



PROPOSED FRONT ELEVATION FOR BUILDING A, B, C, D, & E

SCALE: 3/16" = 1'-0"

ISSUED FOR	DATE
SPA APPROVAL	04.18.2019

ARCHITECTURAL DESIGN

RESIDENTIAL
COMMERCIAL
INDUSTRIAL

G.A.V. ASSOCIATES, INC
24001 ORCHARD LAKE RD., STE. 180A
FARMINGTON, MICHIGAN 48336
PH: (248) 985-9101
WEB: WWW.GAVASSOCIATES.COM

GAV ASSOCIATES

SCHAFER DEVELOPMENT, LLC

PROPOSED BUILDING A,B,C,D&E FOR:
INGLEWOOD PARK - PHASE 4
PITTSFIELD TOWNSHIP
WASHTENAW COUNTY, MI

DRAWN:	DESIGNED:	CHECKED:
MB	G.A.	G.A.

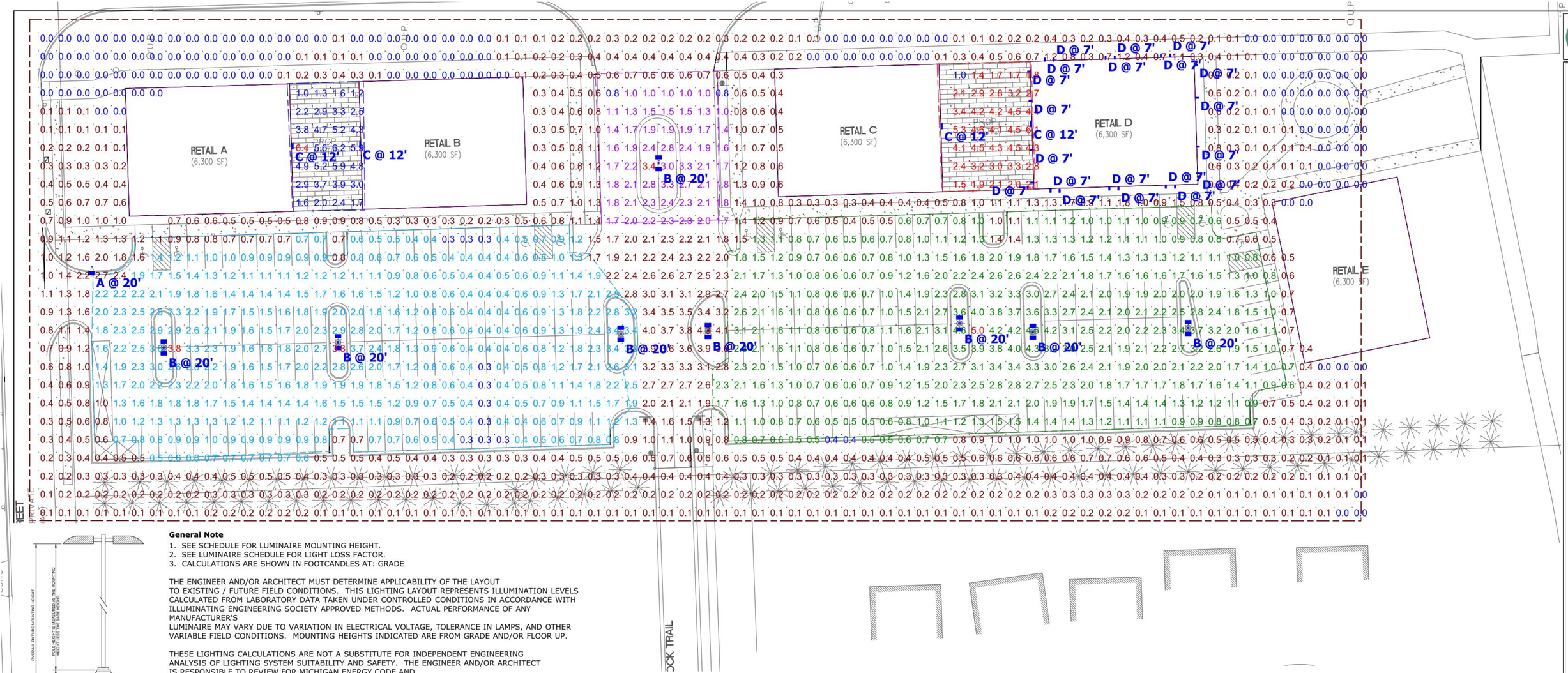
SCALE : AS NOTED

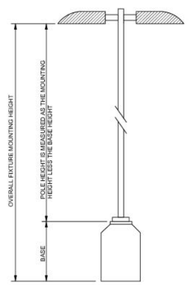
FILE NAME :

