Madison, Wisconsin

CITY OF MADISON

CITY ENGINEERING DIVISION
DEPARTMENT OF PUBLIC WORKS
PLAN OF PROPOSED IMPROVEMENT

PUBLIC IMPROVEMENT PROJECT APPROVED

MAY 22, 2019

BY THE COMMON COUNCIL OF MADISON, WISCONSIN

PUBLIC IMPROVEMENT DESIGN APPROVED BY:

FOR City Engineer 6/7/19 Date

REVISION 3: 05/11/2020

HAWKS LANDING FLOOD MITIGATION SOUTH - 2019

CITY PROJECT NO. 11857
CONTRACT NO. 8421

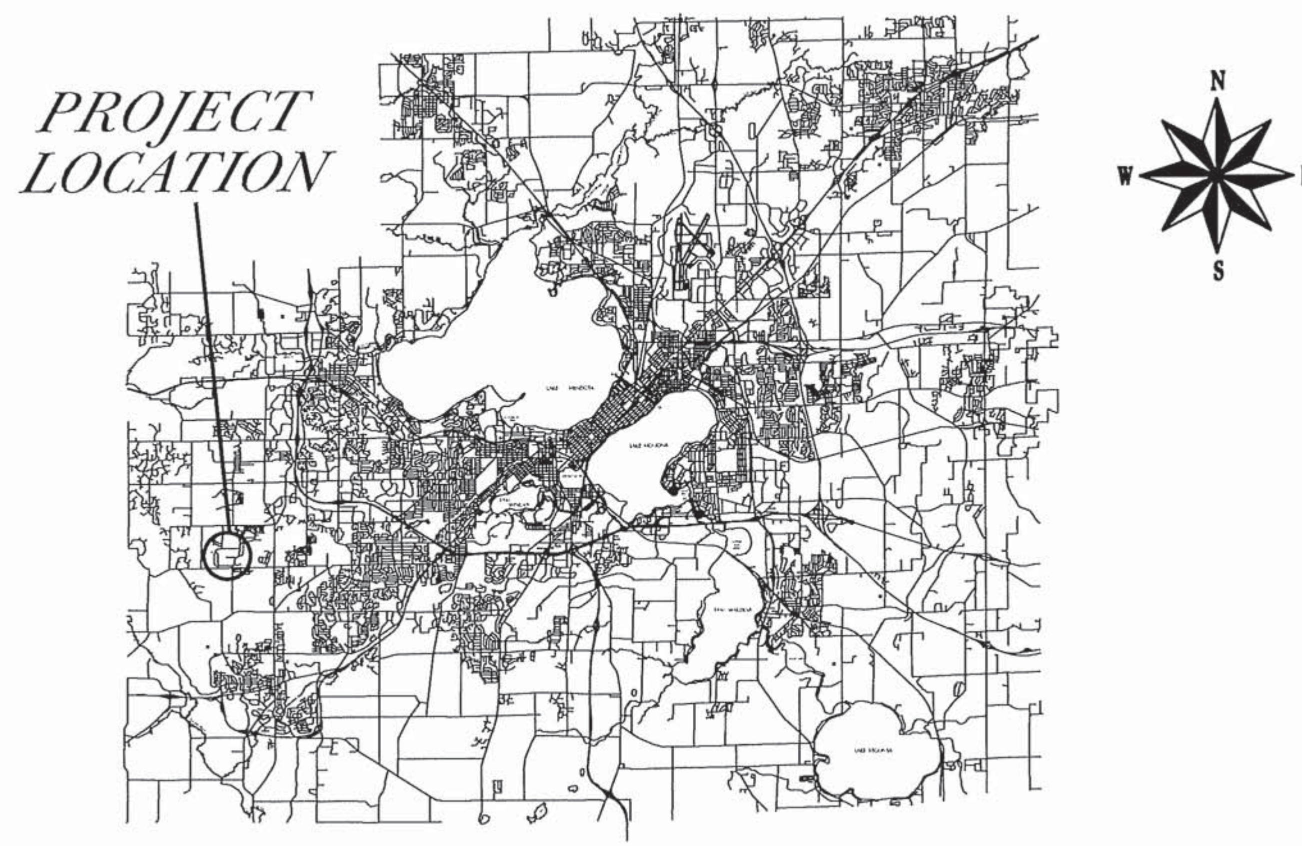
INDEX OF SHEETS

SHEET NO.	1	TITLE
SHEET NO.	G1-G15	GENERAL SHEETS
SHEET NO.	ST1-ST8	SITE PLANS
SHEET NO.	PP1-PP4	ROAD RECONSTRUCTION/STORM SEWER PLANS

CONVENTIONAL SIGNS

FIELD VERIFY ALL UTILITY LOCATIONS

GAS	G
STORM SEWER	ST
SANITARY SEWER	SAN
WATER	W
OVERHEAD ELECTRIC	OH
POWER POLE	
HANDICAP RAMP	
COMBUSTIBLE FLUIDS	



PLANNED EARTHWORK QUANTITIES
ESTIMATED EXCAVATION CUT..........620 CY

PLOT SCALE: ____
PLOT NAME: ____
REV. DATE: ____
ORIGINATOR: CITY OF MADISON, STREETS DIVISION

FILE NAME: M:\DESIGN\Projects\11857\Storm\Design\TITLE.dgn

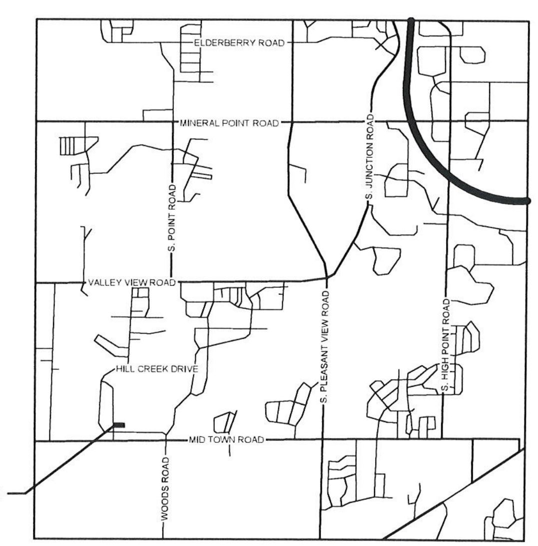
DATE: 6/7/2019

HAWKS LANDING FLOOD MITIGATION SOUTHWEST

CITY OF MADISON
DANE COUNTY, WISCONSIN

WISCONSIN
ERIC J. THOMPSON
E-35761
MADISON
WI
PROFESSIONAL ENGINEER

PROJECT LOCATION



PROJECT LOCATION

LOCATION MAP

NOT TO SCALE

SHEET INDEX

G - GENERAL SHEETS

G 1	TITLE SHEET
G 2	PROJECT OVERVIEW
G 3-4	EROSION CONTROL DETAILS
G 5	STREET DETAILS
G 6	STREET & STORM DETAILS
G 7-12	STORM SEWER DETAILS
G 13A	STORM SEWER DETAILS
G 13	STORM SEWER DETAILS
G 14	STORM SEWER DETAILS
G 15	WATERMAIN DETAILS

ST - SITE PLANS

ST 1	EROSION CONTROL PLAN
ST 2	DEMOLITION PLAN - HIDDEN HILL DRIVE - PHASE I
ST 2A	DEMOLITION PLAN - HIDDEN HILL DRIVE - PHASE II
ST 3	DEMOLITION PLAN - SHADY POINT DRIVE
ST 4	GRADING PLAN - HIDDEN HILL DRIVE - PHASE I
ST 4A	GRADING PLAN - HIDDEN HILL DRIVE - PHASE II
ST 5	GRADING PLAN - SHADY POINT DRIVE
ST 6	GRADING PLAN - CURB RAMPS
ST 7	GRADING PLAN - CURB RAMPS
ST 8A	RESTORATION PLAN
ST 8	RESTORATION PLAN

PP - ROAD CONSTRUCTION AND STORM SEWER PLANS

PP 1A	PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER
PP 1	PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER
PP 2A	PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER
PP 2B	PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER
PP 2	PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER
PP 3	PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER
PP 4	PLAN & PROFILE SHEET - STORMWATER EASEMENT

DIGGERS HOTLINE

Dial 811 or (800) 242-8511

www.DiggersHotline.com

NOTE:
UTILITY LOCATIONS SHOWN ON PLANS ARE APPROXIMATE AND CONTRACTOR SHALL HAVE APPROPRIATE UTILITY MARK EXACT LOCATIONS PRIOR TO CONSTRUCTION.

LEGEND

- EXISTING WATER MAIN
- EXISTING WATER MAIN, VALVE & HYDRANT
- EXISTING WATER SERVICE & CURB STOP
- PROPOSED WATER MAIN, VALVE, & HYDRANT
- PROPOSED WATER SERVICE & CURB STOP
- EXISTING SANITARY SEWER & MANHOLE
- PROPOSED SANITARY SEWER & MANHOLE
- EXISTING FORCEMAIN
- EXISTING STORM SEWER & INLET
- PROPOSED STORM SEWER & INLET
- PROPOSED STORM SEWER & MANHOLE
- BURIED ELECTRIC
- BURIED GAS & VALVE
- BURIED CABLE TELEVISION
- BURIED TELEPHONE
- BURIED FIBER OPTICS
- OVERHEAD UTILITY
- RAILROAD TRACKS
- EXISTING CURB & GUTTER
- PROPOSED CURB & GUTTER
- EXISTING SIDEWALK
- PROPOSED SIDEWALK
- EXISTING CULVERT PIPE
- PROPOSED CULVERT PIPE
- FENCE LINE
- DRAINAGE ARROW
- SILT FENCE
- RIGHT-OF-WAY
- BASELINE
- PROPERTY LINE
- TREE LINE
- BENCHMARK
- IRON PIPE
- IRON ROD
- CONTROL POINT
- UTILITY POLE & GUY
- SOIL BORING
- LIGHT POLE
- PEDESTAL
- STREET SIGN
- MAILBOX
- FLAGPOLE
- TREE - DECIDUOUS
- TREE - CONIFEROUS
- TREE TO BE REMOVED

UTILITIES

GAS:

MADISON GAS & ELECTRIC COMPANY
133 S. BLAIR STREET
MADISON, WI 53701
CONTACT: SHAUN ENDRES
(608) 252-7224
SENDRES@MGE.COM

ELECTRIC:

ALLIANT ENERGY
2147 COUNTY HIGHWAY PB
VERONA, WI 53593
CONTACT: NICK DACHNIWSKYJ
O: (608) 845-1143 C: (608) 444-9362
NICHOLASDACHNIWSKYJ@ALLIANTENERGY.COM

TELEPHONE & CATV:

TDS TELECOM
525 JUNCTION ROAD
MADISON, WI 53717
CONTACT: JERRY MYERS
(608) 664-4404
JERRY.MYERS@TDSTELECOM.COM

CHARTER COMMUNICATIONS
2701 DANIELS STREET
MADISON, WI 53718
CONTACT: TOM PAYNE
(608) 574-3331
TOM.PAYNE@CHARTERCOM.COM

SANITARY SEWER:

CITY OF MADISON - ENGINEERING
CITY - COUNTY BUILDING, ROOM 115
210 MARTIN LUTHER KING JR. BLVD.
MADISON, WI 53703
CONTACT: MARK MODER, P.E.
(608) 261-9250
MMODER@CITYOFMADISON.COM

WATERMAIN:

CITY OF MADISON
119 E. OLIN AVENUE
MADISON, WI 53713
CONTACT: ADAM WIEDERHOEFT
(608) 266-9121
AWIEDERHOEFT@MADISONWATER.ORG
AFTER HOURS EMERGENCY: (608) 266-4665

STORM SEWER:

CITY OF MADISON
CITY - COUNTY BUILDING, ROOM 115
210 MARTIN LUTHER KING JR. BOULEVARD
MADISON, WI 53703
CONTACT: LAUREN STRIEGL
(608) 266-4094
LSTRIEGL@CITY OF MADISON.COM

PROJECT NO.: 00373079	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KH
F.B. : .	CHECKED BY: ET	2	10/4/19	ALIGNMNET REVISION	KH
.	.	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CP

PLOT DATE: Friday, June 7, 2019 11:25:50 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

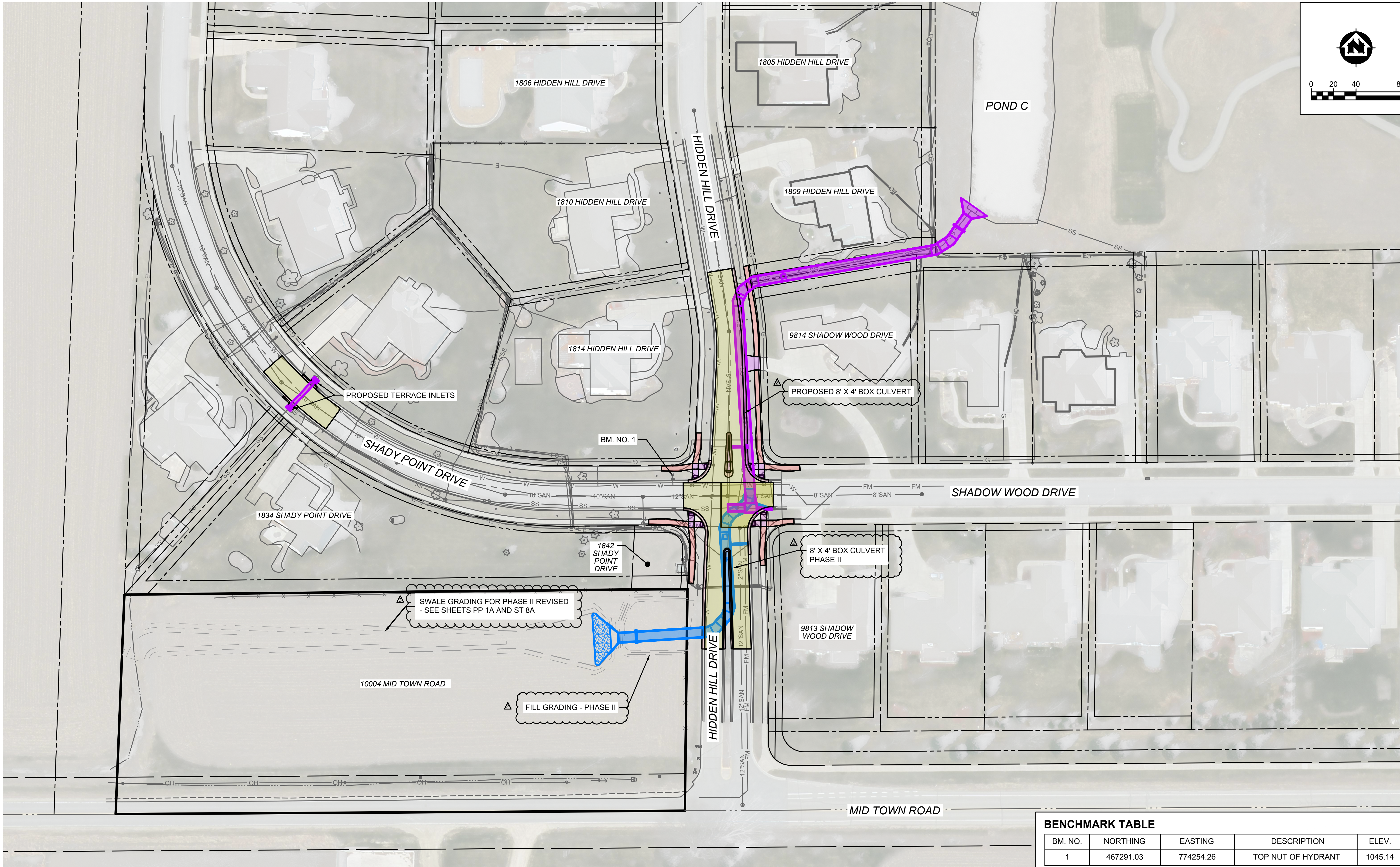
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

TITLE SHEET

FILE NO. 00373079

SHEET G 1



BENCHMARK TABLE

BM. NO.	NORTHING	EASTING	DESCRIPTION	ELEV.
1	467291.03	774254.26	TOP NUT OF HYDRANT	1045.14

PROJECT NO.: 00373079	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
F.B. : .	CHECKED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
.	.	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:22 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

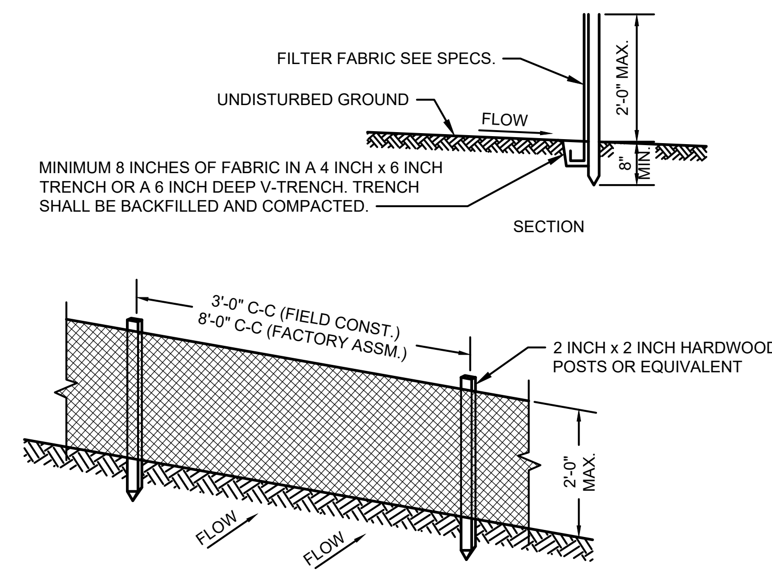
PROJECT OVERVIEW

FILE NO. 00373079

SHEET G 2

CONSTRUCTION SITE
EROSION CONTROL REQUIREMENTS

1. SECTION NR216.46 OF WISCONSIN STATE ADMINISTRATIVE CODE IDENTIFIES REQUIREMENTS FOR CONSTRUCTION SITE AND POST-CONSTRUCTION EROSION CONTROL. IT IS THE INTENT OF THESE PLANS TO SATISFY THESE REQUIREMENTS. THE METHODS AND STRUCTURES USED TO CONTROL EROSION SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR. CONTRACTOR SHALL IMPLEMENT AN APPROPRIATE MEANS OF CONTROLLING EROSION DURING SITE OPERATION AND UNTIL THE VEGETATION IS RE-ESTABLISHED. ADJUSTMENTS TO THE CONTROL SYSTEM SHALL BE MADE AS REQUIRED.
2. ALL WORK SHALL BE IN ACCORDANCE WITH THE LATEST EDITION OF THE WISCONSIN DNR'S CONSERVATION PRACTICE STANDARDS. THESE STANDARDS ARE PERIODICALLY UPDATED AND IT IS THE CONTRACTOR'S RESPONSIBILITY TO OBTAIN AND REFERENCE THE MOST RECENTLY RELEASED STANDARD.
3. THIS INFORMATION IS ONLY ONE PART OF THE OVERALL EROSION CONTROL REQUIREMENTS. ADDITIONAL REQUIREMENTS MAY ALSO BE SHOWN ON THE CONTRACT DRAWINGS AND IN THE ACCOMPANYING SPECIFICATIONS.
4. ADDITIONAL EROSION CONTROL MEASURES, AS REQUESTED IN WRITING BY THE STATE OR LOCAL INSPECTORS, OR THE OWNER'S ENGINEER, SHALL BE INSTALLED WITHIN 24 HOURS.
5. THE AREA OF EROSIVE LAND EXPOSED TO THE ELEMENTS BY GRUBBING, EXCAVATION, TRENCHING, BORROW AND FILL OPERATIONS AT ANY ONE TIME SHALL BE MINIMIZED TO THE MAXIMUM EXTENT PRACTICABLE. FOR ANY DISTURBED AREA THAT REMAINS INACTIVE FOR GREATER THAN 7 WORKING DAYS, OR WHERE GRADING WORK EXTENDS BEYOND THE PERMANENT SEEDING DEADLINES, THE SITE MUST BE TREATED WITH TEMPORARY STABILIZATION MEASURES SUCH AS SOIL TREATMENT, TEMPORARY SEEDING AND/OR MULCHING. ALL DISTURBED AREAS SHALL BE TREATED WITH PERMANENT STABILIZATION MEASURES WITHIN 3 WORKING DAYS OF FINAL GRADING.
6. ALL EROSION CONTROL MEASURES AND STRUCTURES SERVING THE SITE MUST BE INSPECTED AT LEAST WEEKLY OR WITHIN 24 HOURS OF THE TIME 0.5 INCHES OF RAIN HAS OCCURRED. ALL NECESSARY REPAIR AND MAINTENANCE WILL BE DONE AT THIS INSPECTION TIME.
7. ALL EROSION CONTROL DEVICES AND/OR STRUCTURES SHALL BE PROPERLY INSTALLED PRIOR TO CLEARING AND GRUBBING OPERATIONS WITHIN THEIR RESPECTIVE DRAINAGE AREAS. THESE SHALL BE PROPERLY MAINTAINED FOR MAXIMUM EFFECTIVENESS UNTIL VEGETATION IS RE-ESTABLISHED.
8. ALL EROSION CONTROL DEVICES SHALL BE PROPERLY INSTALLED PRIOR TO ANY SOIL DISTURBANCE.
9. ANY SLOPES STEEPER THAN 3H:1V SHALL BE STAKED WITH EROSION CONTROL FABRIC UNLESS INDICATED ON THE PLAN.
10. ALL WASTE AND UNUSED BUILDING MATERIALS (INCLUDING GARBAGE, DEBRIS, CLEANING WASTES, WASTEWATER, TOXIC MATERIALS, OR HAZARDOUS MATERIALS) SHALL BE PROPERLY DISPOSED OF AND NOT ALLOWED TO BE CARRIED OFF-SITE BY RUNOFF OR WIND.
11. WIND EROSION SHALL BE KEPT TO A MINIMUM DURING CONSTRUCTION. WATERING, MULCH, OR A TACKING AGENT MAY BE REQUIRED TO PROTECT NEARBY RESIDENCES AND WATER RESOURCES.
12. CHANNELIZED RUNOFF ENTERING THE PROJECT SITE FROM ADJOINING LANDS SHALL BE DIVERTED THROUGH NATURALLY OR ARTIFICIALLY EROSION-RESISTANT CONVEYANCES. IF CHANNELIZED RUNOFF CANNOT BE DIVERTED, SITE BEST MANAGEMENT PRACTICES MUST ACCOUNT FOR THE ADDITIONAL FLOW RATES AND EROSION POTENTIAL THAT SUCH RUNOFF PRESENTS.
13. THE CONTRACTOR SHALL TAKE ALL POSSIBLE PRECAUTIONS TO PREVENT SOILS FROM BEING TRACKED ONTO PUBLIC OR PRIVATE ROADWAYS. PAVED SURFACES ADJACENT TO CONSTRUCTION SITE VEHICLE ACCESS SHALL BE SWEPT AND/OR SCRAPED (NOT FLUSHED) PERIODICALLY TO REMOVE SOIL, DIRT, AND/OR DUST.
14. EROSION CONTROLS SHALL BE INSTALLED ON THE DOWNSTREAM SIDE OF TEMPORARY STOCKPILES. ANY SOIL STOCKPILE THAT REMAINS FOR MORE THAN 30 DAYS SHALL BE COVERED OR TREATED WITH STABILIZATION PRACTICES SUCH AS TEMPORARY OR PERMANENT SEEDING AND MULCHING. ALL STOCK PILES SHALL BE PLACED AT LEAST 75 FEET FROM STREAMS OR WETLANDS.
15. ADDITIONAL EROSION CONTROL FOR UTILITY CONSTRUCTION (STORM SEWER, SANITARY SEWER, WATER MAIN, ETC.) SHALL INCLUDE THE FOLLOWING:
    a. PLACE EXCAVATED TRENCH MATERIAL ON THE HIGH SIDE OF THE TRENCH.
    b. BACKFILL, COMPACT, AND STABILIZE THE TRENCH IMMEDIATELY AFTER PIPE CONSTRUCTION.
    c. DISCHARGE OF TRENCH WATER OR DEWATERING EFFLUENT MUST BE PROPERLY TREATED TO REMOVE SEDIMENT IN ACCORDANCE WITH THE WDNR CONSERVATION PRACTICE STANDARD 1061 - DEWATERING OR A SUBSEQUENT WDNR DEWATERING STANDARD PRIOR TO DISCHARGE INTO A STORM SEWER, DITCH, DRAINAGEWAY, OR WETLAND OR LAKE.
16. ALL DRAINAGE CULVERTS, STORM DRAIN INLETS, MANHOLES, OR ANY OTHER EXISTING STRUCTURES THAT COULD BE DAMAGED BY SEDIMENTATION SHALL BE PROTECTED ACCORDING TO THE VARIOUS METHODS PROVIDED IN THE PRINTED CONSERVATION PRACTICE STANDARDS.
17. ANY SOIL EROSION THAT OCCURS AFTER FINAL GRADING AND/OR STABILIZATION MUST BE REPAIRED AND THE STABILIZATION WORK REDONE.
18. THE FIRST SIX WEEKS AFTER INITIAL STABILIZATION, ALL NEWLY SEEDED AND MULCHED AREAS SHALL WATERED WHENEVER 7 DAYS ELAPSE WITHOUT A RAIN EVENT.
19. WHEN THE DISTURBED AREA HAS BEEN STABILIZED BY PERMANENT VEGETATION OR OTHER MEANS, TEMPORARY BMP'S SUCH AS SILT FENCES, STRAW BALES, AND SEDIMENT TRAPS SHALL BE REMOVED AND THESE AREAS STABILIZED.
20. ALL TEMPORARY BEST MANAGEMENT PRACTICES SHALL BE MAINTAINED UNTIL THE SITE IS STABILIZED.
21. ALL DISTURBED AREAS SHALL BE PERMANENTLY STABILIZED WITH SEED AND MULCH UNLESS OTHERWISE SPECIFIED. A MINIMUM OF FOUR INCHES OF TOPSOIL SHALL BE APPLIED TO ALL AREAS TO BE SEEDED OR SODDED.

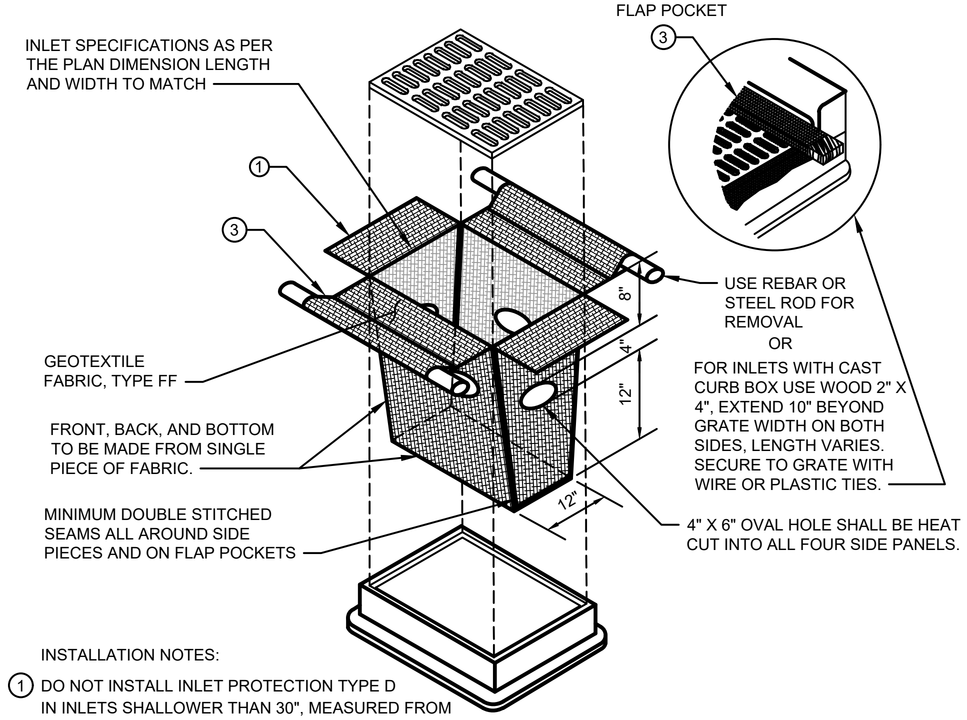


GENERAL NOTES:

1. ENDS OF FENCE SHALL BE TURNED UPSLOPE 1 TO 2 FEET IN ELEVATION TO PREVENT FLANKING.
2. STAPLE FABRIC WITH 1/2 INCH (MINIMUM) STAPLES TO THE UPSLOPE SIDE OF THE POSTS.
3. WHEN TWO SECTIONS OF FILTER FABRIC ADJOIN EACH OTHER THEY SHALL BE OVERLAPPED BY SIX INCHES AND FOLDED.

TYPICAL SILT FENCE INSTALLATION AT SITE PERIMETER DETAIL

NO SCALE



INSTALLATION NOTES:

1. DO NOT INSTALL INLET PROTECTION TYPE D IN INLETS SHALLOWER THAN 30", MEASURED FROM THE BOTTOM OF THE INLET TO THE TOP OF THE GRATE.
2. TRIM EXCESS FABRIC IN THE FLOW LINE TO WITHIN 3" OF THE GRATE.
3. THE INSTALLED BAG SHALL HAVE A MINIMUM SIDE CLEARANCE, BETWEEN THE INLET WALLS AND THE BAG, MEASURED AT THE BOTTOM OF THE OVERFLOW HOLES, OF 3". WHERE NECESSARY THE CONTRACTOR SHALL CINCH THE BAG, USING PLASTIC ZIP TIES, TO ACHIEVE THE 3" CLEARANCE. THE TIES SHALL BE PLACED AT A MAXIMUM OF 4" FROM THE BOTTOM OF THE BAG.

INLET PROTECTION, TYPE D

NO SCALE
CAN BE INSTALLED IN ANY INLET TYPE WITH OR WITHOUT A CURB BOX AS PER NOTE

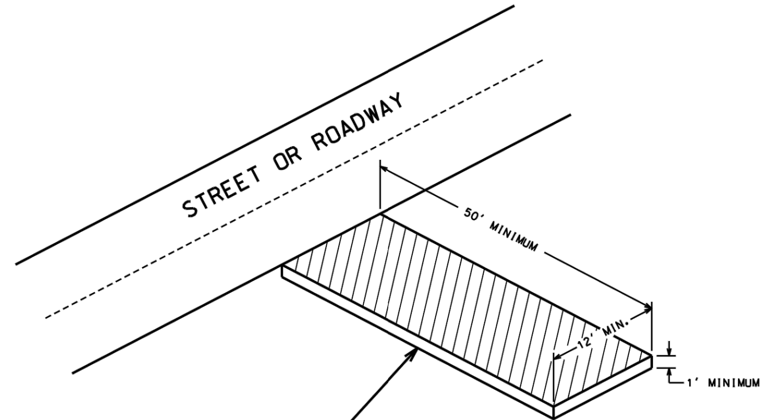
PROJECT NO.: 00373079	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
F.B. : .	CHECKED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
.	.	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:23 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

EROSION CONTROL DETAILS



CONSTRUCTION ENTRANCE

(SEE NOTES #2 & #3)

GENERAL NOTES FOR TYPICAL STONE TRACKING PADS:

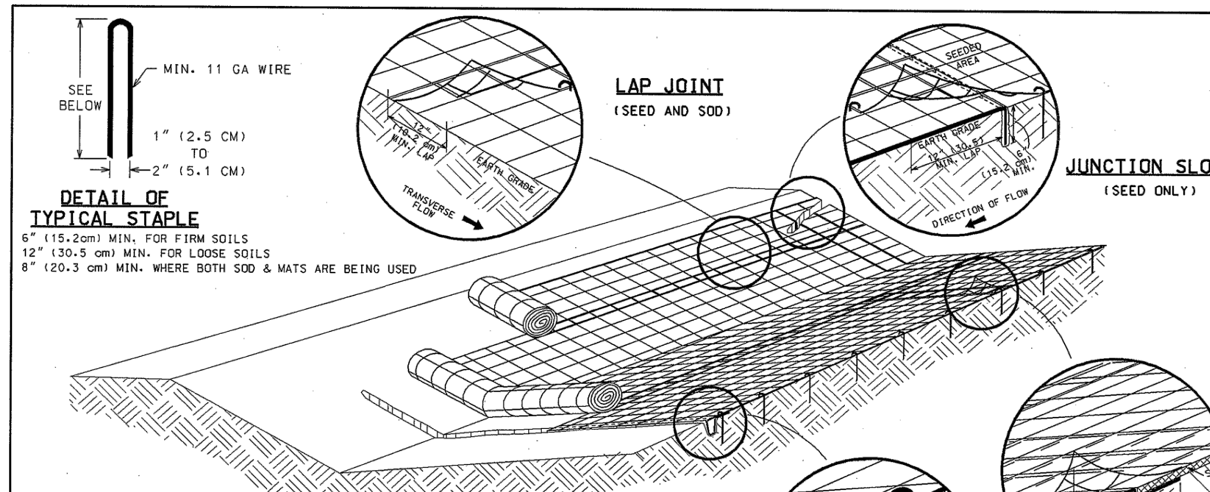
1. CONSTRUCTION ENTRANCE TRACKOUT CONTROLS MUST BE INSTALLED PRIOR TO ANY TRAFFIC LEAVING THE SITE.
2. THE AGGREGATE FOR THE CONSTRUCTION ENTRANCE SHALL BE HARD, DURABLE, ANGULAR STONE OR RECYCLED CONCRETE MEETING THE FOLLOWING GRADATION, LISTED BY SIEVE SIZE IN INCHES (PERCENT BY WEIGHT PASSING): 3" (100% PASSING), 2.5" (90-100% PASSING), 1.5" (25-60% PASSING), 3/4" (0-20% PASSING), AND 3/8" (0-5% PASSING).
3. WHERE WARRANTED DUE TO SOIL TYPE OR HIGH GROUNDWATER, UNDERLAY THE STONE TRACKING PAD WITH GEOTEXTILE FABRIC TO MINIMIZE MIGRATION OF UNDERLYING SOIL INTO THE STONE. SELECT FABRIC TYPE HR OR FF GEOTEXTILE FABRIC BASED ON SOIL CONDITIONS AND VEHICLE LOADING. IF UNDERLAY IS REQUIRED IT SHALL BE INCLUDED IN CONSTRUCTION ENTRANCE COST.
4. INSTALL THE STONE TRACKING PAD TO ENSURE VEHICLES THAT DRIVE OVER EXPOSED SOIL EXIT ALONG THE FULL LENGTH OF THE PAD.
5. AGGREGATE SHALL BE PLACED IN A LAYER AT LEAST 12 INCHES THICK. DO NOT COMPACT, GROUT, OR CAUSE SMOOTHING OF TRACKING PAD SURFACE.
6. INSTALL THE TRACKING PAD ACROSS THE FULL WIDTH OF THE ACCESS POINT, OR RESTRICT EXITING TRAFFIC TO A DEDICATED EGRESS LANE WITH A DRIVING SURFACE AT LEAST 12 FEET WIDE.
7. SURFACE WATERS MUST BE PREVENTED FROM PASSING THROUGH THE CONSTRUCTION ENTRANCE. FLOWS SHALL BE DIVERTED AWAY FROM THE CONSTRUCTION ENTRANCE OR CONVEYED UNDER AND AROUND BY USE OF A CULVERT, DIVERSION BERM OR OTHER PRACTICES AS APPROVED BY THE CONSTRUCTION ENGINEER.
8. RUNOFF FROM TRACKING PAD MUST BE DIRECTED TO SEDIMENT CONTROL PRACTICES.
9. MAINTAIN A LOOSENED, ROUGH SURFACE BY SCRAPING, LOOSENING, OR TOP-DRESSING WITH ADDITIONAL AGGREGATE.
10. ALTERNATIVE TRACKOUT CONTROL DEVICES MUST MEET THE REQUIREMENTS OF WDNR STANDARD FOR TRACKOUT CONTROL PRACTICES (1057) AND HAVE APPROVAL OF CITY OF MADISON ENGINEERING PRIOR TO IMPLEMENTATION.

2018

CITY OF MADISON
ENGINEERING DIVISION

CONSTRUCTION ENTRANCE

STANDARD DETAIL DRAWING 1.07



GENERAL NOTES:

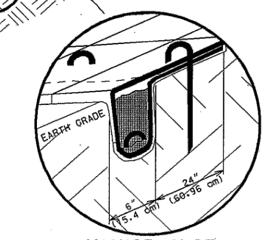
DETAILS OF CONSTRUCTION MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

VARIATIONS IN THE DIMENSIONS OR MATERIALS SHOWN HEREON SHALL BE PERMITTED IF THEY PROVIDE EQUIVALENT PROTECTION AND MATERIAL STRENGTH AND IF PRIOR APPROVAL OF THE ENGINEER IS OBTAINED.

LAP JOINTS SHALL NOT BE PLACED IN THE BOTTOM OF V-SHAPED DITCHES.

JUNCTION SLOTS ON ADJACENT STRIPS OF MATTING SHALL BE STAGGERED A MINIMUM OF 4 FEET (1.219 m) APART.

EROSION MAT SHALL BE MEASURED AND PAID FOR IN ACCORDANCE WITH THE STANDARD SPECIFICATIONS.



ANCHOR SLOT
AT BEGINNING OF EROSION MAT
EXTRA STAPLE AT END ONLY
(SEED AND SOD)

EROSION MAT OVER SOD:

a. ONLY JUTE FABRIC WILL BE PERMITTED OVER SOD.

b. WOOD STAKES FOR SOD MAY BE OMITTED BY THE ENGINEER IF EXISTING SLOPE AND SOIL CONDITIONS SO WARRANT.

c. THE WIDTH OF EROSION MAT SHALL ALWAYS EXCEED THE SOD WIDTH.

EROSION MAT OVER SEEDING:

JUNCTION OR ANCHOR SLOTS SHALL BE AT MINIMUM INTERVALS OF 100 FEET (30.48 m) ON GRADES UP TO AND INCLUDING 3 PERCENT, AND 50 FEET (15.24 m) ON GRADES EXCEEDING 3 PERCENT.

DRAWING NOT TO SCALE

2004

CITY OF MADISON
ENGINEERING DIVISION

EROSION MAT

STANDARD DETAIL DRAWING 1.02

PROJECT NO.: 00373079	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
F.B. : .	CHECKED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
.	.	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:23 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

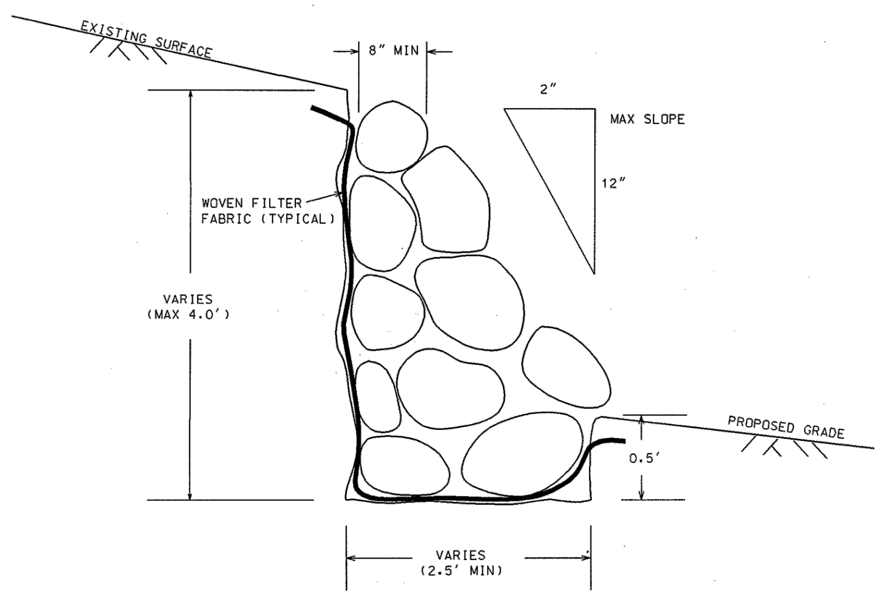
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

EROSION CONTROL DETAILS

FILE NO. 00373079

SHEET G 4



NOTE: FILTER FABRIC TO BE PLACED BEHIND WALL UNLESS OTHERWISE SPECIFIED

2004

CITY OF MADISON
ENGINEERING DIVISION

TYPICAL FIELD STONE RETAINING WALL

DRAWING NOT TO SCALE

STANDARD DETAIL DRAWING 2.06

GENERAL NOTES

TYPE 2-A RAMPS SHALL BE USED IN NEW DEVELOPMENT UNLESS OTHERWISE APPROVED BY THE CITY ENGINEER

DETAILS OF CONSTRUCTION, MATERIALS AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND THE APPLICABLE SPECIAL PROVISIONS.

RAMPS SHALL BE BUILT AT 12H:1V OR FLATTER. WHEN NECESSARY, THE SIDEWALK ELEVATION MAY BE LOWERED TO MEET THE HIGH POINT ON THE RAMP.

DETECTABLE WARNING FIELD SHALL BE MEASURED AND PAID BY THE SQUARE FOOT AS "CURB RAMP DETECTABLE WARNING FIELD".

SURFACE TEXTURE OF THE RAMP SHALL BE OBTAINED BY COARSE BROOMING TRANSVERSE TO THE SLOPE OF THE RAMP.

THE DETECTABLE WARNING SURFACE SHALL BE LOCATED SO THAT THE EDGE NEAREST THE CURB LINE IS 6 INCHES MINIMUM AND 8 INCHES MAXIMUM FROM THE CURB LINE.

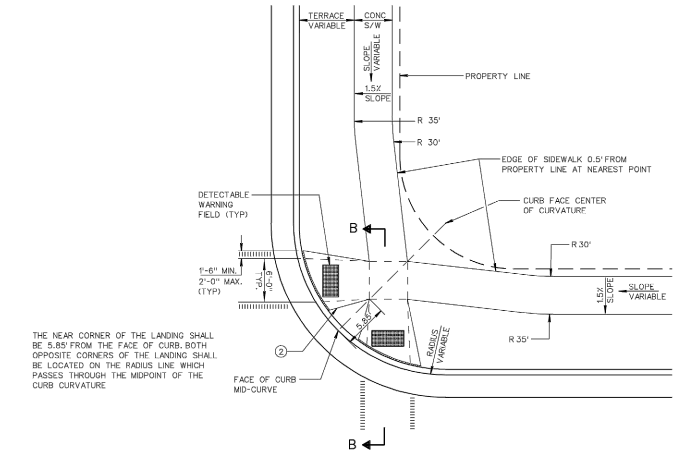
(1) THIS POINT IS AN EXTENSION OF OUTSIDE EDGE OF APPROACHING SIDEWALK WHERE IT MEETS THE BACK OF CONCRETE CURB.

(2) WHEN THIS DISTANCE IS LESS THAN 6'-0" IT MAY BE DIFFICULT TO ACHIEVE A 12H:1V SLOPE, OR FLATTER, ON THE RAMP. REDUCE CURB HEIGHT IN TRIANGLE AREA TO ACHIEVE 12H:1V SLOPE, OR FLATTER, ON RAMP. 2" MINIMUM CURB HEIGHT.

LEGEND

1" EXPANSION JOINT-SIDEWALK
CONTRACTION JOINT FIELD LOCATED
PAVEMENT MARKING CROSSWALK (WHITE)
ALTERNATIVE LAYOUT

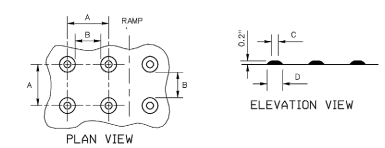
THE NEAR CORNER OF THE LANDING SHALL BE 5.85' FROM THE FACE OF CURB. BOTH OPPOSITE CORNERS OF THE LANDING SHALL BE LOCATED ON THE RADIUS LINE WHICH PASSES THROUGH THE MIDPOINT OF THE CURB CURVATURE



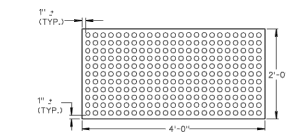
PLAN VIEW
TYPE 2A RAMP

	MIN.	MAX.
A	1.6"	2.4"
B	0.65"	1.5"
C	*	*
D	0.9"	1.4"

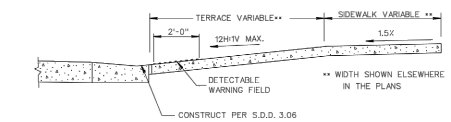
* THE C DIMENSION IS 50% TO 65% OF THE D DIMENSION.