JOB #: 19045

SHEET TITLE
PROPOSED ELEVATIONS FOR BUILDING A,B,C,D&E

SHEET #
A.201





General Note

1. SEE SCHEDULE FOR LUMINAIRE MOUNTING HEIGHT.
2. SEE LUMINAIRE SCHEDULE FOR LIGHT LOSS FACTOR.
3. CALCULATIONS ARE SHOWN IN FOOTCANDLES AT: GRADE

THE ENGINEER AND/OR ARCHITECT MUST DETERMINE 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 MICHIGAN ENERGY CODE AND LIGHTING QUALITY COMPLIANCE.

UNLESS EXEMPT, PROJECT MUST COMPLY WITH LIGHTING CONTROLS REQUIRMENTS DEFINED IN ASHRAE 90.1 2013. FOR SPECIFIC INFORMATION CONTACT GBA CONTROLS GROUP AT ASG@GASSERBUSH.COM OR 734-266-6705

Statistics

Description	Symbol	Avg	Max	Min	Max/Min	Avg/Min	Avg/Max
Entrance B/C	X	1.9 fc	3.4 fc	0.8 fc	4.3:1	2.4:1	0.6:1
Left Lot	X	1.3 fc	3.8 fc	0.3 fc	12.7:1	4.3:1	0.3:1
Patio A/B	X	3.6 fc	6.4 fc	1.0 fc	6.4:1	3.6:1	0.6:1
Patio C/D	X	3.2 fc	6.1 fc	1.0 fc	6.1:1	3.2:1	0.5:1
Right Lot	X	1.6 fc	5.0 fc	0.4 fc	12.5:1	4.0:1	0.3:1

Schedule

Symbol	Label	QTY	Manufacturer	Catalog Number	Description	Number Lamps	Filename	Lumens per Lamp	LLF	Wattage	Lamp
	B	8	Lithonia Lighting	DSX0 LED P4 40K TSW MVOLT	DSX0 LED P4 40K TSW MVOLT	1	DSX0_LED_P4_40K_TSW_MVOLT.ies	10889	0.9	184	LED
	C	4	Lithonia Lighting	DSXW1 LED 20C 1000 40K TFTM MVOLT	DSXW1 LED WITH (2) 10 LED LIGHT ENGINES, TYPE TFTM OPTIC, 4000K, @ 1000mA.	1	DSXW1_LED_20C_1000_40K_TFTM_MVOLT.ies	7711	0.9	73.2	LED
	D	20	Brownlee Lighting	7601-C9LED-35K	N/A	1	7601-C09-35K.ies	555	0.9	8.34	LED

D-Series Size 1
LED Wall Luminaire

Specifications
Luminaire

Width: 13-3/4" (34.9 cm)
Depth: 10" (25.4 cm)
Height: 6-3/8" (16.2 cm)
Weight: 12 lbs (5.4 kg)

Back Box (BBW, ELCW)

Width: 13 3/4" (34.9 cm)
Depth: 4" (10.2 cm)
Height: 6-3/8" (16.2 cm)
Weight: BBW 5 lbs (2.3 kg); ELCW 10 lbs (4.5 kg)

Catalog Number
Notes
Type

Introduction

The D-Series Wall luminaire is a stylish, fully integrated LED solution for building-mount applications. It features a sleek, modern design and is carefully engineered to provide long-lasting, energy-efficient lighting with a variety of optical and control options for customized performance.

With an expected service life of over 20 years of nighttime use and up to 74% in energy savings over comparable 250W metal halide luminaires, the D-Series Wall is a reliable, low-maintenance lighting solution that produces sites that are exceptionally illuminated.