TRUNCATED DOMES
DETECTABLE WARNING PATTERN DETAIL



PLAN VIEW
DETECTABLE WARNING FIELD (TYPICAL)



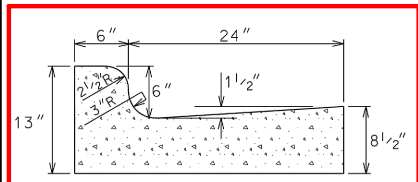
SECTION B-B

2015

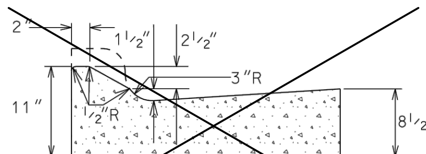
CITY OF MADISON
ENGINEERING DIVISION

CURB RAMPS GENERAL AND CURB RAMP TYPE 2-A

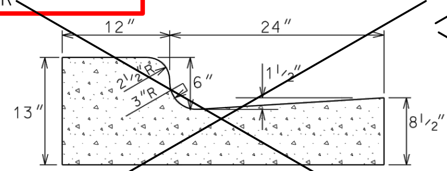
STANDARD DETAIL DRAWING 3.04



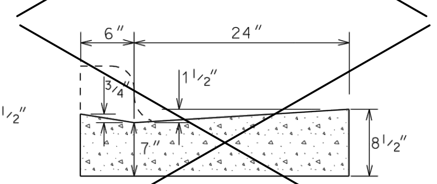
TYPE 'A' CONCRETE CURB & GUTTER



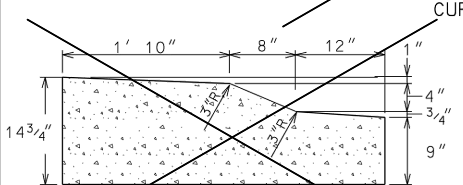
TYPE 'A' MOUNTABLE CONCRETE CURB & GUTTER
(PAY AS TYPE 'A' CURB AND GUTTER)



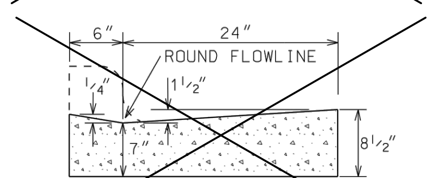
TYPE 'B' CONCRETE CURB & GUTTER



DRIVEWAY SECTION TYPE 'A' CONCRETE CURB & GUTTER
(PAY AS TYPE 'A' CURB AND GUTTER)



TRAFFIC CIRCLE MOUNTABLE CONCRETE CURB & GUTTER



BIKE/PED. RAMP SECTION TYPE 'A' CONCRETE CURB & GUTTER
(PAY AS TYPE 'A' CURB AND GUTTER)

GENERAL NOTES:

LATERAL CONTRACTION JOINTS SHALL BE PLACED AT INTERVALS OF NOT MORE THAN 15' NOR LESS THAN 6' IN LENGTH. THE JOINTS SHALL BE A MINIMUM OF 3" IN DEPTH

EXPANSION JOINTS SHALL BE PLACED TRANSVERSLY AT RADIUS POINTS ON CURVES OF RADIUS 200' OR LESS, AND AT ANGLE POINTS, OR AS DIRECTED BY THE ENGINEER. THE EXPANSION JOINT SHALL BE A ONE PIECE ASPHALTIC MATERIAL HAVING THE SAME DIMENSIONS AS CURB & GUTTER AT THAT STATION AND BE 1/2" THICK.

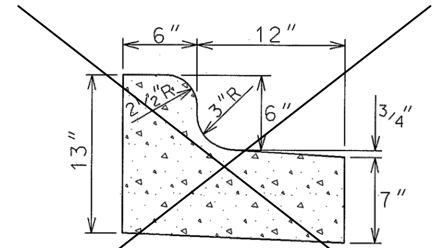
IN ALL CASES, CONCRETE CURB & GUTTER SHALL BE PLACED ON THOROUGHLY COMPACTED CRUSHED STONE

2016

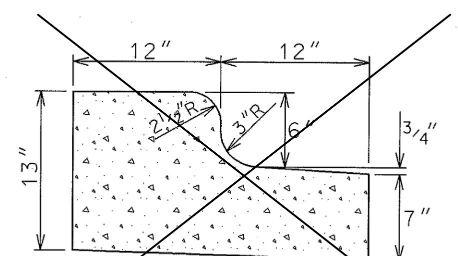
CITY OF MADISON
ENGINEERING DIVISION

MADISON STANDARD CONCRETE CURB & GUTTER

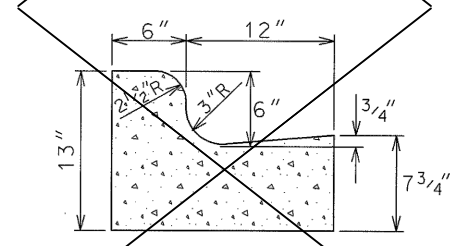
STANDARD DETAIL DRAWING 3.06



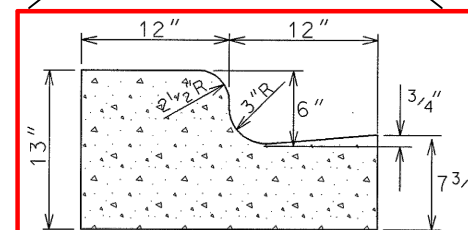
TYPE 'D' CONCRETE CURB & GUTTER



TYPE 'E' CONCRETE CURB & GUTTER



TYPE 'G' CONCRETE CURB & GUTTER



TYPE 'H' CONCRETE CURB & GUTTER

GENERAL NOTES:

LATERAL CONTRACTION JOINTS SHALL BE PLACED AT INTERVALS OF NOT MORE THAN 15' NOR LESS THAN 6' IN LENGTH. THE JOINTS SHALL BE A MINIMUM OF 3" IN DEPTH

EXPANSION JOINTS SHALL BE PLACED TRANSVERSLY AT RADIUS POINTS ON CURVES OF RADIUS 200' OR LESS, AND AT ANGLE POINTS, OR AS DIRECTED BY THE ENGINEER. THE EXPANSION JOINT SHALL BE A ONE PIECE ASPHALTIC MATERIAL HAVING THE SAME DIMENSIONS AS CURB & GUTTER AT THAT STATION AND BE 1/2" THICK.

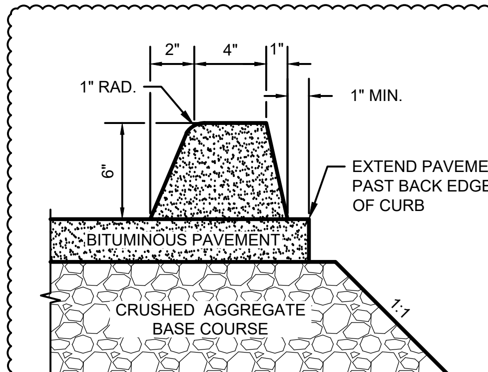
IN ALL CASES, CONCRETE CURB & GUTTER SHALL BE PLACED ON THOROUGHLY COMPACTED CRUSHED STONE

2004

CITY OF MADISON
ENGINEERING DIVISION

MADISON STANDARD CONCRETE CURB & GUTTER

STANDARD DETAIL DRAWING 3.08



ASPHALTIC CURB DETAIL
NO SCALE

PROJECT NO.:	00373079	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE:	6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
F.B.:	.	CHECKED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
			3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:25 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

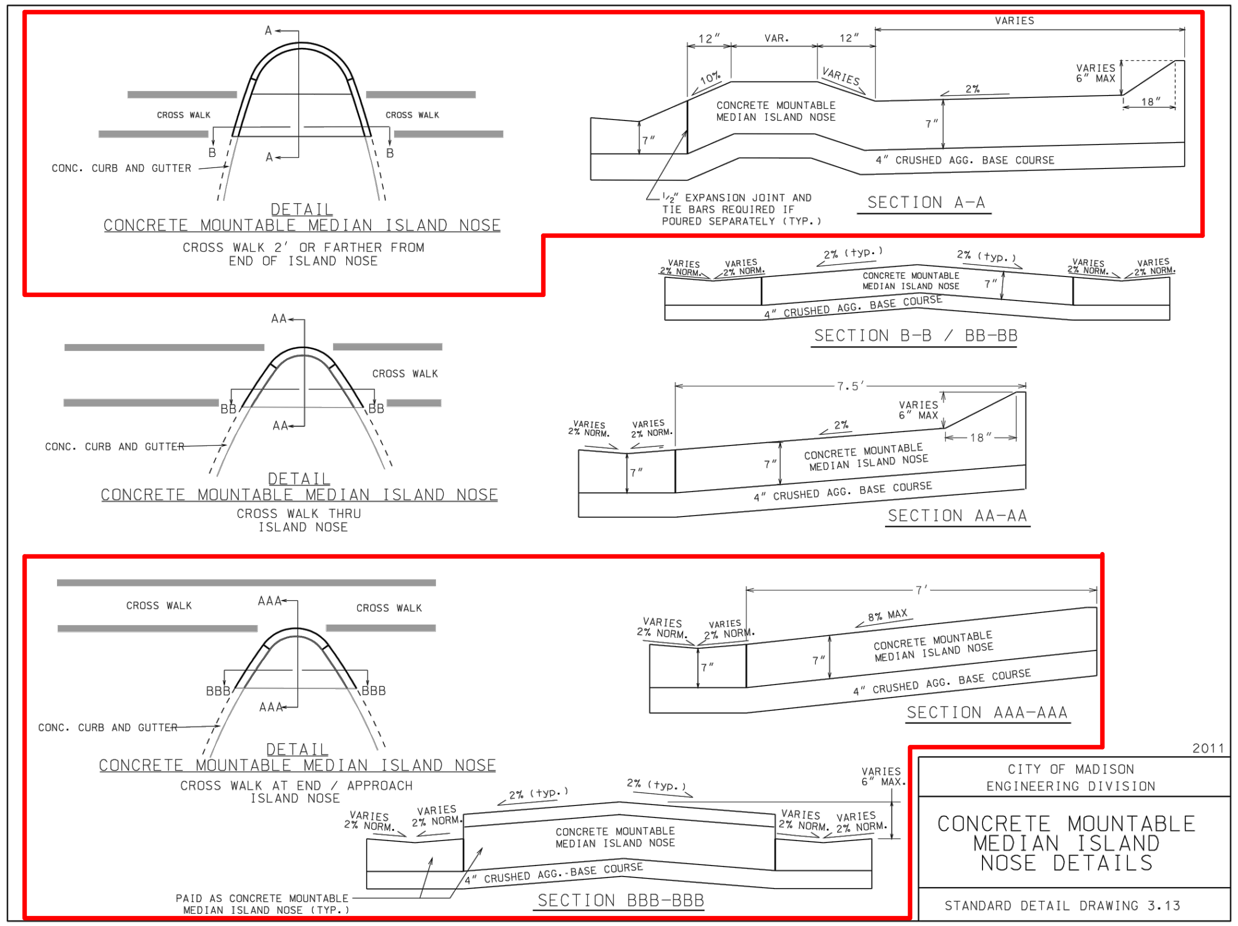
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STREET DETAILS

FILE NO.
00373079

SHEET
G 5

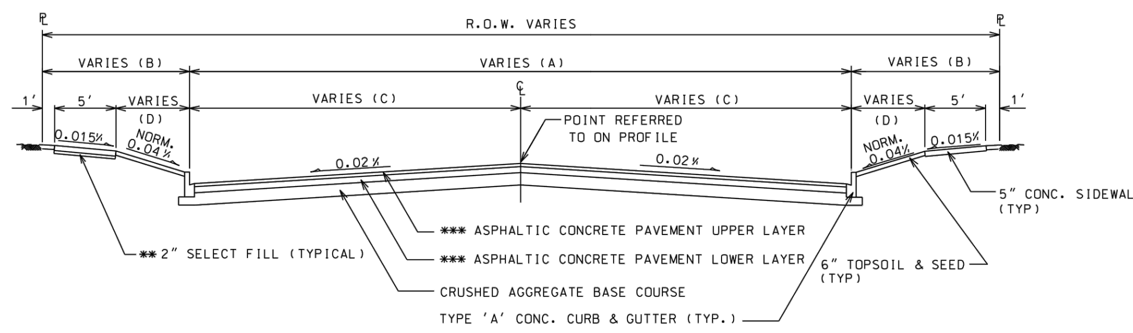


2011

CITY OF MADISON
ENGINEERING DIVISION

CONCRETE MOUNTABLE MEDIAN ISLAND NOSE DETAILS

STANDARD DETAIL DRAWING 3.13



NOTES:

* A PAVEMENT DESIGN IN ACCORDANCE WITH STANDARD DETAIL DRAWING 4.06 IS REQUIRED ON ALL PROJECTS.

** 3" OF CRUSHED AGGREGATE BASE COURSE GRADATION 3 SHALL BE PLACED UNDER THE SIDEWALK WHERE THE CENTERLINE GRADE OF THE STREET EXCEEDS 5%.

*** ALL UPPER LAYER PAVEMENTS ARE 12.5 mm; LOWER LAYER PAVEMENT IS 12.5 mm FOR TYPE A & 19 mm FOR TYPE B & C.

TYPICAL DIMENSIONS

R.O.W.	A	B	C	D
60	32	14	16	8
66	36	15	18	9
66	40	13	20	7
80	44	18	22	12
80	54	13	27	7

*CITY OF MADISON MINIMUM PAVEMENT DESIGN

TYPE	CRUSHED AGGREGATE BASE COURSE		ASPHALTIC CONCRETE PAVEMENT			
	LOWER LAYER GRADATION 1	UPPER LAYER GRADATION 2	LOWER LAYER TYPE	LOWER LAYER THICKNESS	UPPER LAYER TYPE	UPPER LAYER THICKNESS
A	6"	6"	4 LT 58-28 S	1.75"	4 LT 58-28 S	1.75"
B	6"	6"	3 LT 58-28 S	2.50"	4 LT 58-28 S	2.00"
C	6"	6"	3 MT 58-28 S/H 3 HT 58-28 H	3.50"	4 MT 58-28 S/H 4 HT 58-28 H	2.00"

2018

CITY OF MADISON
ENGINEERING DIVISION

TYPICAL SECTION VARIOUS WIDTH STREETS

STANDARD DETAIL DRAWING 4.02

PAVEMENT DESIGN CRITERIA

Identification of roadway classification for pavement design.

Type A - Local street with low traffic volume.

Type B - Collector Type streets or any streets expected to become bus routes (Design Year DLT ≤ 2500).

Type C - Arterial Type streets - all streets expected to carry significant truck traffic (Design Year DLT > 2500).

A.) Design procedure Type A roadway - use greater of:

1. The Standard Minimum Section:
   3.5" Asphaltic Pavement
   12" Crushed Aggregate Base Course
2. Pavement design based on Section 14-10-5 of the Wisconsin Department of Transportation's Facilities Development Manual. Use serviceability index (Pt) = 2.5. ESAL = 10 18K per day, and the soil support value given the existing field conditions. The Minimum Section is based on the above parameters and a soil support value of 3.5.

B.) Design Procedure Type B roadway - use greater of:

1. The Standard Minimum Section:
   4.50"Asphaltic Pavement
   12" Crushed Aggregate Base Course

2. Pavement design based on Section 14-10-5 of the Wisconsin Department of Transportation's Facilities Development Manual. Use serviceability index (Pt) = 2.5. ESAL = 20 18K per day, and the soil support value given the existing field conditions. The Minimum Section is based on the above parameters and a soil support value of 3.5.

C.) Design Procedure Type C roadway - use greater of:

1. The Standard Minimum Section:
   5.50"Asphaltic Pavement
   12" Crushed Aggregate Base Course

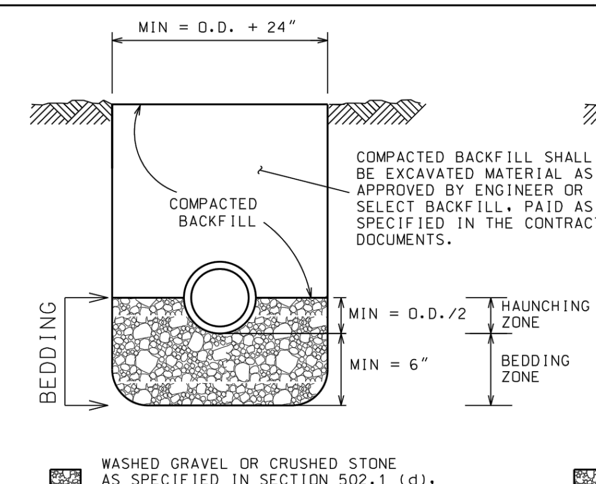
2. Pavement design based on Section 14-10-5 of the Wisconsin Department of Transportation's Facilities Development Manual. Use serviceability index (Pt) = 2.5, and the soil support value given the existing field conditions. The ESAL shall be calculated based on Section 14-1-5.

2018

CITY OF MADISON
ENGINEERING DIVISION

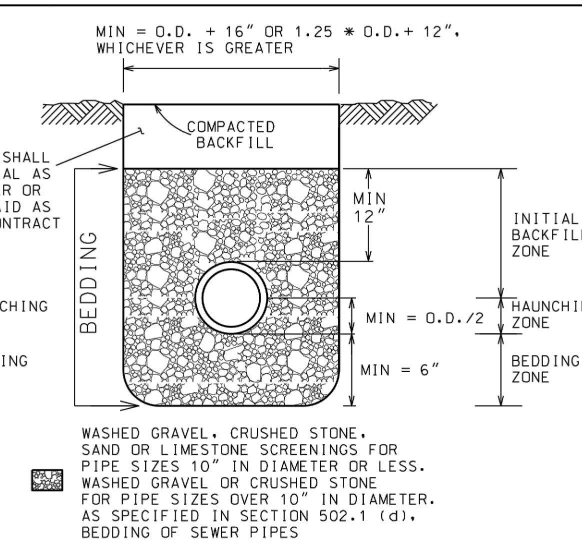
PAVEMENT DESIGN CRITERIA

STANDARD DETAIL DRAWING 4.06



WASHED GRAVEL OR CRUSHED STONE AS SPECIFIED IN SECTION 502.1 (d), BEDDING OF SEWER PIPES

BEDDING FOR REINFORCED CONCRETE SEWER PIPES



WASHED GRAVEL, CRUSHED STONE, SAND OR LIMESTONE SCREENINGS FOR PIPE SIZES 10" IN DIAMETER OR LESS. WASHED GRAVEL OR CRUSHED STONE FOR PIPE SIZES OVER 10" IN DIAMETER. AS SPECIFIED IN SECTION 502.1 (d), BEDDING OF SEWER PIPES

BEDDING FOR SANITARY PIPE

NOTES:

UNLESS OTHERWISE SPECIFIED, ALL SANITARY PIPES, INCLUDING LATERALS AND LEADS, SHALL BE INSTALLED WITH THE TYPE OF BEDDING SHOWN FOR THE TYPE AND SIZE OF PIPE INSTALLED.

THE COSTS OF BEDDING SHALL BE INCLUDED IN THE UNIT PRICES BID FOR THE PIPE. FOR RCP, BEDDING INCLUDES THE HAUNCHING & BEDDING ZONES. FOR PLASTIC PIPES, THE BEDDING INCLUDES THE HAUNCHING, BEDDING & INITIAL BACKFILL ZONES. THE BEDDING SHALL BE INSTALLED & COMPACTED IN 6" MAXIMUM LIFTS.

ALL TRENCHES SHALL BE HAND BACKFILLED TO A POINT 12" ABOVE THE TOP OF THE PIPE. ALL BEDDING SHALL BE MECHANICALLY COMPACTED.

PAYMENT SHALL NOT BE MADE FOR BACKFILL WITH EXCAVATED MATERIAL, IF APPROVED. SELECT FILL, IF REQUIRED, SHALL BE PAID PER CONTRACT.

THE MAXIMUM ALLOWABLE TRENCH WIDTH SHALL BE 3 * O.D., THE MINIMUM TRENCH WIDTH AS SPECIFIED, AND SHALL APPLY FROM THE BOTTOM OF THE TRENCH TO A POINT 12" ABOVE THE TOP OF THE PIPE. WHERE THIS WIDTH IS EXCEEDED, THE CONTRACTOR SHALL FURNISH AND INSTALL A HIGHER TYPE OF BEDDING AT **NO EXTRA COST**. THE TYPE OF BEDDING SHALL BE DETERMINED BY THE ENGINEER.

O.D. EQUALS THE OUTSIDE DIAMETER OF THE PIPE.

DRAWING NOT TO SCALE

2016

CITY OF MADISON
ENGINEERING DIVISION

PIPE BEDDING AND BACKFILL

STANDARD DETAIL DRAWING 5.2.1

PROJECT NO.: 00373079	SCALE: AS SHOWN	NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
F.B. : .	CHECKED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
.	.	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:27 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

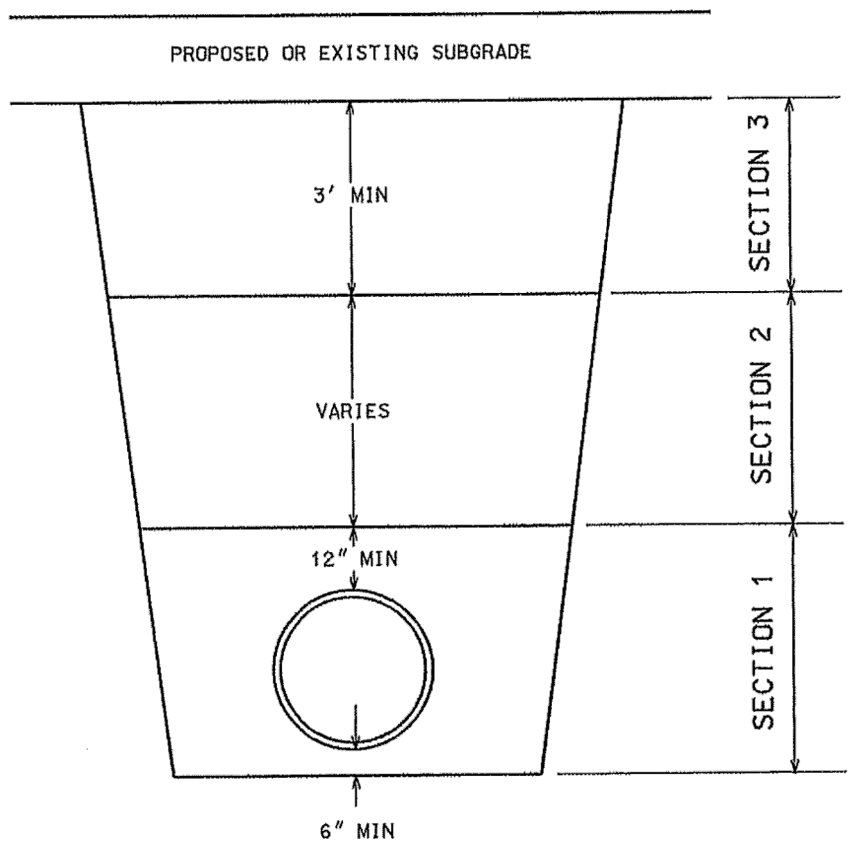
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STREET & STORM SEWER DETAILS

FILE NO.
00373079

SHEET
G 6



TYPICAL TRENCH COMPACTION

ALL BACKFILL MATERIAL SHALL BE PLACED IN LIFTS NOT TO EXCEED 12" BEFORE COMPACTION UNLESS AUTHORIZED BY THE ENGINEER DUE TO THE CHARACTER OF THE MATERIAL AND THE COMPACTING EQUIPMENT. EACH LIFT SHALL BE MECHANICALLY COMPACTED TO THE REQUIRED DENSITY PRIOR TO PLACING SUCCEEDING LIFTS OF BACKFILL MATERIAL.

IN COLD WEATHER, TRENCHES SHALL BE COMPACTED IN ACCORDANCE WITH THE REQUIREMENTS SPECIFIED IN SECTION 502.1 (e), BACKFILLING EXCAVATIONS AND COMPACTION OF BACKFILL, OF THESE SPECIFICATIONS.

SECTION 1:

MECHANICALLY COMPACTED BEDDING AS REQUIRED BY THE SPECIFICATIONS. COMPACTION ACHIEVED WITH SMALLER PLATE COMPACTOR. FOR ALL PLASTIC PIPE SECTION 1 SHALL BE INSTALLED IN ACCORDANCE WITH S.D.D. 5.2.1A

SECTION 2:

MINIMUM COMPACTION OF 90% MAXIMUM DENSITY. COMPACTION OF BACKFILL WITH BOMAG OR HOE-PAC SHALL NOT BEGIN UNTIL THE DEPTH OF BACKFILL MATERIAL IS TWO FEET ABOVE THE TOP OF PIPE.

SECTION 3:

MINIMUM COMPACTION OF 95% MAXIMUM DENSITY.

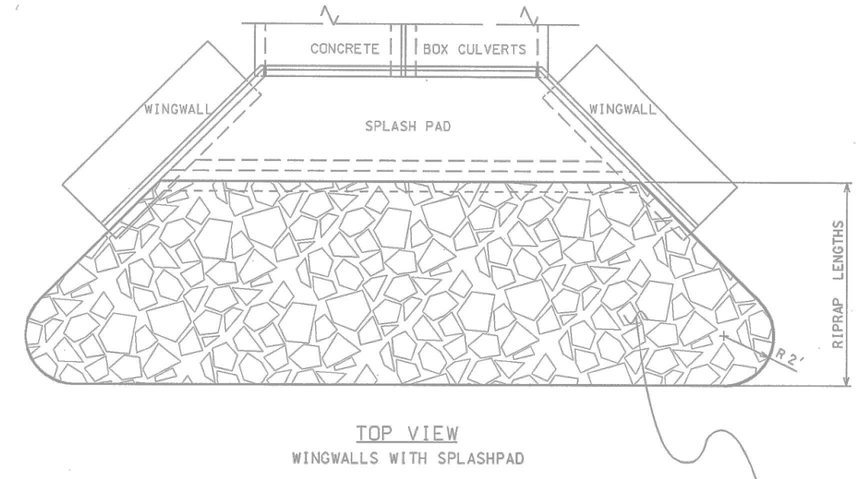
2011

CITY OF MADISON
ENGINEERING DIVISION

TYPICAL TRENCH COMPACTION

STANDARD DETAIL DRAWING 5.2.2

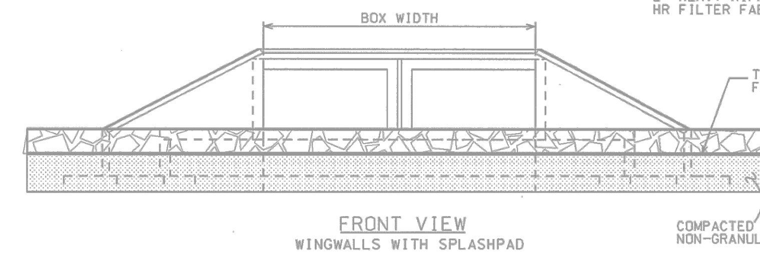
CONSTRUCT WINGWALLS AND SPLASH PAD PER S.D.D. 5.5.1



TOP VIEW
WINGWALLS WITH SPLASHPAD

RIPRAP LENGTHS	
BOX WIDTH FT	RIPRAP LENGTH FT
4	10
6	12
8	15
10	20
10+	20

FILL AREA WITH COMPACTED NON-GRANULAR FILL. INSTALL 2' HEAVY RIPRAP OVER TYPE HR FILTER FABRIC



FRONT VIEW
WINGWALLS WITH SPLASHPAD

PHASE II

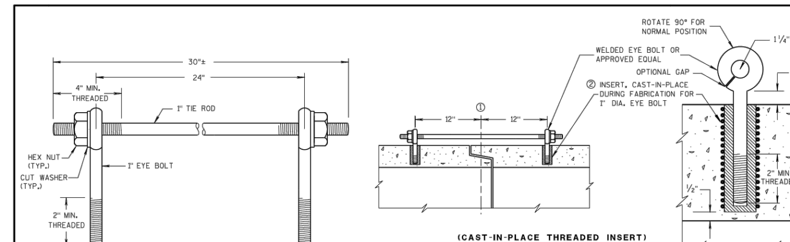
2004

CITY OF MADISON
ENGINEERING DIVISION

RIPRAP AT BOX CULVERT WINGWALLS

STANDARD DETAIL DRAWING 5.5.2

RIPRAP FOR DOWNSTREAM WORK ONLY.



EYE BOLTS AND TIE ROD

(CAST-IN-PLACE THREADED INSERT)
LONGITUDINAL SECTIONS

EYE BOLT AND TIE ROD ASSEMBLY (ALTERNATE NO. 1)

GENERAL NOTES

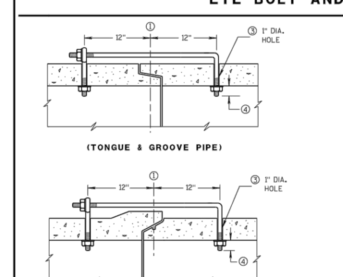
DETAILS OF CONSTRUCTION, MATERIALS, AND WORKMANSHIP NOT SHOWN ON THIS DRAWING SHALL CONFORM TO THE PERTINENT REQUIREMENTS OF THE STANDARD SPECIFICATIONS AND APPLICABLE SPECIAL PROVISIONS.

CONCRETE CULVERT AND STORM SEWER PIPE SHALL BE TIED TOGETHER IN THE MANNER ILLUSTRATED BY THIS DETAIL AT LOCATIONS DESIGNATED IN THE STANDARD SPECIFICATIONS AND THE PLAN. THE CONTRACTOR MAY USE EITHER ALTERNATE 1, 2 OR 3 FOR DRAINAGE STRUCTURES. ONLY ALTERNATE 1 AND 3 MAY BE USED FOR CATTLE PASSES, UNLESS OTHERWISE STATED IN THE CONTRACT. THE MATERIALS, FABRICATION AND WORK NECESSARY TO TIE THE PIPE BY THIS DETAIL WILL BE CONSIDERED INCIDENTAL TO THE PIPE AND APRON ENDWALLS IF REQUIRED.

DETAILED DRAWINGS FOR PROPOSED ALTERNATE DESIGNS FOR JOINT TIES SHALL BE SUBMITTED TO THE ENGINEER FOR APPROVAL.

JOINT TIES TO BE HOT-DIP GALVANIZED PER ASTM A 153.

1. ℄ OF TONGUE AND GROOVE OR BELL AND SPIGOT JOINTS.
2. THE INSIDE OF THE THREADED INSERTS SHALL BE CLEAN TO ALLOW THE INSERTION OF THREADED EYE BOLTS.
3. HOLES SHALL BE CAST-IN-PLACE OR DRILLED 12 INCHES FROM ℄ OF TONGUE AND GROOVE.
4. BOLT PROJECTION INSIDE OF PIPE SHALL NOT EXCEED 2 INCHES.
5. OPENING TO BE ROD DIAMETER PLUS 1 INCH.
6. LENGTH ADEQUATE TO EXTEND TO WITHIN 1/2 INCH OF THE INNER SURFACE OF THE PIPE.

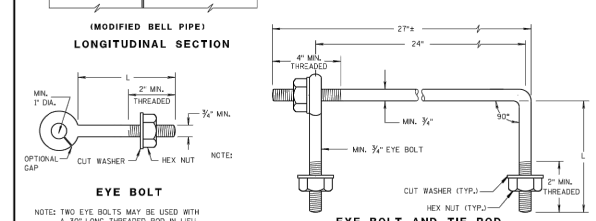


(TONGUE & GROOVE PIPE)

(MODIFIED BELL PIPE)
LONGITUDINAL SECTION

EYE BOLT DIMENSION TABLE

PIPE SIZE	L = LENGTH	
	TONGUE & GROOVE PIPE	MODIFIED BELL PIPE
18" TO 24"	4 1/2"	6 1/4"
30"	5"	7"
36"	5 1/2"	7"
42"	6"	
48"	6 1/2"	
60"	7 1/2"	
66"	8"	



EYE BOLT

NOTE: TWO EYE BOLTS MAY BE USED WITH A 30" LONG THREADED ROD IN LIEU OF THE 90° BENT TIE ROD.

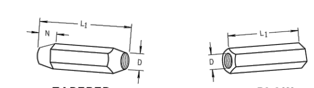
EYE BOLT AND TIE ROD

(JOINT TIES FOR 18" TO 66" DIA. CONCRETE PIPE)
EYE BOLT AND TIE ROD ASSEMBLY (ALTERNATE NO. 2)

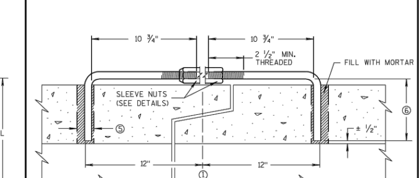
ADJUSTABLE TIE ROD TABLE

PIPE DIAMETER	TIE ROD DIAMETER	D	L_1	N
12-60	5/8	5/8	5	1/2
66-84	3/4	3/4	5	1/2
90-108	1	1	7	1 7/16

DIMENSIONS SHOWN ARE IN INCHES

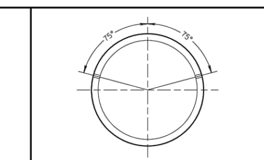


TAPERED
PLAIN
RIGHT AND LEFT THREADS
SLEEVE NUTS



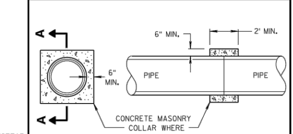
LONGITUDINAL SECTION

(JOINT TIES FOR 12" TO 108" DIA. CONCRETE PIPE)
ADJUSTABLE TIE ROD (ALTERNATE NO. 3)



PLACEMENT OF (2) CAST-IN-PLACE INSERTS OR HOLES DURING FABRICATION FOR PIPE SECTIONS REQUIRING TIE RODS

TRANSVERSE SECTION



SECTION A-A
CONCRETE COLLAR DETAIL

NOT TO SCALE
2018

CITY OF MADISON
ENGINEERING DIVISION

CONCRETE PIPE JOINT TIES

STANDARD DETAIL DRAWING 5.4.6

		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:29 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

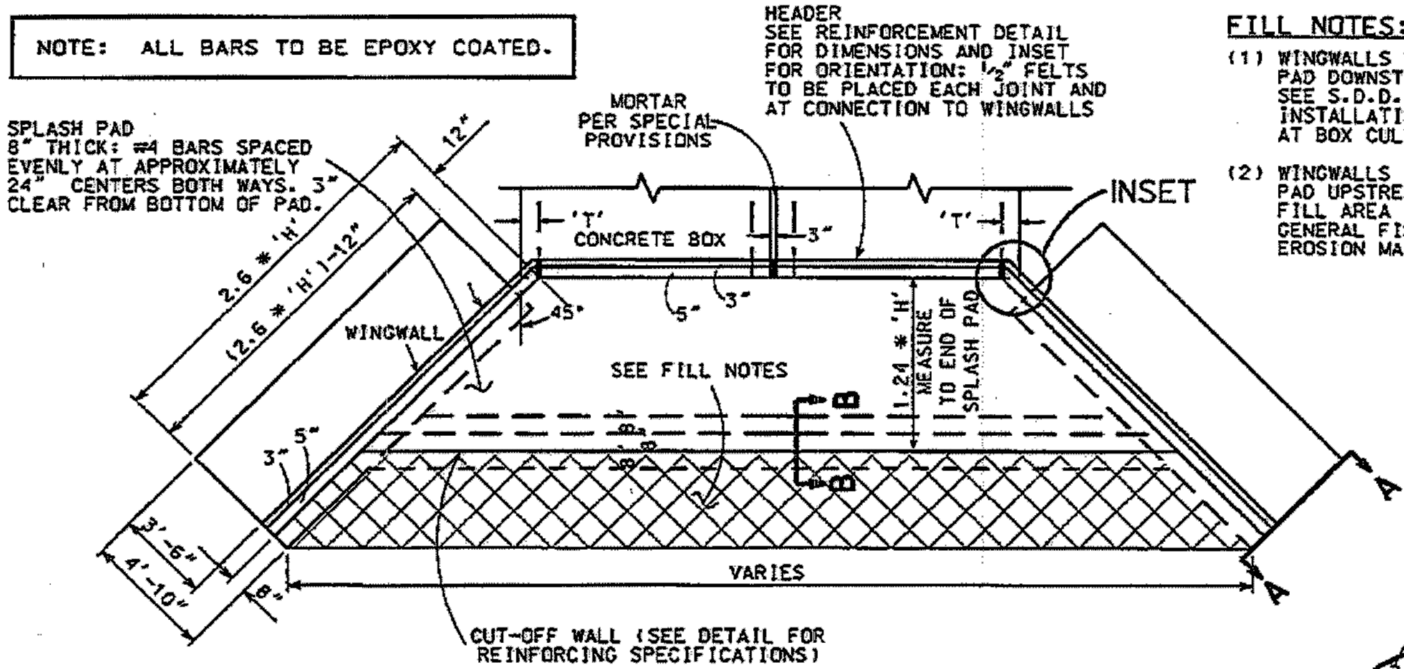
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM SEWER DETAILS

PROJECT NO.
00373079

SHEET
G 7

NOTE: ALL BARS TO BE EPOXY COATED.



TOP VIEW
WINGWALLS WITH SPLASHPAD

FILL NOTES:

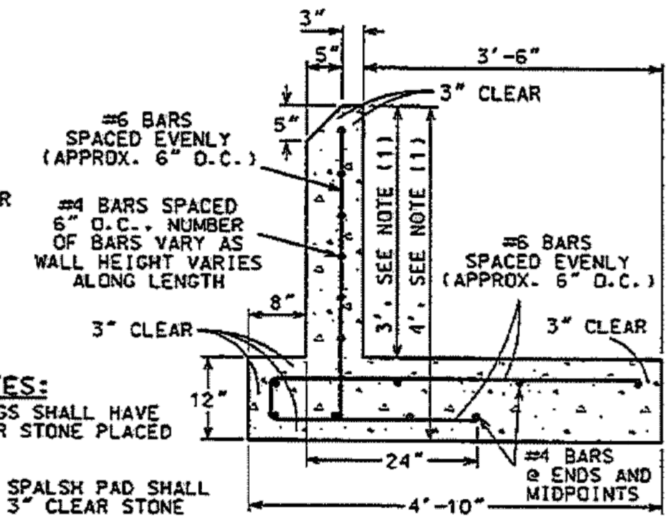
(1) WINGWALLS WITH SPLASH PAD DOWNSTREAM: SEE S.D.D. 5.5.2 FOR INSTALLATION OF RIPRAP AT BOX CULVERT WINGWALLS.

(2) WINGWALLS WITH SPLASH PAD UPSTREAM: FILL AREA WITH NON-GRANULAR GENERAL FILL OVERLAID WITH EROSION MATTING.

BEDDING NOTES:

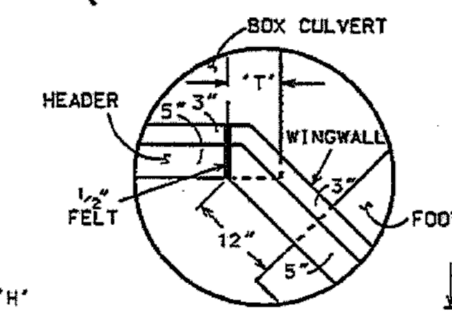
(1) ALL FOOTINGS SHALL HAVE 12" OF 3" CLEAR STONE PLACED AS BEDDING.

(2) AREA BELOW SPALSH PAD SHALL BE FILLED WITH 3" CLEAR STONE

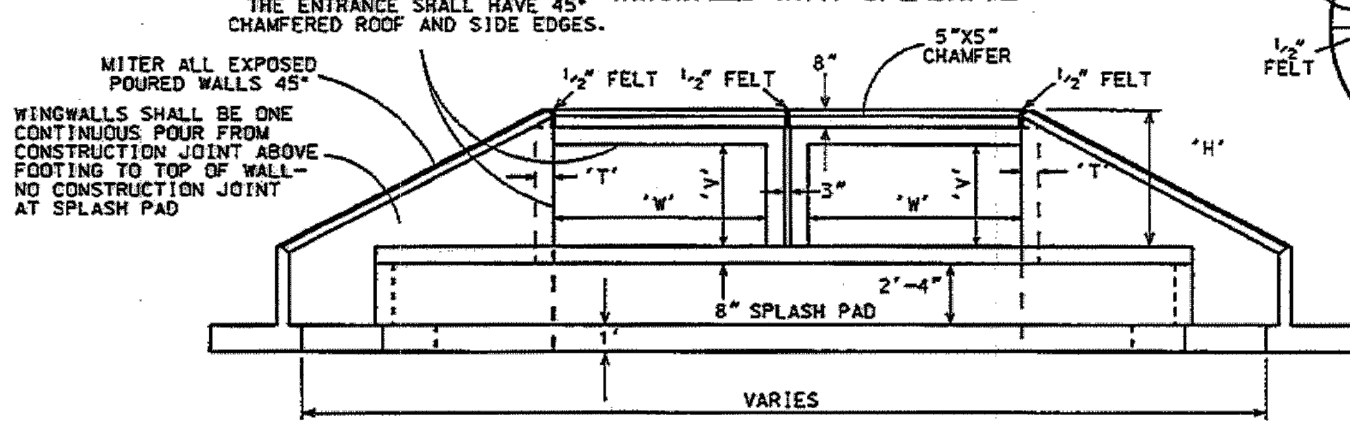


NOTE:
(1) VERTICAL DIMENSION SHOWN IS AT END OF WALL. DIMENSION INCREASES ALONG WALL LENGTH. SEE SIDE VIEW.
(2) THE WINGWALL SHALL BE ONE CONTINUOUS POUR FROM CONSTRUCTION JOINT ABOVE FOOTING TO TOP OF WALL.

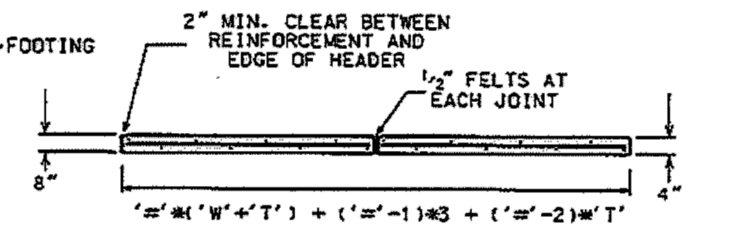
SECTION A-A
WINGWALL DETAIL AT END OF WALL



INSET

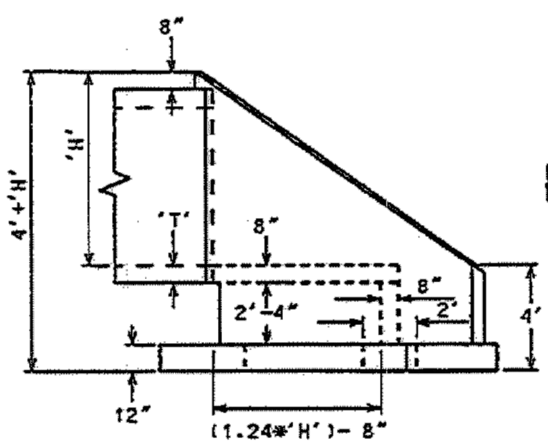


FRONT VIEW
WINGWALLS WITH SPLASHPAD

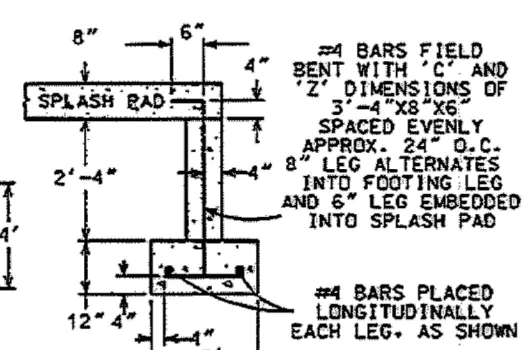


VERTICAL REINFORCEMENT PER SECTION STAGGERED
#4 BARS SPACED EVENLY ON APPROXIMATELY 1'-3" CENTERS.
2" CLEAR EACH SIDE: BARS TO BE EMBEDDED IN CONCRETE 4".
HORIZONTAL REINFORCEMENT PER SECTION:
('W' + 2 * 'T' - 4) OF #4 BAR CENTERED BOTH DIRECTION IN PROPOSED BOX CULVERT HEADER.

TOP VIEW
BOX CULVERT HEADER REINFORCEMENT DETAIL



SIDE VIEW
WINGWALLS WITH SPLASHPAD



SECTION B-B
CUT-OFF WALL DETAIL

STEEL CONNECTION NOTES:

(1) CONNECTION OF SPLASH PAD TO BOX CULVERTS:
12" LONG #6 REBARS SPACED EVENLY ON APPROXIMATELY 2'-6" CENTERS. TIGHT DRIVEN 6" INTO END OF BOX CULVERT FLOOR AND EMBEDDED 6" INTO SPLASH PAD FLOOR WITH 2" CLEAR SPACING EACH SIDE.

(2) CONNECTION OF WINGWALL TO BOX CULVERT:
#4 REBARS FIELD BENT WITH 'L' DIMENSIONS OF 6"X6" SPACED EVENLY ON APPROXIMATELY 8" CENTERS. ONE 6" LEG DRIVEN INTO SIDE OF BOX AND THE OTHER EMBEDDED 6" INTO THE WINGWALL. BARS SHALL HAVE 2" CLEAR SPACING TOP AND BOTTOM. (SAME EACH WINGWALL)

(3) CONNECTION OF SPLASH PAD TO WINGWALLS:
#4 REBARS FIELD BENT WITH 'L' DIMENSIONS OF 12"X8" SPACED EVENLY ON APPROXIMATELY 12" CENTERS. THE 12" LEG EMBEDDED INTO THE SPLASH PAD AND THE 8" LEG EMBEDDED DOWNWARD INTO THE WINGWALL. BARS SHALL BE CENTERED IN THE SPLASH PAD AND THE WINGWALL. WINGWALLS SHALL BE ONE CONTINUOUS POUR FROM CONSTRUCTION JOINT ABOVE FOOTING TO TOP OF THE WALL. THERE SHOULD BE NO CONSTRUCTION JOINT AT PAD ELEVATION.