Ordering Information EXAMPLE: DSXW1 LED 20C 1000 40K T3M MVOLT DDBTXD

DSXW1 LED

Series	LEDs	Drive Current	Color temperature	Distribution	Voltage	Mounting	Control Options
DSXW1 LED	10C 10 LEDs (one engine)	350 350 mA	30K 3000K	T2S Type I Short	MVOLT 3,4	Shipped included	Shipped installed
	20C 20 LEDs (two engines)	530 530 mA	40K 4000K	T2M Type I Medium	120 5	(Blank) Surface mounting bracket	PE Photoelectric cell, bottom type 5
		700 700 mA	50K 5000K	T3S Type II Short	208 5	BBW Surface-mounting back box (for conduit entry)6	DMG 0-10v dimming wires pulled outside fixture (for use with an external control, ordered separately)
		1000 1000 mA (1A) 7	AMBPC Amber phosphor converted	T3M Type II Medium	240 5		PIR 180° motion/ambient light sensor, < 15' mounting ht. 8
				T4W Type IV Wide	277 5		PIRH 180° motion/ambient light sensor, 15-40' mounting ht. 8
				TFTM Forward Throw Medium	347 5,8		PIRTFCW Motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc 9,10
				ASYM Asymmetric diffuse	480 5,8		PIRHTFCW Motion/ambient sensor, 15-40' mounting height, ambient sensor enabled at 1fc 9,10
							ELCW Emergency battery backup (includes external component enclosure), non-CE, complies 11

Other Options

Shipped installed
SF Single fuse (120, 277 or 347V) 5,12
DF Double fuse (208, 240 or 480V) 5,12
HS House-side shield 13
SPD Separate surge protection

Shipped separately 14
BSW Bird-deterrent spikes
WG Wire guard
VG Vandal guard
DBL Dual displacers

Finish (required)
DDBXD Dark bronze
DBLXD Black
DNAXD Natural aluminum
DWHXD White
DDBTXD Textured dark bronze
DBLBTXD Textured black
DNATXD Textured natural aluminum
DWHGXD Textured white
DSSTXD Textured sandstone

Accessories
Ordered and shipped separately.

DSXW1KIT Wall mounting back box (for conduit entry)
DSXW1SF Single fuse (120, 277, 347V)
DSXW1DF Double fuse (208, 240, 480V)
DSXW1HS House-side shield
DSXW1SPD Surge protection

NOTES
1 20C 1000 is not available with PIR, PIRH, PIRTFCW or PIRHTFCW.
2 MVOLT driver operates on any line voltage from 120-277V (50/60 Hz).
3 Single fuse (SF) requires 120, 277 or 347 voltage option. Double fuse (DF) requires 208, 240 or 480 voltage option.
4 Only available with 20C, 700mA or 1000mA. Not available with PIR or PIRH.
5 Back box ships installed on fixture. Cannot be field installed. Cannot be ordered as an accessory.
6 Photocontrol (PE) requires 120, 208, 240, 277 or 347 voltage option. Not available with motion/ambient light sensors (PIR or PIRH).
7 Not available with 530mA or 700mA.
8 Cold weather (-40C) rated. Not compatible with corrosive/dry applications. Not available with BBW mounting option. Not available with fusing. Not available with 347 or 480 voltage options. Emergency components located in back box housing. Emergency models IES files located in product page at www.lithonia.com.
9 Not available with ELCW.
10 Also available as a separate accessory; see Accessories information.

LITHONIA LIGHTING. One Lithonia Way • Conyers, Georgia 30012 • Phone: 800.279.8041 • www.lithonia.com/contact
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DSXW1 LED Rev. 10/30/18

D-Series Size 0
LED Area Luminaire

Specifications

EPA: 0.95 ft² (.09 m²)
Length: 26" (66.0 cm)
Width: 13" (33.0 cm)
Height: 7" (17.8 cm)
Weight (max): 16 lbs (7.3 kg)

Catalog Number
Notes
Type

A+ Capable Luminaire

This item is an A+ capable luminaire, which has been designed and tested to provide consistent color appearance and system-level interoperability.

- All configurations of this luminaire meet the Acuity Brands' specification for chromatic consistency
- This luminaire is A+ Certified when ordered with DTL® controls marked by a shaded background. DTL DLL equipped luminaires meet the A+ specification for luminaire to photocontrol interoperability!
- This luminaire is part of an A+ Certified solution for ROAM® or XPoint™ Wireless control networks, providing out-of-the-box control compatibility with simple commissioning, when ordered with drivers and control options marked by a shaded background.

To learn more about A+, visit www.acuitybrands.com/aplus.

1. See ordering tree for details.
2. A+ Certified Solutions for ROAM require the order of one ROAM node per luminaire. Sold Separately: Link to Roamy Link to DTL DLL

A+ Capable options indicated by this color background.

Ordering Information EXAMPLE: DSX0 LED P6 40K T3M MVOLT SPA DDBXD

DSX0 LED

Series	LEDs	Color temperature	Distribution	Voltage	Mounting
DSX0 LED	Forward optics P1 P4 P7 P2 P5 P3 P6 Rotated optics P10 2 P12 2 P11 2 P13 2	30K 3000K 40K 4000K 50K 5000K AMBPC Amber phosphor converted 1	T1S Type I short T2S Type II short T2M Type II medium T3S Type III short T3M Type III medium T4W Type IV wide T4VW Type IV very wide BLC Backlight control 3,4 LCCO Left cutoff 3,4 RCCO Right cutoff 3,4	MVOLT 6 120 6 208 6 240 6 277 6 347 6,8 480 6,8	Shipped included SPA Square pole mounting RPA Round pole mounting WBA Wall bracket SPUMBA Square pole universal mounting adapter 7 RPUMBA Round pole universal mounting adapter 7 Shipped separately KNUCKLEDOWN Knuckle mounting bracket (specify finish) 7

Control options

Shipped installed
NLTAIR2 nLight AIR generation 2 enabled 9,10
PIR High mode sensor (factory default settings) 11
PIR1 Two-watt sensor (for use in control zones) 11,12
PIR7 Seven-watt sensor (for use in control zones) 11,12
DMG 0-10V dimming wires pulled outside fixture (for use with an external control, ordered separately)
PIR Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc 13,14,15
PIRH Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc 13,14,15
PIRTFCW Bi-level, motion/ambient sensor, 8-15' mounting height, ambient sensor enabled at 1fc 13,14,15
PIRHTFCW Bi-level, motion/ambient sensor, 15-30' mounting height, ambient sensor enabled at 1fc 13,14,15
BL30 Bi-level switched dimming, 30% 14,15
BL50 Bi-level switched dimming, 50% 14,15
PNMTR30 Bi-level, dim 30% over 1 14
PNMTR50 Bi-level, dim 50% over 1 14
PNMTR70 Bi-level, dim 70% over 1 14
PNMTR100 Bi-level, dim 100% over 1 14
BAA Field adjustable output 16

Other options

Shipped installed
HS House-side shield 17
SF Single fuse (120, 277, 347V) 6
DF Double fuse (208, 240, 480V) 6
L90 Left rotated optics 7
R90 Right rotated optics 7
DDL Diffused drop lens 18

Shipped separately
BS Bird spikes 19
EGS External glare shield 19

Finish (required)
DDBXD Dark bronze
DBLXD Black
DNAXD Natural aluminum
DWHXD White
DDBTXD Textured dark bronze
DBLBTXD Textured black
DNATXD Textured natural aluminum
DWHGXD Textured white

DSX0 LED Rev. 03/21/18 Page 1 of 7

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7601 LED
Mini 7600

STANDARD SPECIFICATIONS

FRAME
Heavy duty aluminum with roll formed aluminum bands. The optional trim bars are solid 6.2557 thick aluminum, held in place by fasteners.

DIFFUSER
Translucent, UV stabilized, white acrylic. Diffuser is form molded allowing for a uniform standard thickness of 0.100" throughout.

PAN
Heavy duty formed aluminum, featuring thread inserts to prevent rusting of fasteners.