(4) CONNECTION OF SPLASH PAD TO THE CUT-OFF WALL:
(SEE CUT-OFF WALL DETAIL) THE #4 BAR REINFORCING OF THE CUT-OFF WALL SHALL BE FIELD BENT INTO A 'C' AND 'Z' SHAPES WITH THE DIMENSIONS 3'-4"X8"X6" SPACED EVENLY ON APPROXIMATELY 24" CENTERS. THE 8" LEG ALTERNATES INTO FOOTING LEG AND 6" EMBEDDED INTO SPLASH PAD. THE BARS SHALL BE CENTERED IN THE CUT-OFF WALL.

VARIABLES (UNITS: INCHES)

'#' = NUMBER OF BOXES
'H' = INSIDE BOX HEIGHT + ROOF THICKNESS + HEADER HEIGHT
'W' = INSIDE WIDTH OF BOX
'V' = INSIDE HEIGHT OF BOX
'T' = SIDE WALL THICKNESS

DRAWING NOT TO SCALE 2010

CITY OF MADISON
ENGINEERING DIVISION

BOX CULVERT WINGWALL

STANDARD DETAIL DRAWING 5.5.1

			NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY:	KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY:	ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY:	ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:31 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM SEWER DETAILS

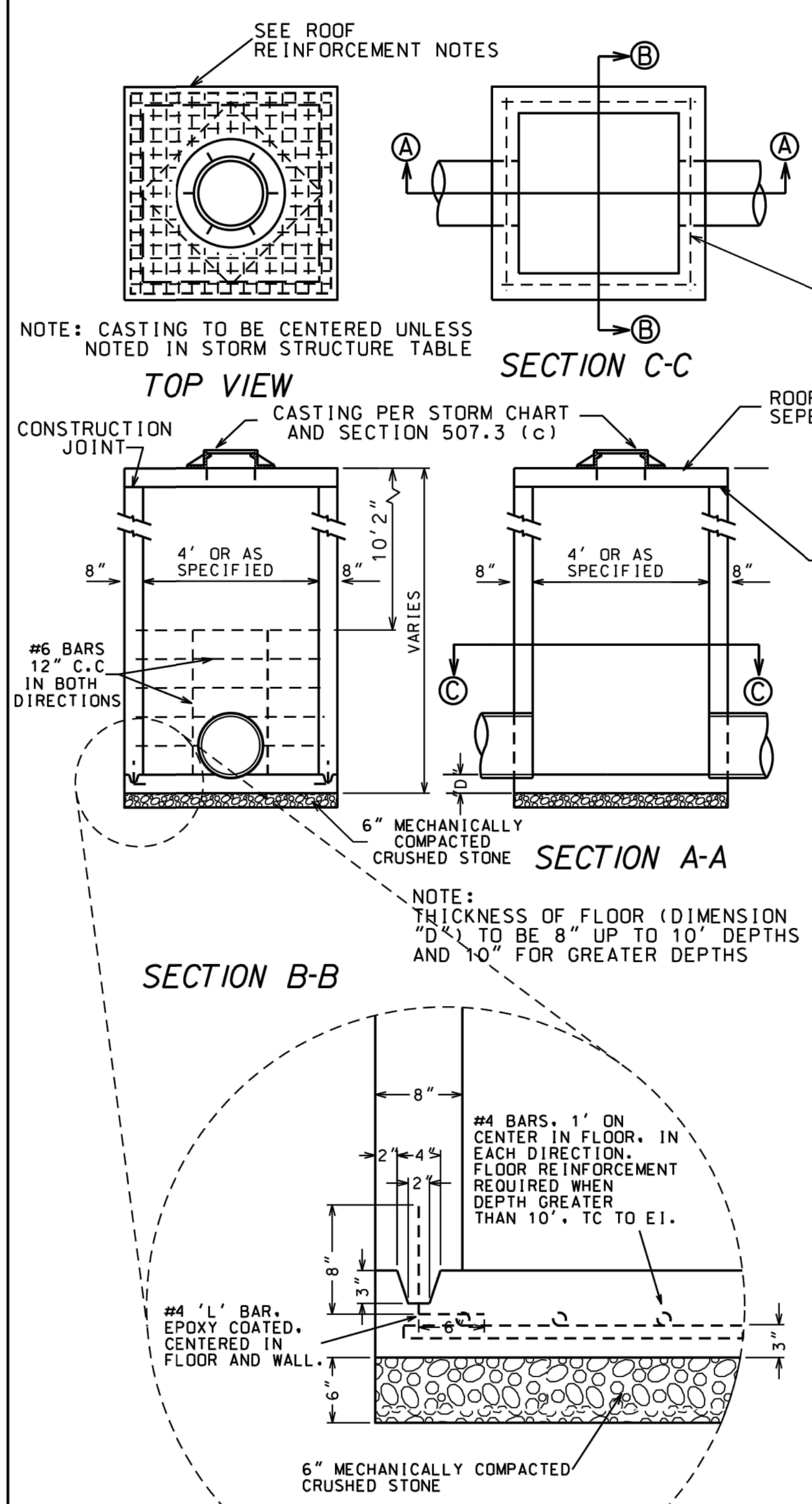
PROJECT NO. 00373079

SHEET G 8

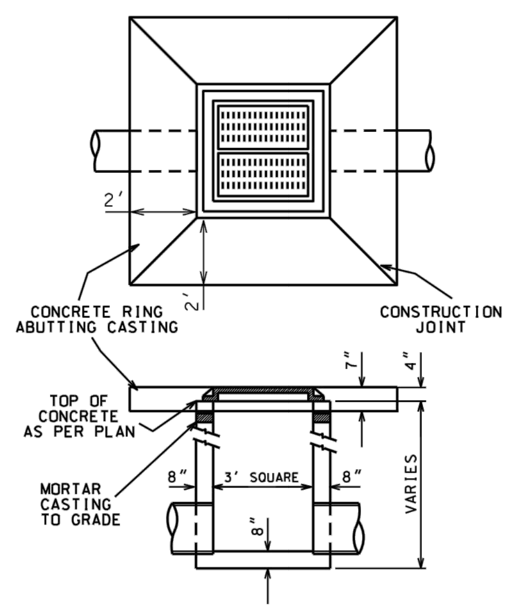
SEWER ACCESS STRUCTURES

ROOF REINFORCEMENT NOTES:

1) EPOXY COATED REBARS SHALL BE USED IN ALL CASES
2) #6 BARS PLACED ON 6" CENTERS FOR 3'X3' 3'X4' 4'X4' 4'X5' 5'X5' STRUCTURES
3) #6 BARS PLACED ON 4" CENTERS FOR 6'X5' 6'X6' AND LARGER STRUCTURES
4) #6 BARS PLACED AT 45° AROUND CUT OUT FOR MH CASTING
5) 3" CLEAR SHALL BE MAINTAINED IN ALL CASES
6) ROOF THICKNESS SHALL BE 8" MINIMUM UNLESS SPECIFIED OTHERWISE.



3'X3' CATCH BASIN



PRECAST REINFORCED CONCRETE STRUCTURES MAY BE USED IF APPROVED ACCORDING TO ARTICLES 106.3 AND 507.3 (b) OF THE STANDARD SPECIFICATIONS

NEENAH FOUNDRY CASTINGS AS LISTED OR EQUAL. ALL CASTING WITH FLANGE AT BASE.

LIGHT DUTY
- R-1879-A10G FOR OPEN GRATE
- R-1879-A10L FOR SOLID LID

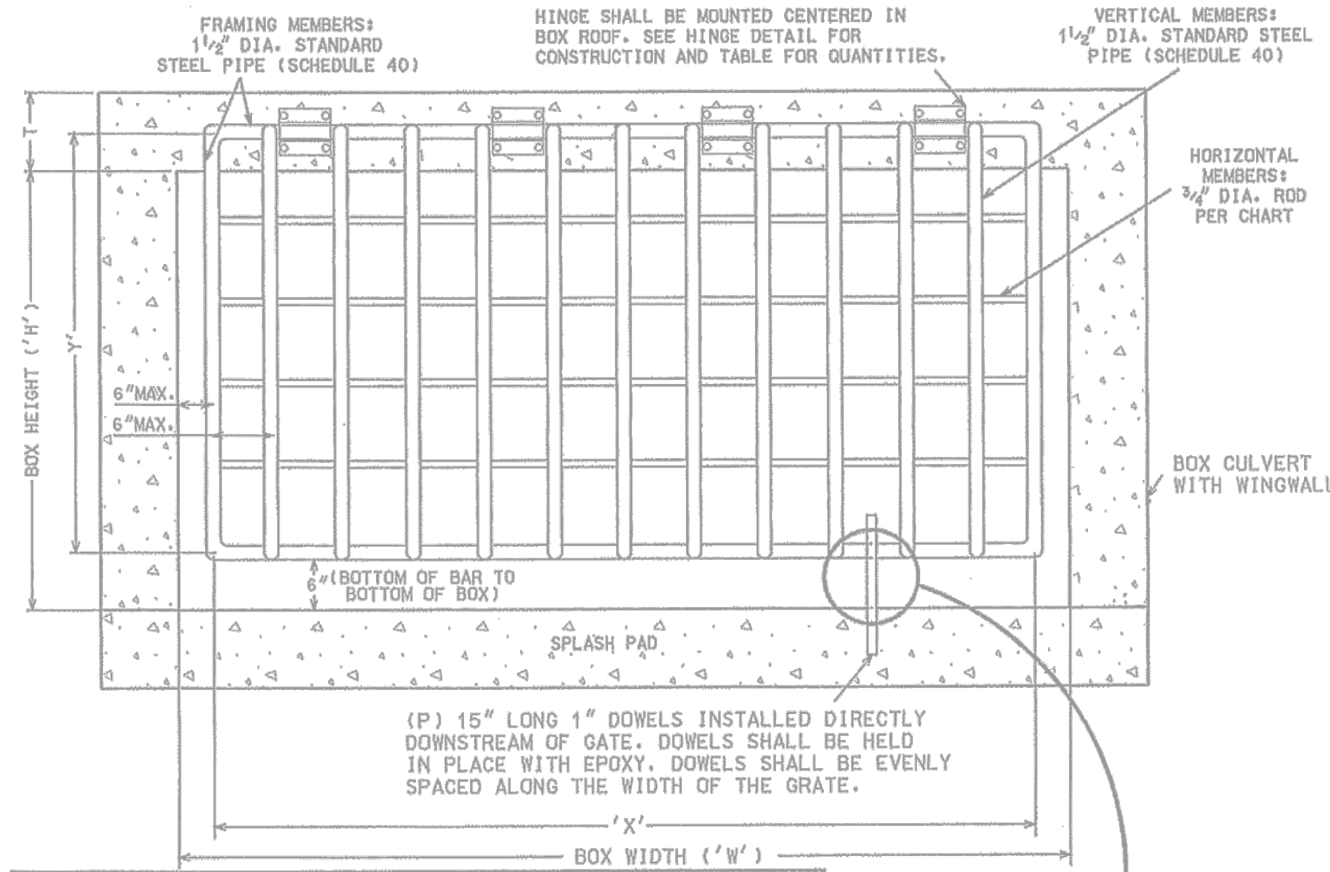
HEAVY DUTY
- R-1878-A10G FOR OPEN GRATE
- R-1878-A10L FOR SOLID LID

2017

CITY OF MADISON
ENGINEERING DIVISION

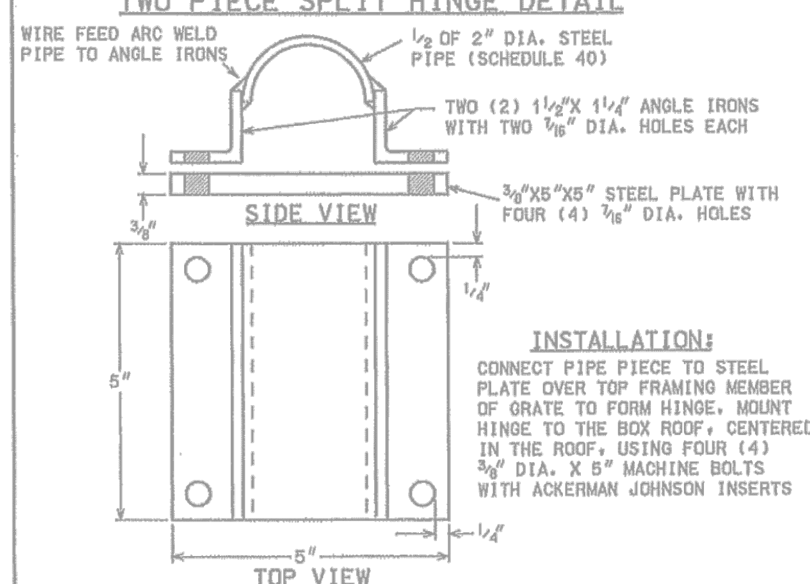
STORM SEWER FIELD POURED SAS AND CATCH BASINS

STANDARD DETAIL DRAWING 5.7.3



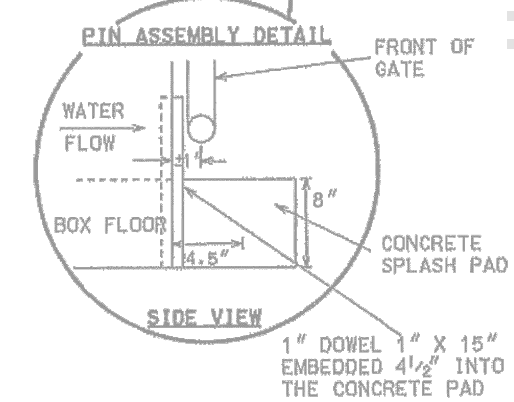
PHASE II

TWO PIECE SPLIT HINGE DETAIL



INSTALLATION:

CONNECT PIPE PIECE TO STEEL PLATE OVER TOP FRAMING MEMBER OF GRATE TO FORM HINGE. MOUNT HINGE TO THE BOX ROOF, CENTERED IN THE ROOF, USING FOUR (4) 3/8" DIA. X 5" MACHINE BOLTS WITH ACKERMAN JOHNSON INSERTS



NOTES:

PAINTING SPECIFICATIONS

FOR PAINTING REQUIREMENTS, SEE SECTION 506.2 (b) STRUCTURAL STEEL PAINT-EPOXY SYSTEM FOR STORM SEWER GATES

CONSTRUCT WINGWALLS AND SPLASH PADS PER S.D.D. 5.5.1

ALL DIMENSIONS ARE BAR CENTER TO BAR CENTER UNLESS OTHERWISE NOTED

BOX SIZE 'W' X 'H' (FEET)	T (IN)	NUMBER OF GATES	DIMENSIONS (INCHES) X	DIMENSIONS (INCHES) Y	NUMBER OF BARS PER GATE (EXCLUDING FRAMING BARS) (EVENLY SPACED) VERTICAL	NUMBER OF BARS PER GATE HORIZONTAL	NO. OF HINGES PER GATE	NO. OF PINS PER GATE
4X3	7 1/2	1	36	32.80	4	4	2	1
6X3	8	1	60	33.05	7	4	3	2
6X4	8	1	60	45.05	7	6	3	2
6X5	8	1	60	57.05	7	8	3	2
6X6	8	1	60	69.05	7	10	3	2
* 8X4	8	1	84	45.05	10	6	4	2
* 8X5	8	1	84	57.05	10	8	4	2
* 8X6	8	1	84	69.05	10	10	4	2
*10X6	10	1	108	70.05	13	10	5	3

2011

CITY OF MADISON
ENGINEERING DIVISION

BOX CULVERT OUTLET GATE (DOWNSTREAM)

STANDARD DETAIL DRAWING 5.6.3

		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:33 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA

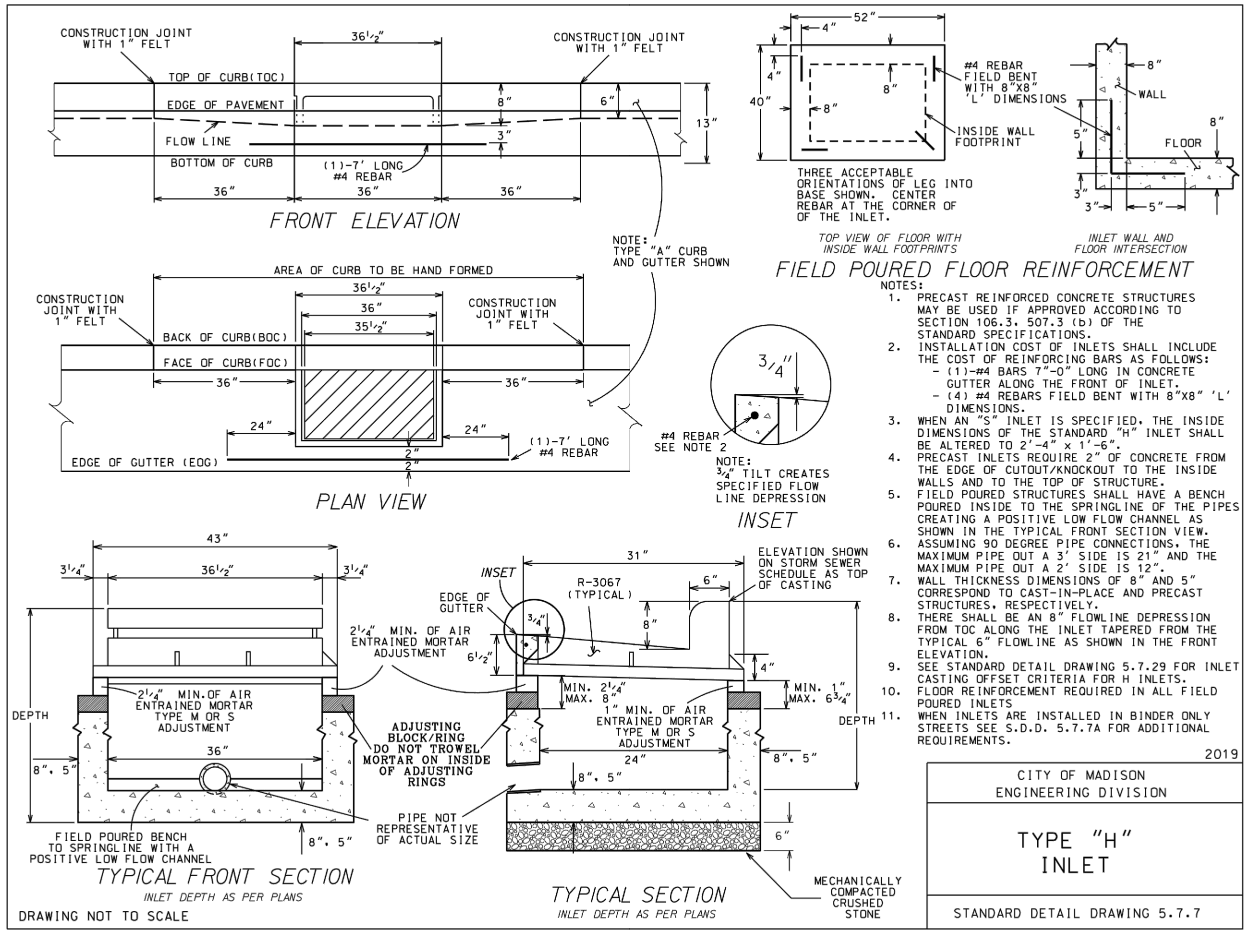
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

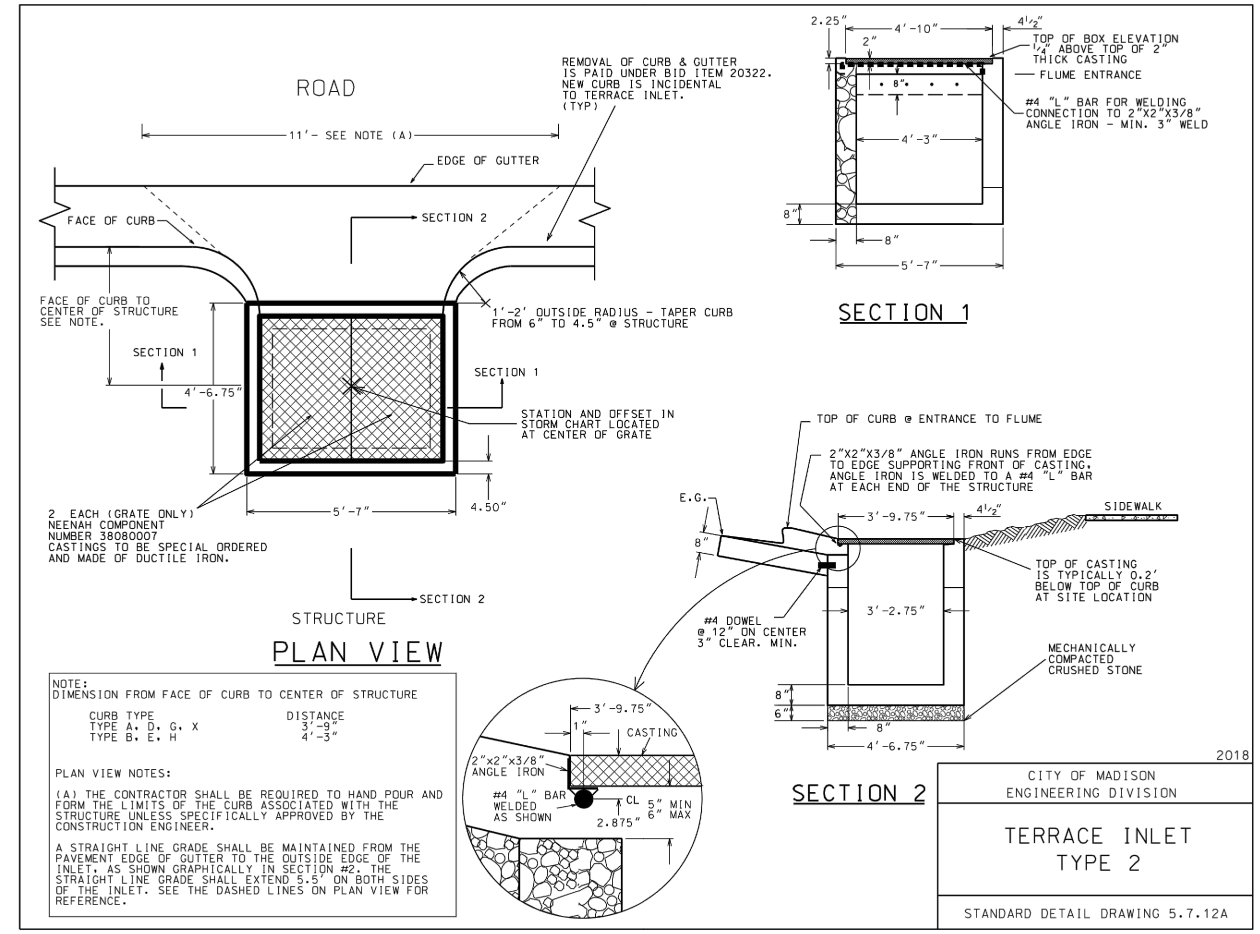
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

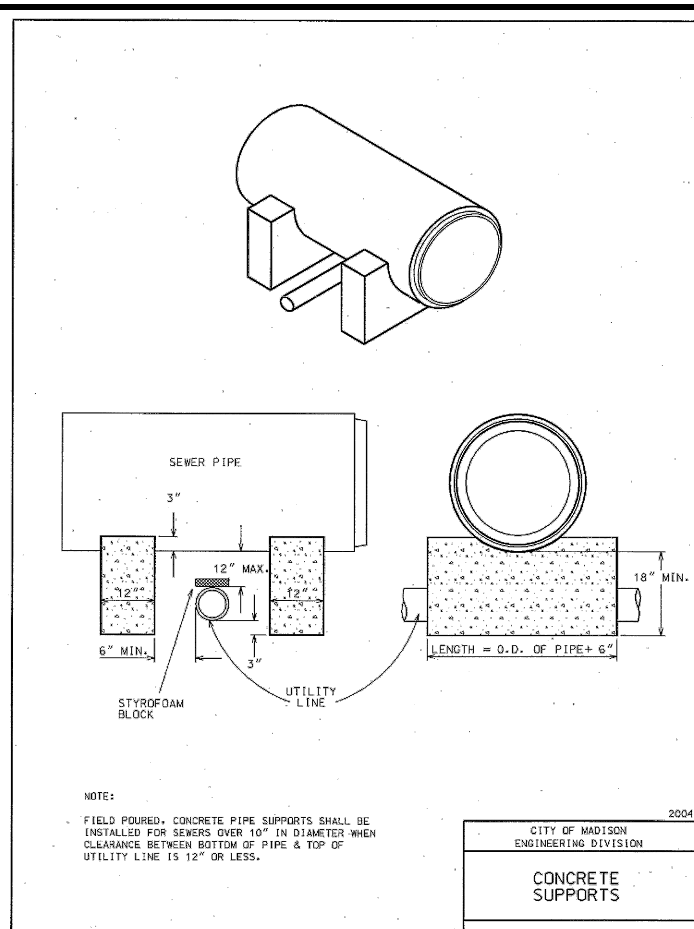
STORM SEWER DETAILS

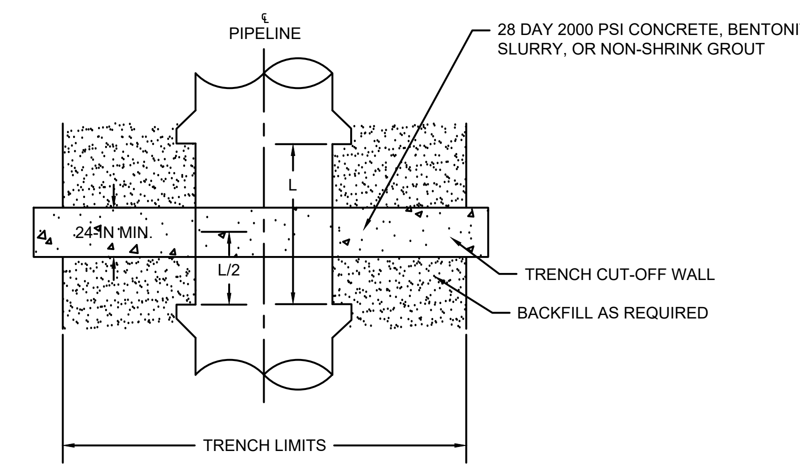
PROJECT NO. 00373079

SHEET G 9









PLAN VIEW

TRENCH CUT-OFF WALL DETAIL

SCALE: NONE

PROJECT DATE:	6/6/19	DRAWN BY:	KH	NO.	DATE	REVISION	BY
		DESIGNED BY:	ET	1	6/11/19	ADDENDUM #1	KNH
		CHECKED BY:	ET	2	10/4/19	ALIGNMNET REVISION	KNH
				3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:34 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA

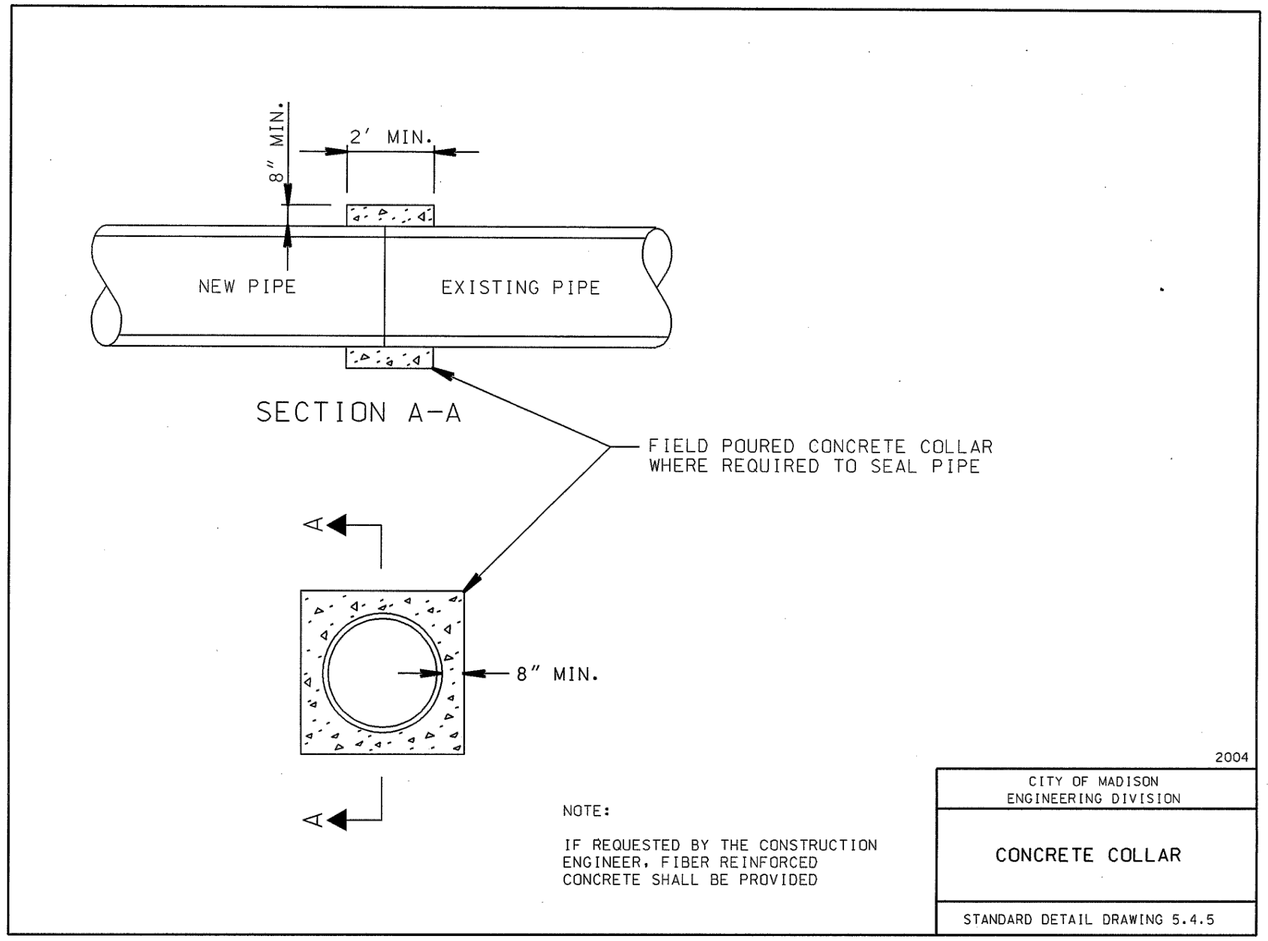
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

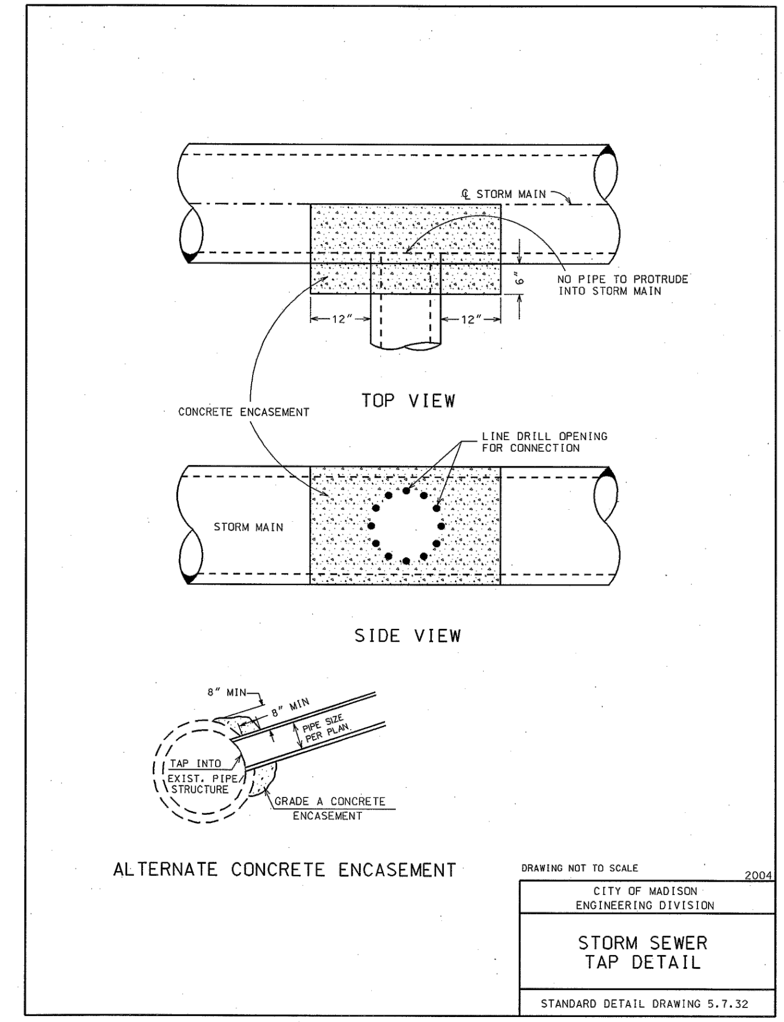
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM STORM DETAILS

PROJECT NO. 00373079

SHEET G 10





		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:36 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

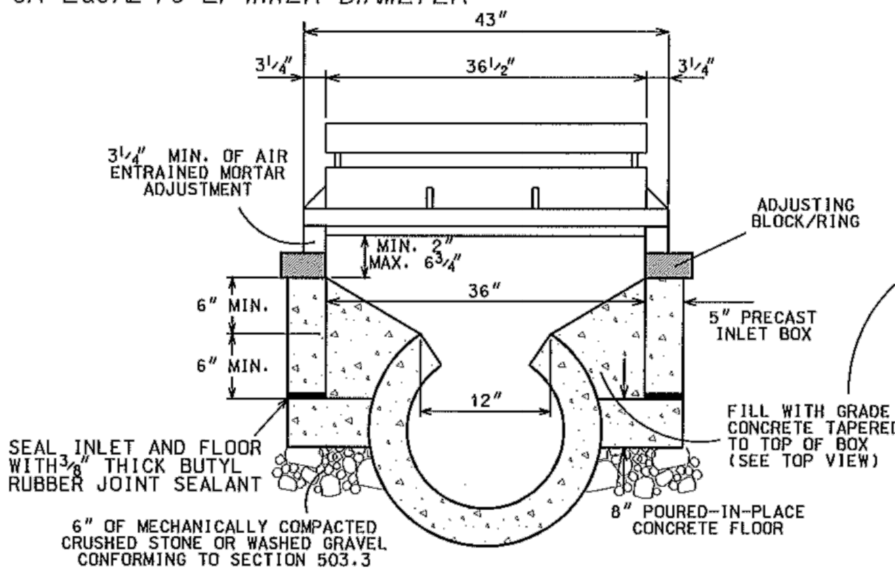
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM SEWER DETAILS

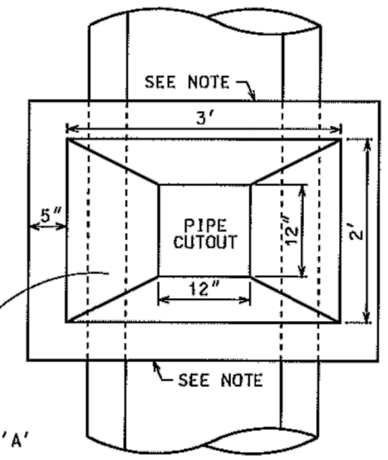
PROJECT NO. 00373079
SHEET G 11

TYPE A

FOR PIPES WITH DIAMETER LESS THAN OR EQUAL TO 27" INNER DIAMETER



SIDE VIEW



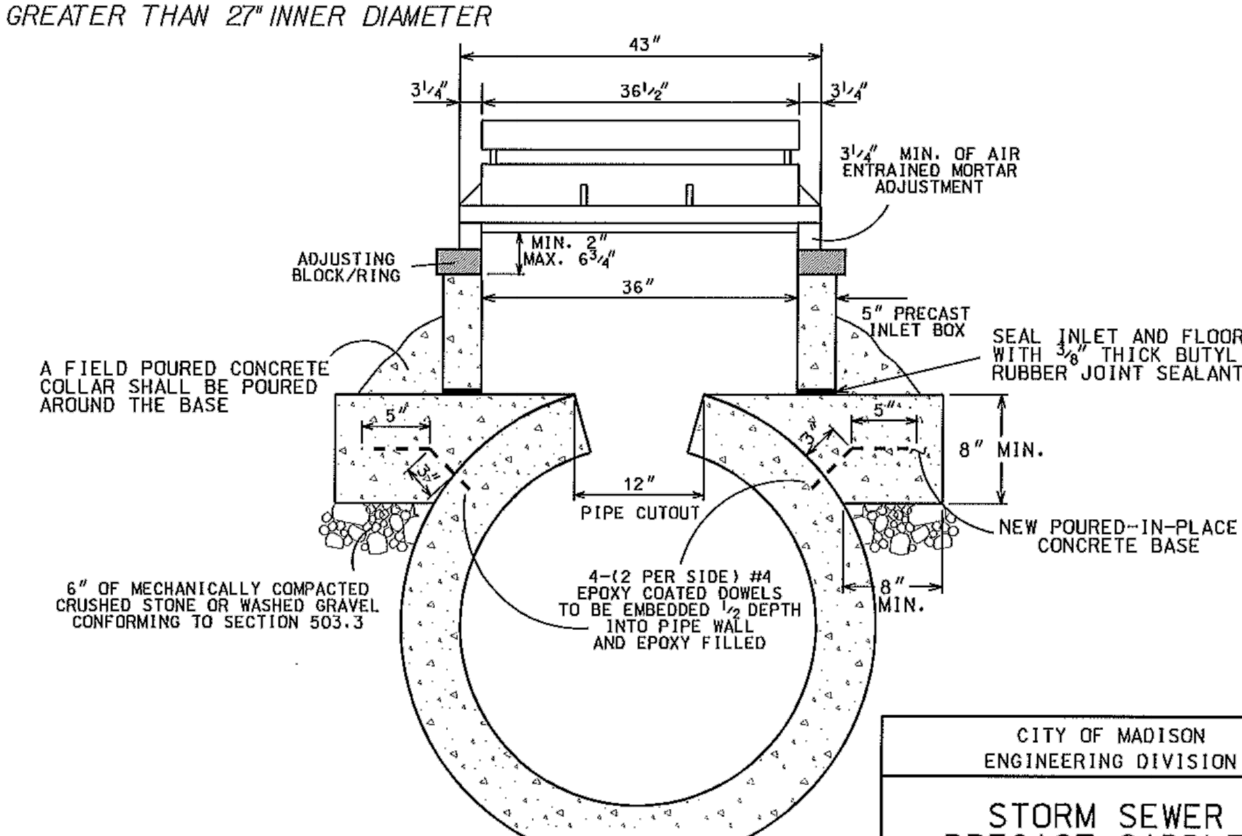
NOTE:
A DOGHOUSE CUTOUT SHALL BE PROVIDED ON EITHER SIDE FOR THE PLACEMENT OF THE PRECAST BOX AS SHOWN OVER THE PIPE; THE CONTRACTOR SHALL ASSURE A TIGHT SEAL AROUND THE PIPE CUTOUT AND THE PIPE CONNECTION BY POURING A TAPERED BENCH

TOP VIEW

DRAWING NOT TO SCALE

TYPE B

FOR PIPES WITH DIAMETER GREATER THAN 27" INNER DIAMETER



2006

CITY OF MADISON
ENGINEERING DIVISION

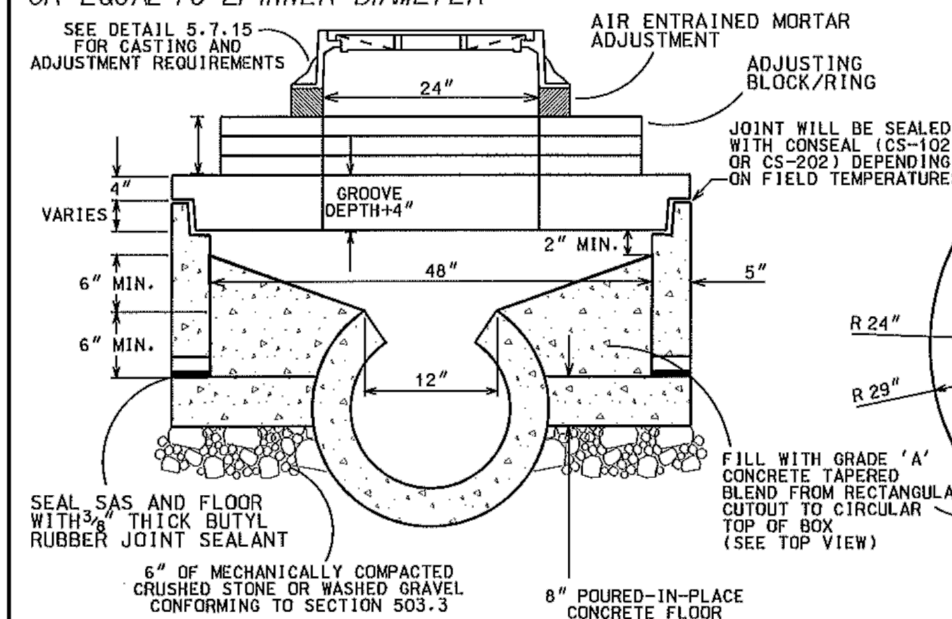
STORM SEWER
PRECAST SADDLED
INLET

DRAWING NOT TO SCALE

STANDARD DETAIL DRAWING 5.7.10

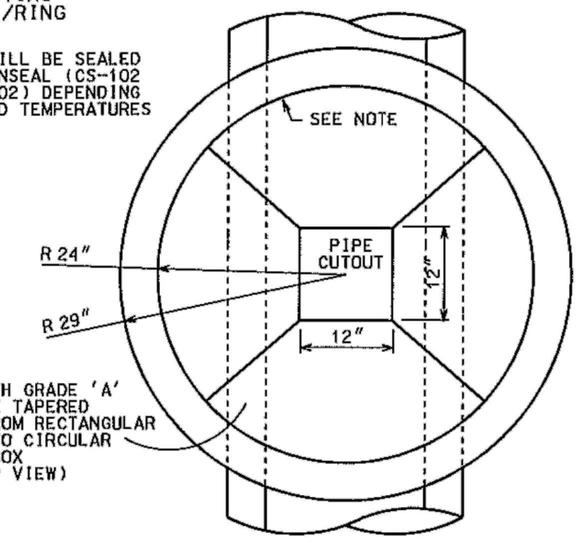
TYPE A

FOR PIPES WITH DIAMETER LESS THAN OR EQUAL TO 21" INNER DIAMETER



SIDE VIEW

NOTE:
A DOGHOUSE CUTOUT SHALL BE PROVIDED ON EITHER SIDE FOR THE PLACEMENT OF THE PRECAST BOX AS SHOWN OVER THE PIPE; THE CONTRACTOR SHALL ASSURE A TIGHT SEAL AROUND THE PIPE CUTOUT AND THE PIPE CONNECTION BY POURING A TAPERED BENCH

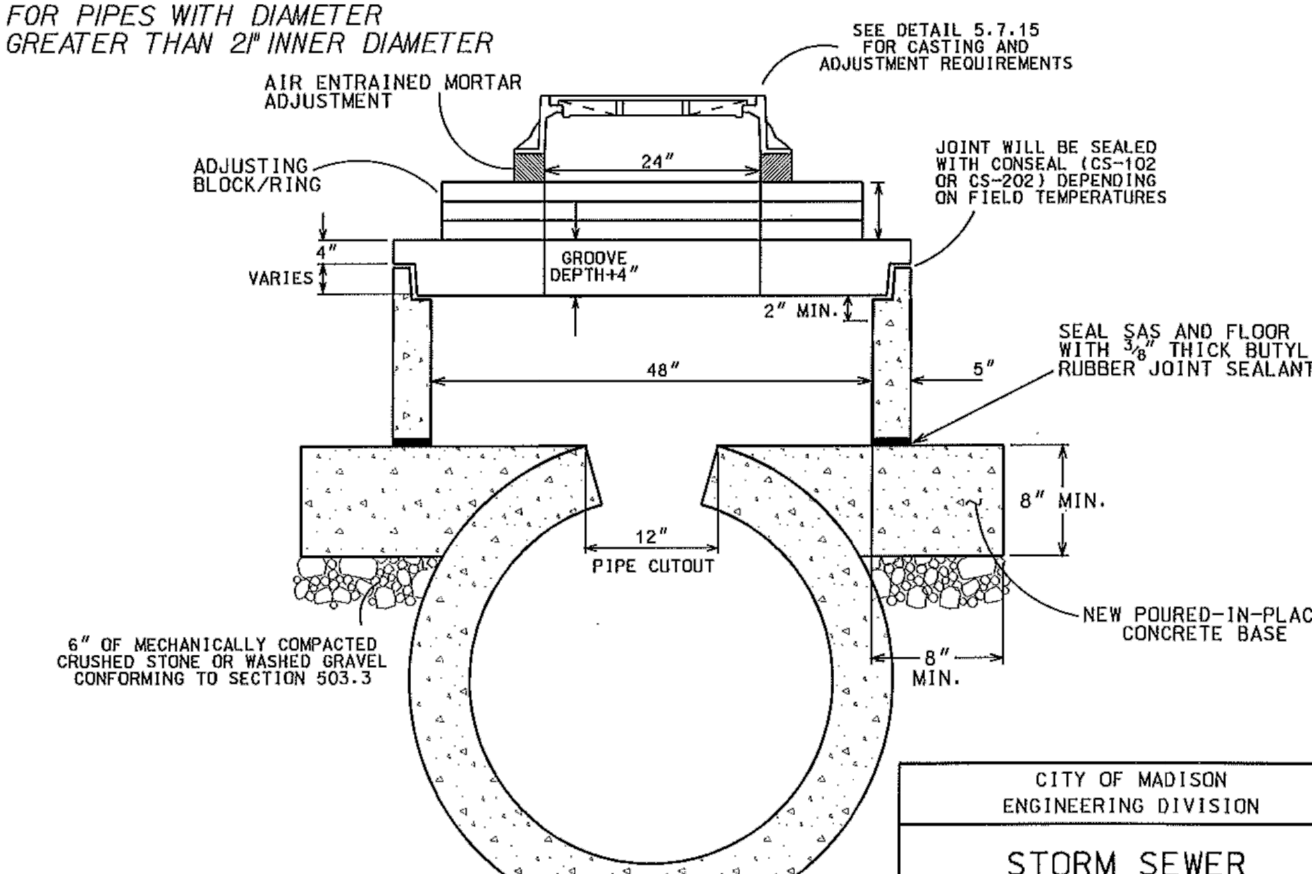


TOP VIEW

DRAWING NOT TO SCALE

TYPE B

FOR PIPES WITH DIAMETER GREATER THAN 21" INNER DIAMETER



NOTE:
ALTERNATE ROOF DETAIL AS SHOWN ON S.D.D. 5.7.5 IS ACCEPTABLE FOR BOTH TYPES A & B.