LED PERFORMANCE - 3500K STANDARD
120/277V - 3500K, 80 CRI - L80 rating: 60,000 hrs - L70 rating (projected) - 100,000 hrs
Ambient ratings @ 110V input
Operating ambient temperature: -20°C/ -4°F - 40°C/ 104°F

Standard 3500K source lumens noted. Consult Brownlee sales for performance of all CCTs.
B06 - 6W nominal, 05 A input - 700 lm - 117 lm/W. Non-dimming
B12 - 12W nominal, 10 A input - 1400 lm - 120 lm/W. Dim mable (0-10V).
C09 - 9W nominal, 10 A input - 1200 lm - 144 lm/W. Dim mable (0-10V).
C17 - 16W nominal, 15 A input - 2050 lm - 132 lm/W. Dim mable (0-10V).
C24 - 23W nominal, 20 A input - 2950 lm - 131 lm/W. Dim mable (0-10V).

MOUNTING
Directly to j-box (by others). Mounting hardware included.

FINISH
All 7601 parts are prepared using a three step pre-treatment/sealing process, followed by a powder coat primer prior to applying any of the Brownlee paint finishes.

WARRANTY
5 year limited warranty on this LED product. Consult factory for details.

PROJECT:
MODEL #:
FIXTURE TYPE:

ORDERING INFORMATION

7601 - _ _ - _ _ - _ _ - _ _ - _ _
Model 2. 3. 4. 5. 6. (if required)

2. FINISH

STANDARD
AB Antique Bronze
AG Antique Silver
BL Black
BZ Bronze
DB Desert Bronze
GM Gun Metal
MB Metallic Bronze
NT Nickel Tone
PL Platinum
WH White

CUSTOM
Provide color sample or RAL code to match

3. WATTAGE
B06 6W B Series LED
B12 12W B Series LED
C09 9W C Series LED
C17 16W C Series LED
C24 23W C Series LED

4. TRIM
VB0 No trim
VB1 1 vertical bar 8
VB2 2 vertical bars 8
*Does not meet ADA requirements

5. COLOR TEMPERATURE
35K 3500K standard color temperature
27K 2700K color temperature
30K 3000K color temperature
40K 4000K color temperature

6. AVAILABLE OPTIONS
BAC1 Buy American Compliant
BB(1) Integral Battery Backup (adds 1.5" to depth)
BB(C) Integral Battery Backup, Cold Weather (adds 1.5" to depth)
BLD(1) Bi-Level Dimming (All except B06)
DF(1) Triac (Line Voltage) Dimming (120V) (All except B06)
ECW(1) Extreme Cold Weather (-40°C / -40°F min.)
ES1 ENERGY STAR®
EXT Extended Housing (Intended to match BB(C) aesthetics) (Adds 1.5" to depth)
FC1 French Canadian Labels
OCC1 Occupancy Sensor
T24 Title 24 Compliant (B12 & C24 in 3000K only)

Notes: (1) 7601 cannot be combined with Elite T24 (T24) BAC - cannot be combined with FC1. (2) BB/BB(C)/BB(C) - cannot be combined with DF10, ECW, EXT, or T24 (3) BLD - cannot be combined with DF10, OCC, or T24 (4) DF10 - cannot be combined with BB, BB(C), BB(C) or T24 (5) ECW - cannot be combined with BB, BB(C), or T24 (6) ES1 - cannot be combined with DF10, ECW, FC1, or T24 (7) EXT - cannot be combined with BB (8) T24 - cannot be combined with 9W, B06, B06C, B06L, B06LB, B06LBL or BCL (9) BB(C) - cannot be combined with B06, B06C, B06L, B06LB, B06LBL or BCL (10) FC1 - cannot be combined with ECW, EXT, OCC, or T24
Additional: *Not available with BB(C) and BB(C) options has a minimum operating temperature of 10C/50F. BBC option has a minimum operating temperature of 10C/14F. **Not available on Elite T24 (T24) as a standard option. Elite T24 is a standard light level of 70 lm, 30 lm/W, 80 cri lumens and at 50%.
Specifications and dimensions subject to change without notice.
Consult your Brownlee Lighting representative for availability and ordering information.

BROWNLEE LIGHTING www.brownlee.com
REVISED 03/21/18

INGLEWOOD PHASE 4
PHOTOMETRIC SITE PLAN
GASSER BUSH ASSOCIATES
WWW.GASSERBUSH.COM

Designer: DB
Date: 3/13/2019
Scale: Not to Scale
Drawing No.: #19-33060-V2