2007

CITY OF MADISON
ENGINEERING DIVISION

STORM SEWER
PRECAST SADDLED
SAS

DRAWING NOT TO SCALE

STANDARD DETAIL DRAWING 5.7.10A

		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:37 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

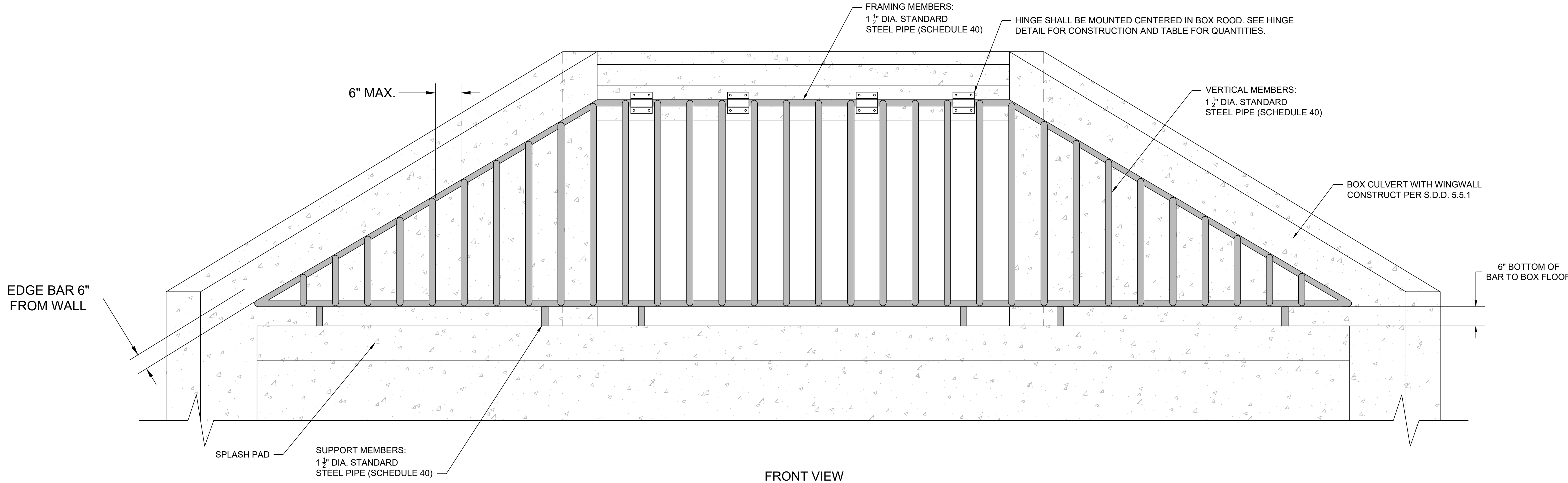
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

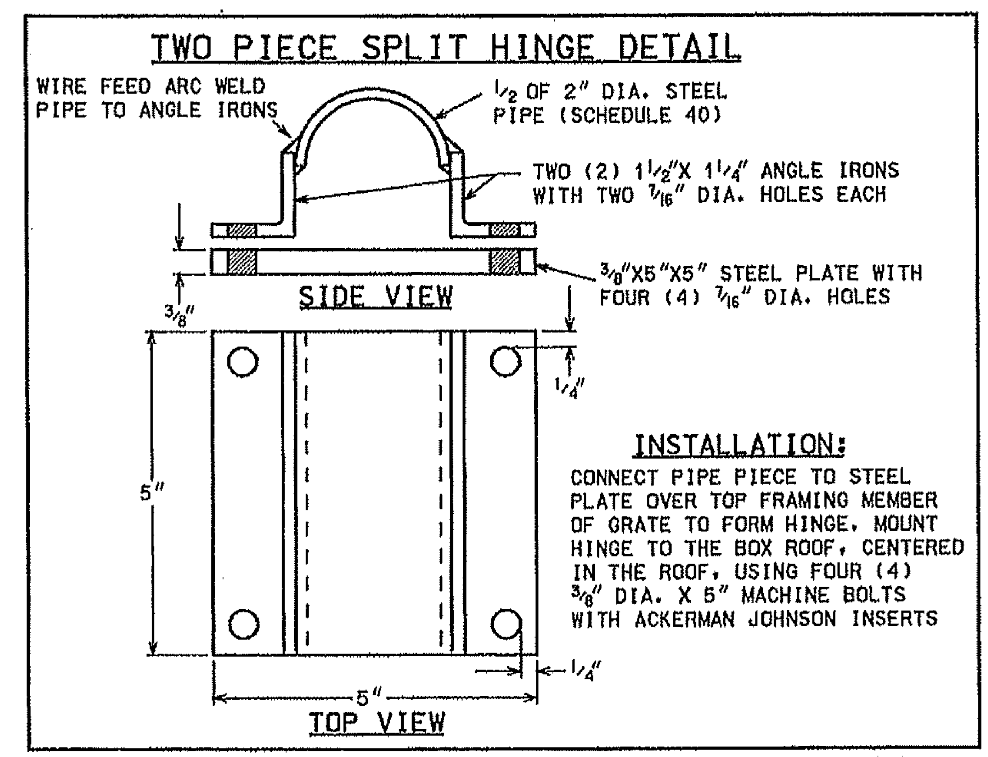
STORM SEWER DETAILS

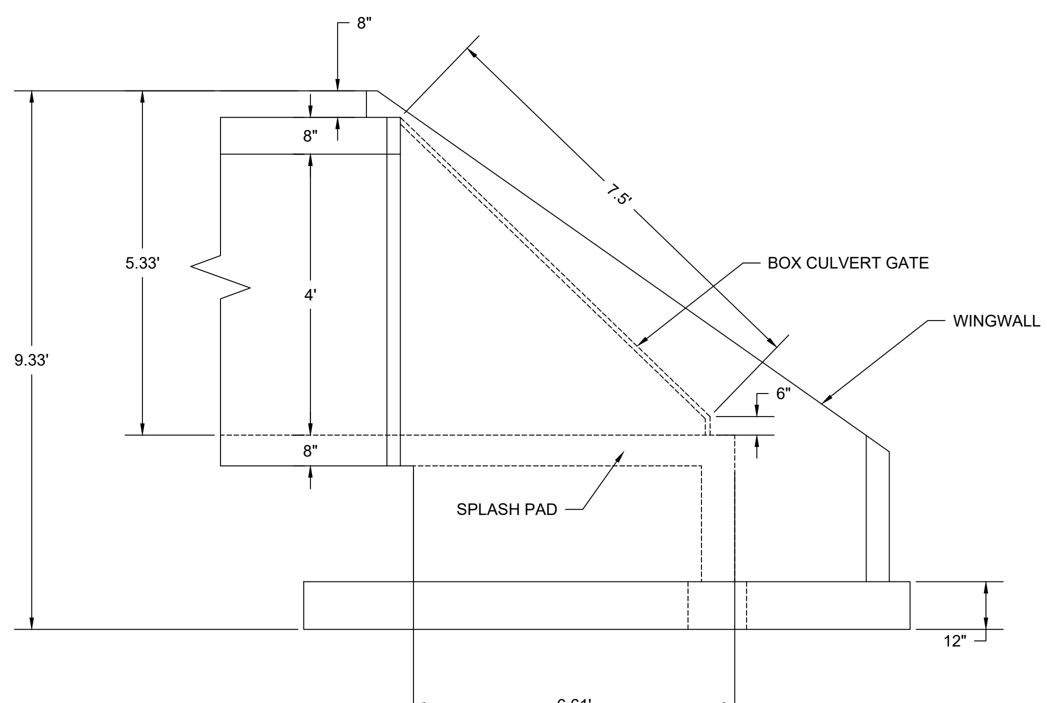
PROJECT NO. 00373079

SHEET G 12



FRONT VIEW





SIDE VIEW

BOX CULVERT GATE DETAIL
SCALE: NONE

NOTES:

1. BAR COUNT NOT REPRESENTATIVE OF ACTUAL.
2. GATE SHALL BE GALVANIZED.
3. CONSTRUCT WINGWALLS AND SPLASH PADS PER S.D.D. 5.5.1.

				NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY:	KH		1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY:	ET		2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY:	ET		3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

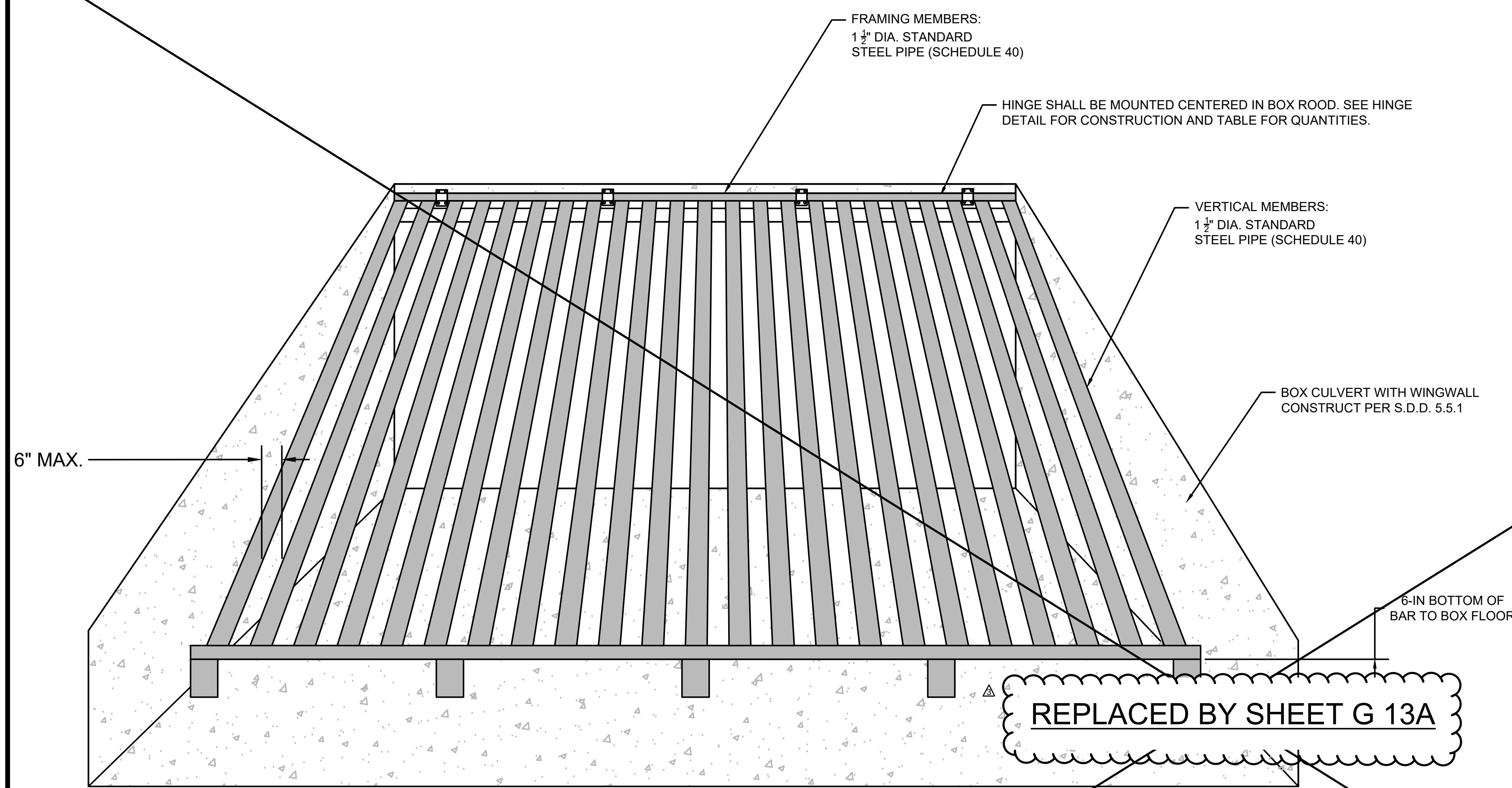
PLOT DATE: Wednesday, January 8, 2020 1:20:02 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

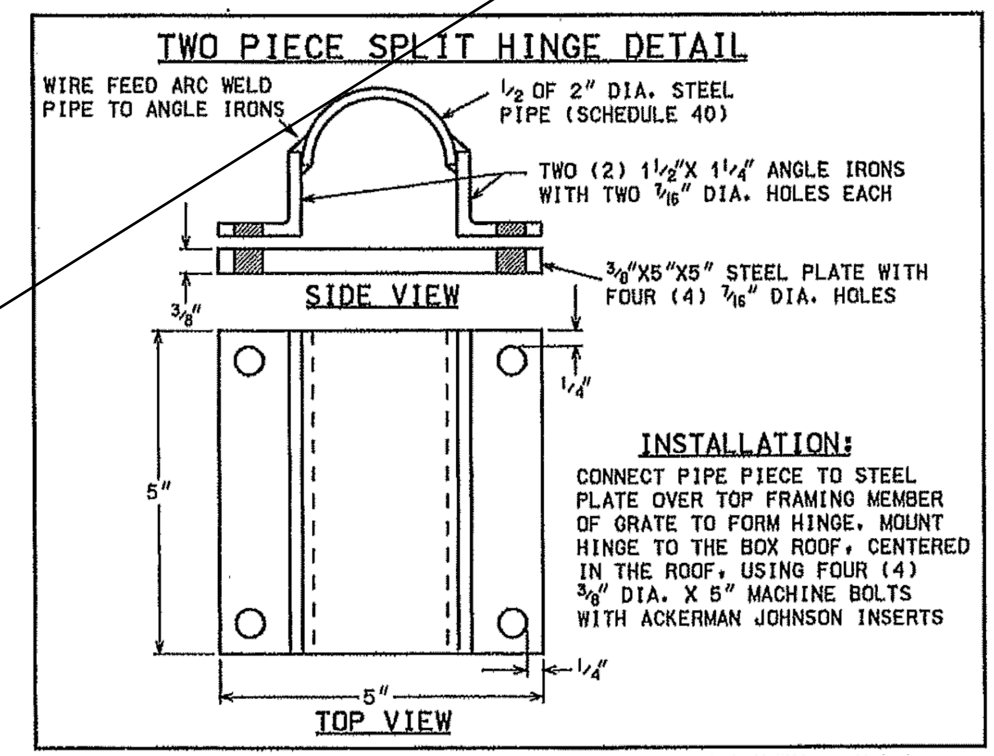
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM SEWER DETAILS

PROJECT NO. 00373079
SHEET G 13A

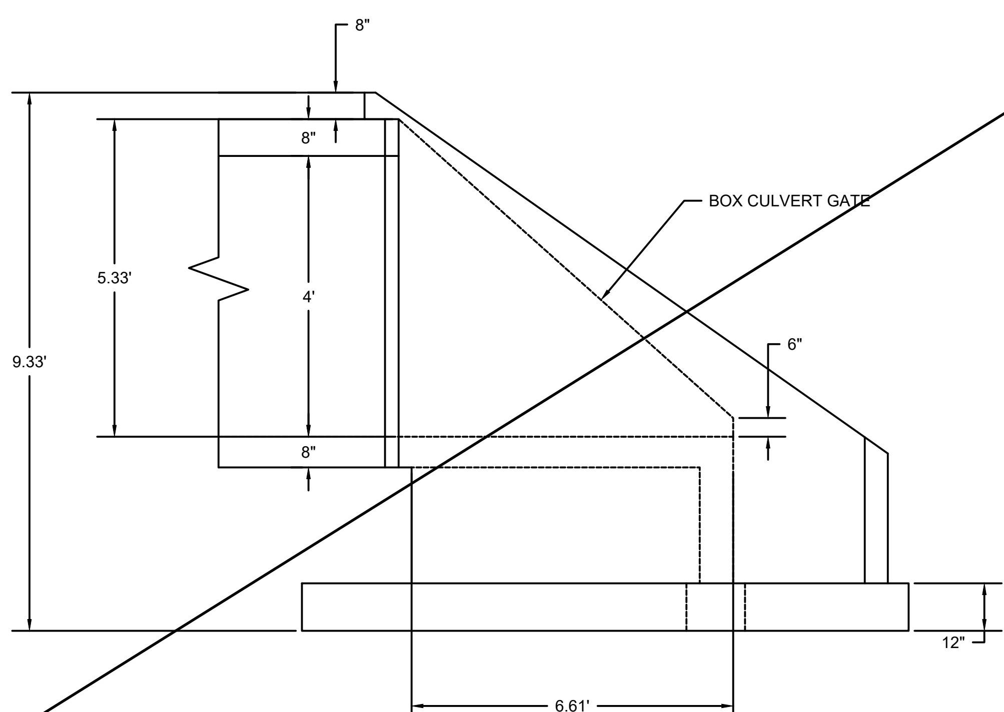


FRONT VIEW



NOTES:

1. BAR COUNT NOT REPRESENTATIVE OF ACTUAL.
2. GATE SHALL BE GALVANIZED.
3. CONSTRUCT WINGWALLS AND SPLASH PADS PER S.D.D. 5.5.1.



SIDE VIEW

BOX CULVERT GATE DETAIL
SCALE: NONE

		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:39 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

MSA

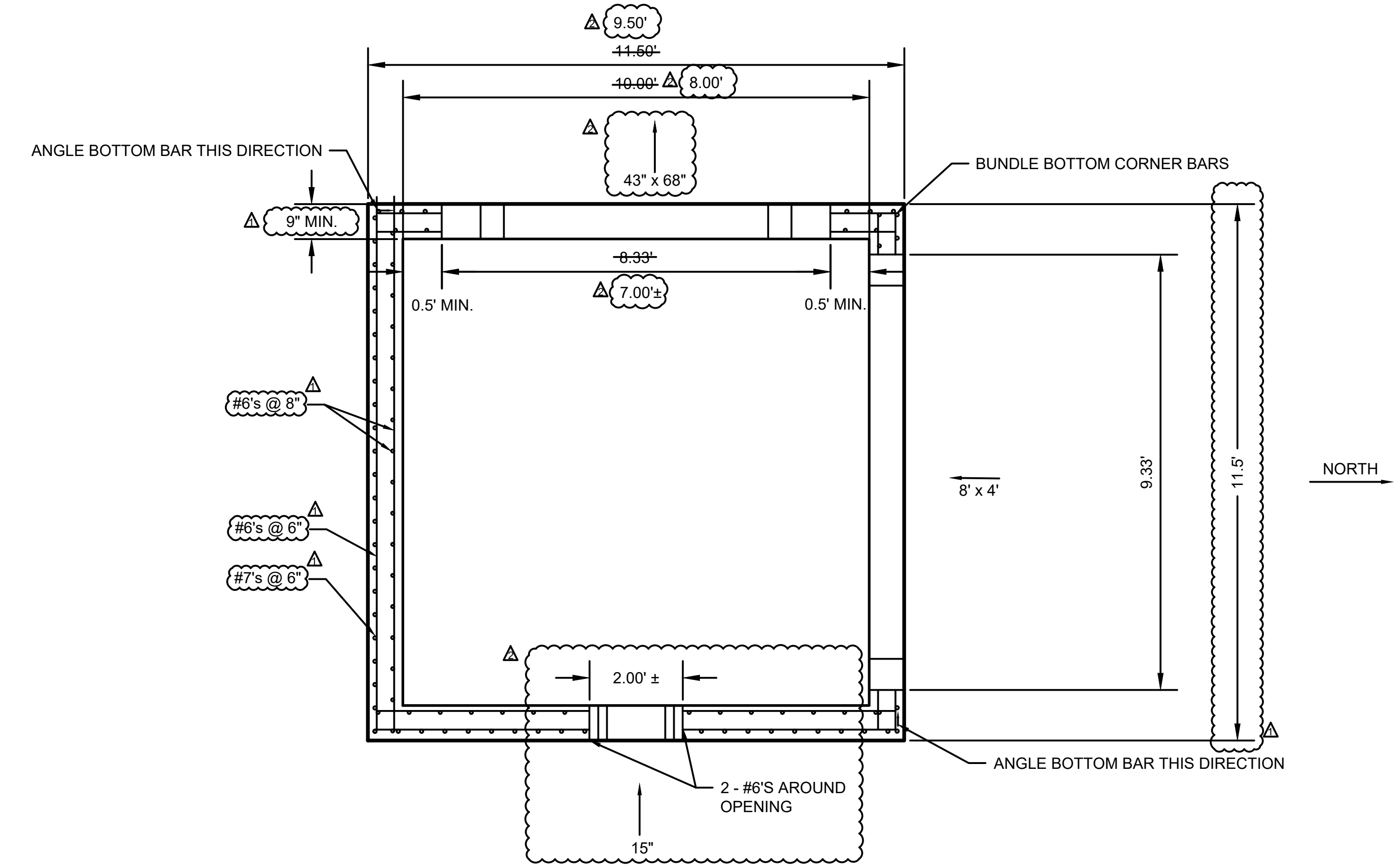
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM SEWER DETAILS

PROJECT NO. 00373079

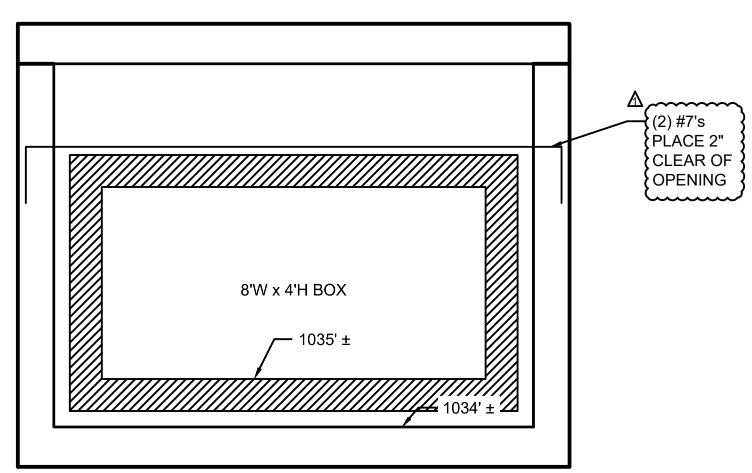
SHEET G 13



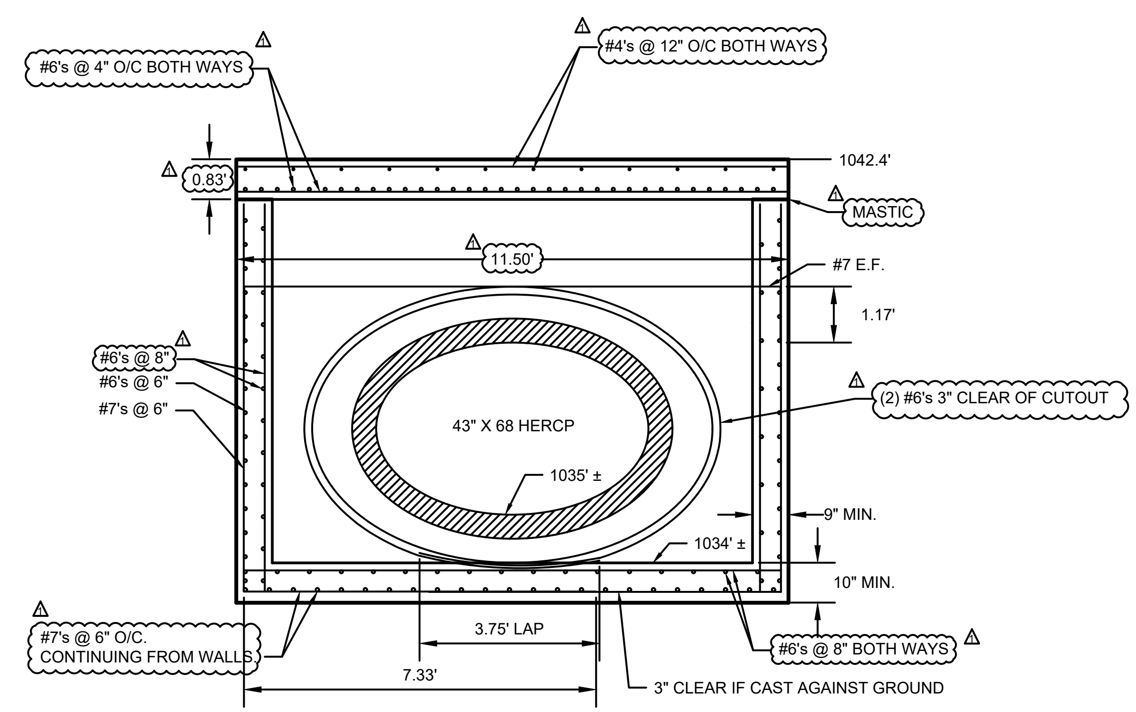
TOP VIEW

NOTES:

1. ALL REINFORCING BARS SHALL BE EPOXY COATED.
2. STRUCTURE TO BE POURED IN PLACE.
3. ~~THIS DETAIL SHALL BE USED FOR THE 10'x10' S.A.S. W/ NEENAH CASTING R-1550-0054.~~
4. ~~THIS DETAIL SHALL BE USED FOR THE 10'x10' S.A.S. W/ NEENAH CASTING 3067-7004-V. EXCEPT THIS STRUCTURE SHALL HAVE BOTH CUTOUTS BE FOR A 43"X68" HERCP.~~
5. INVERTS SHALL BE AS SHOWN ON THE PLANS.



NORTH FACE



WEST FACE

10' X 10' SAS DETAIL

NOT TO SCALE

		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:44 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\00373079 Structure Details.dwg

MSA

ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

STORM SEWER DETAILS

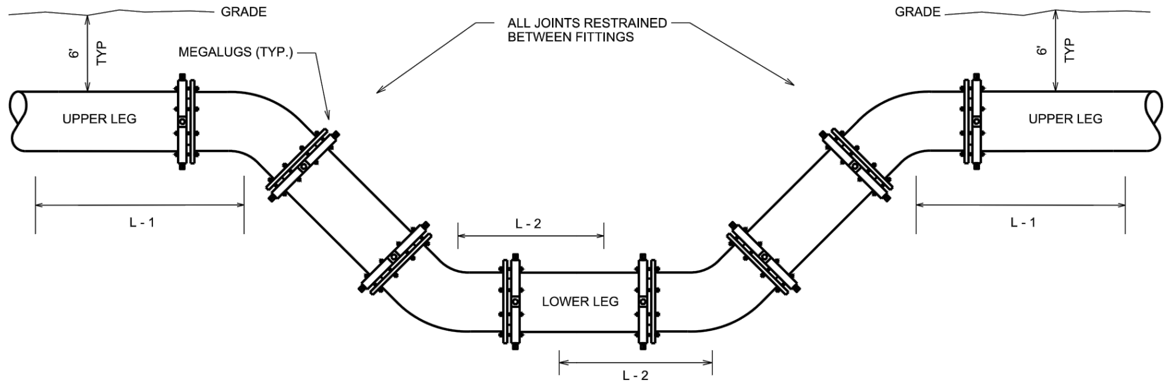
PROJECT NO. 00373079

SHEET G 14

PART VII - WATER MAINS AND SERVICE LATERALS

DETAIL DRAWING NO. **7.16**

REVISED: 12/2018



L - 1: RESTRAINED JOINT LENGTH
UPPER LEG OF VERTICAL BEND

L - 2: RESTRAINED JOINT LENGTH
LOWER LEG OF VERTICAL BEND

*NOTE - AS THE BEND ANGLE APPROACHES 90° (VERTICAL SWEEPS/OFFSETS), LATERAL MOVEMENT OF THE OUTER LEGS APPROACHES ZERO. FOR THIS CONDITION, RESTRAIN ALL PIPE BETWEEN THE FITTINGS AND RESTRAIN THE OUTER LEGS AS DEAD ENDS.

	45° BEND		22.5° BEND		11.25° BEND	
FITTING SIZE (IN)	L - 1 (FT)	L - 2 (FT)	L - 1 (FT)	L - 2 (FT)	L - 1 (FT)	L - 2 (FT)
4	13	3	6	2	3	1
6	18	4	9	2	5	1
8	24	5	12	3	6	2
10	28	6	14	3	7	2
12	34	7	16	4	8	2
16	43	10	21	5	11	3
20	53	12	26	6	13	3
24	62	13	30	7	15	4

NOTES:
SOURCE: Adapted from the EBAA Iron Restraint Length Calculator, Version 7.1.2
Materials = Poly Wrapped Ductile Iron Pipe
Soil Type = GM (Silty Gravels, Gravel-Sand-Silt Mixtures)
Test Pressure = 150 PSI

Safety Factor = 1.5
Trench Type = 4
Bury Depth = 6'
Low Side Depth = 8'

CITY OF MADISON WATER UTILITY	NOT TO SCALE	JOINT RESTRAINT LENGTHS FOR VERTICAL BENDS

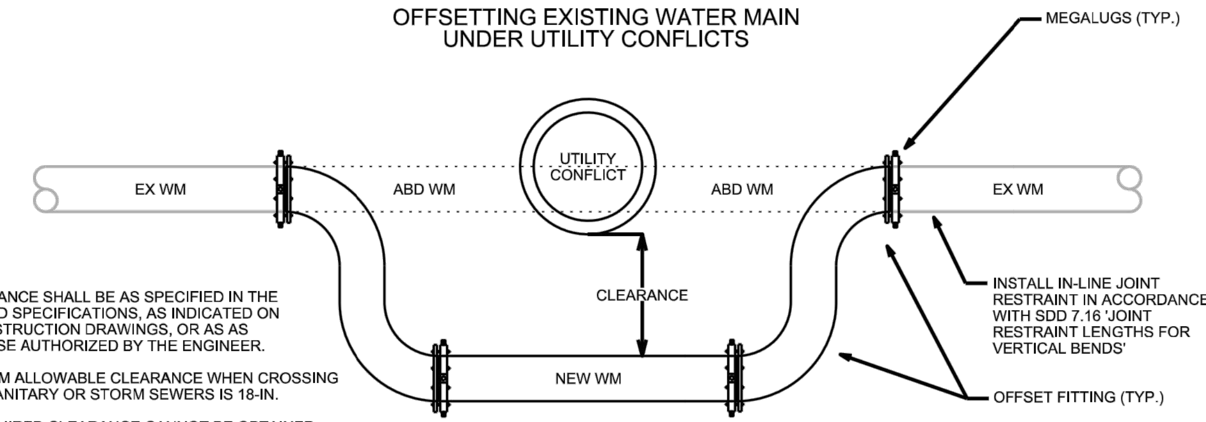
City of Madison Standard Specifications for Public Works Construction

PART VII - WATER MAINS AND SERVICE LATERALS

DETAIL DRAWING NO. **7.22**

REVISED: 12/2018

OFFSETTING EXISTING WATER MAIN UNDER UTILITY CONFLICTS



NOTES:

1) CLEARANCE SHALL BE AS SPECIFIED IN THE STANDARD SPECIFICATIONS, AS INDICATED ON THE CONSTRUCTION DRAWINGS, OR AS AS OTHERWISE AUTHORIZED BY THE ENGINEER.

2) MINIMUM ALLOWABLE CLEARANCE WHEN CROSSING BELOW SANITARY OR STORM SEWERS IS 18-IN.

3) IF REQUIRED CLEARANCE CANNOT BE OBTAINED, USE 45° FITTINGS IN LIEU OF OFFSET FITTINGS.

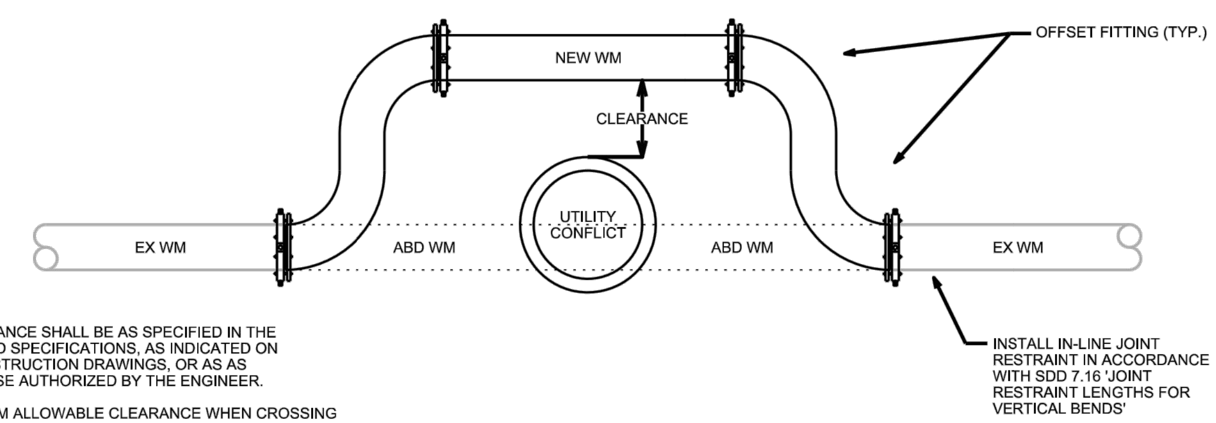
4) 11.25°, 22.5°, OR 90° FITTINGS ARE NOT ALLOWED WITHOUT ENGINEER APPROVAL.

5) INSULATE AS REQUIRED PER THE STANDARD SPECIFICATIONS OR AS INDICATED ON THE DRAWINGS.

6) FITTINGS CONNECTED TO EXISTING WATER MAINS WITH CUT-IN CONNECTIONS PER THE STANDARD SPECIFICATIONS.

7) NEW PIPE SHALL HAVE NO JOINTS BETWEEN FITTINGS.

OFFSETTING EXISTING WATER MAIN OVER UTILITY CONFLICTS



NOTES:

1) CLEARANCE SHALL BE AS SPECIFIED IN THE STANDARD SPECIFICATIONS, AS INDICATED ON THE CONSTRUCTION DRAWINGS, OR AS AS OTHERWISE AUTHORIZED BY THE ENGINEER.

2) MINIMUM ALLOWABLE CLEARANCE WHEN CROSSING ABOVE SANITARY OR STORM SEWERS IS 6-IN.

3) IF REQUIRED CLEARANCE CANNOT BE OBTAINED, USE 45° FITTINGS IN LIEU OF OFFSET FITTINGS.

4) 11.25°, 22.5°, OR 90° FITTINGS ARE NOT ALLOWED WITHOUT ENGINEER APPROVAL.

5) INSULATE AS REQUIRED PER THE STANDARD SPECIFICATIONS OR AS INDICATED ON THE DRAWINGS.

6) FITTINGS CONNECTED TO EXISTING WATER MAINS WITH CUT-IN CONNECTIONS PER THE STANDARD SPECIFICATIONS.

7) NEW PIPE SHALL HAVE NO JOINTS BETWEEN FITTINGS.

CITY OF MADISON WATER UTILITY	NOT TO SCALE	OFFSETTING EXISTING WATER MAIN OVER/UNDER UTILITY CONFLICTS

City of Madison Standard Specifications for Public Works Construction

			NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY:	KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY:	ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY:	ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 11:50:47 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_GSheets_Hidden Hill Storm Sewer.dwg

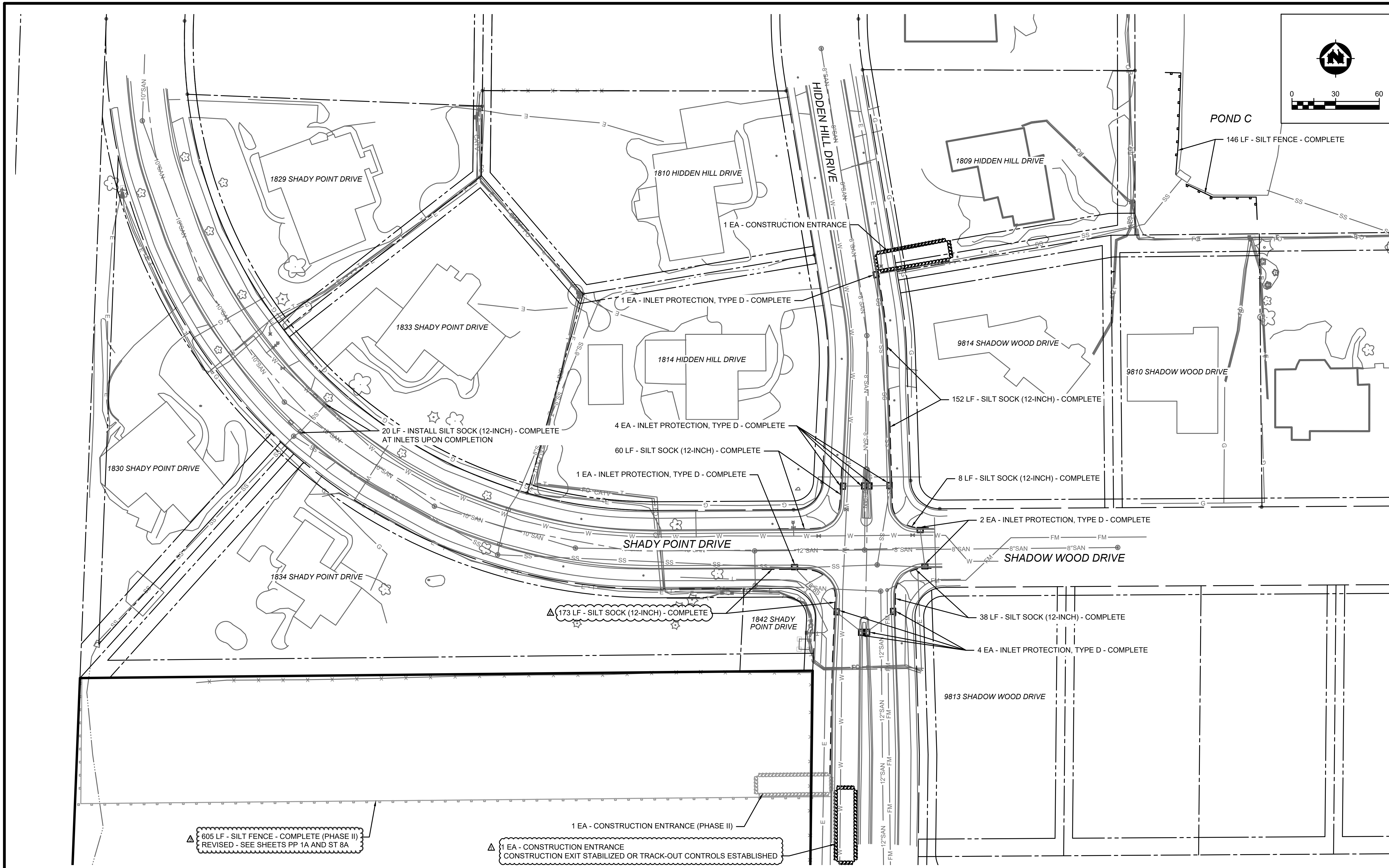
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

WATERMAIN DETAILS

PROJECT NO. 00373079

SHEET G 15



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 2:03:27 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

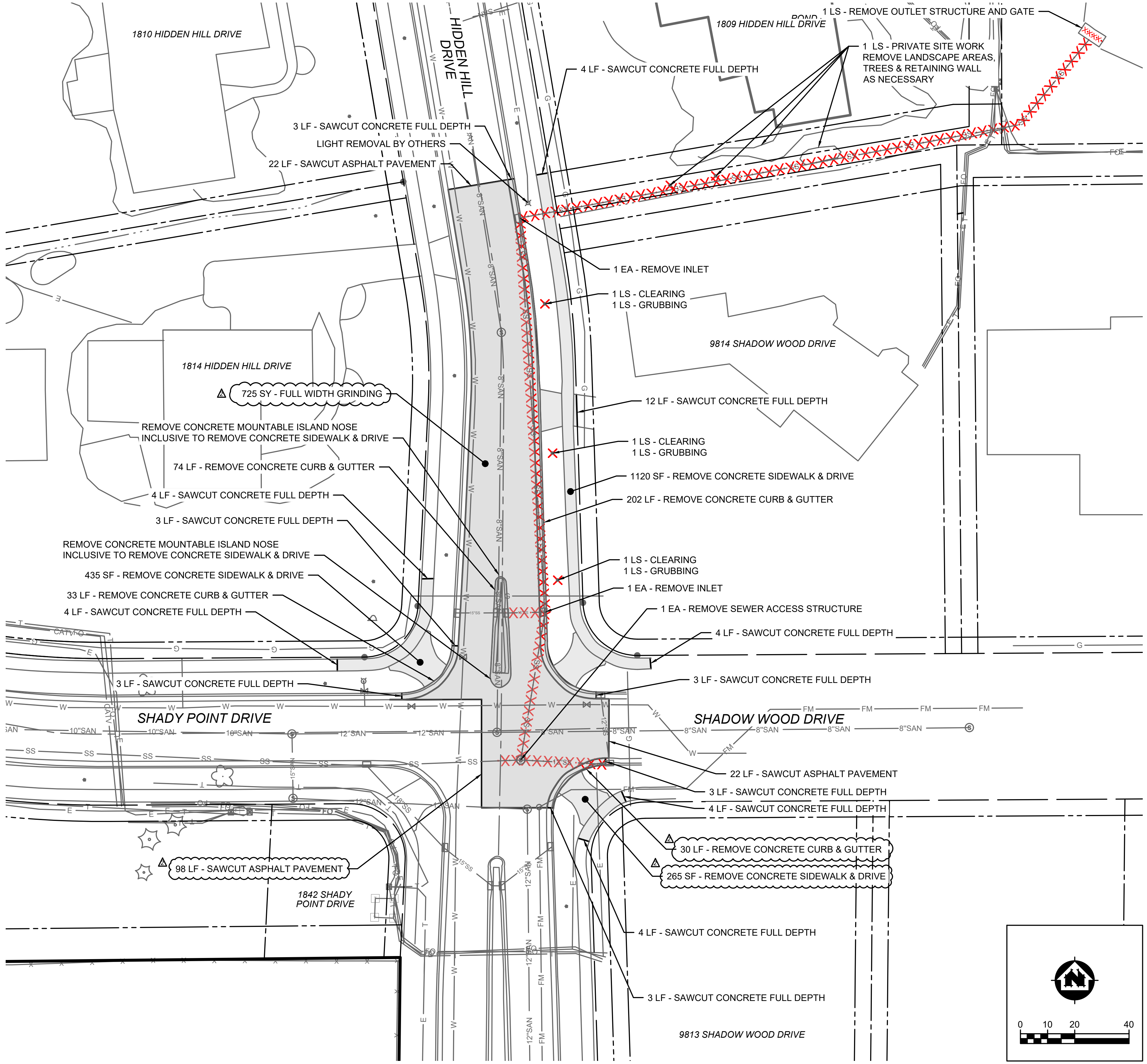
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

EROSION CONTROL PLAN

PROJECT NO. 00373079

SHEET ST 1



			NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY:	KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY:	ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY:	ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 2:03:29 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

MSA

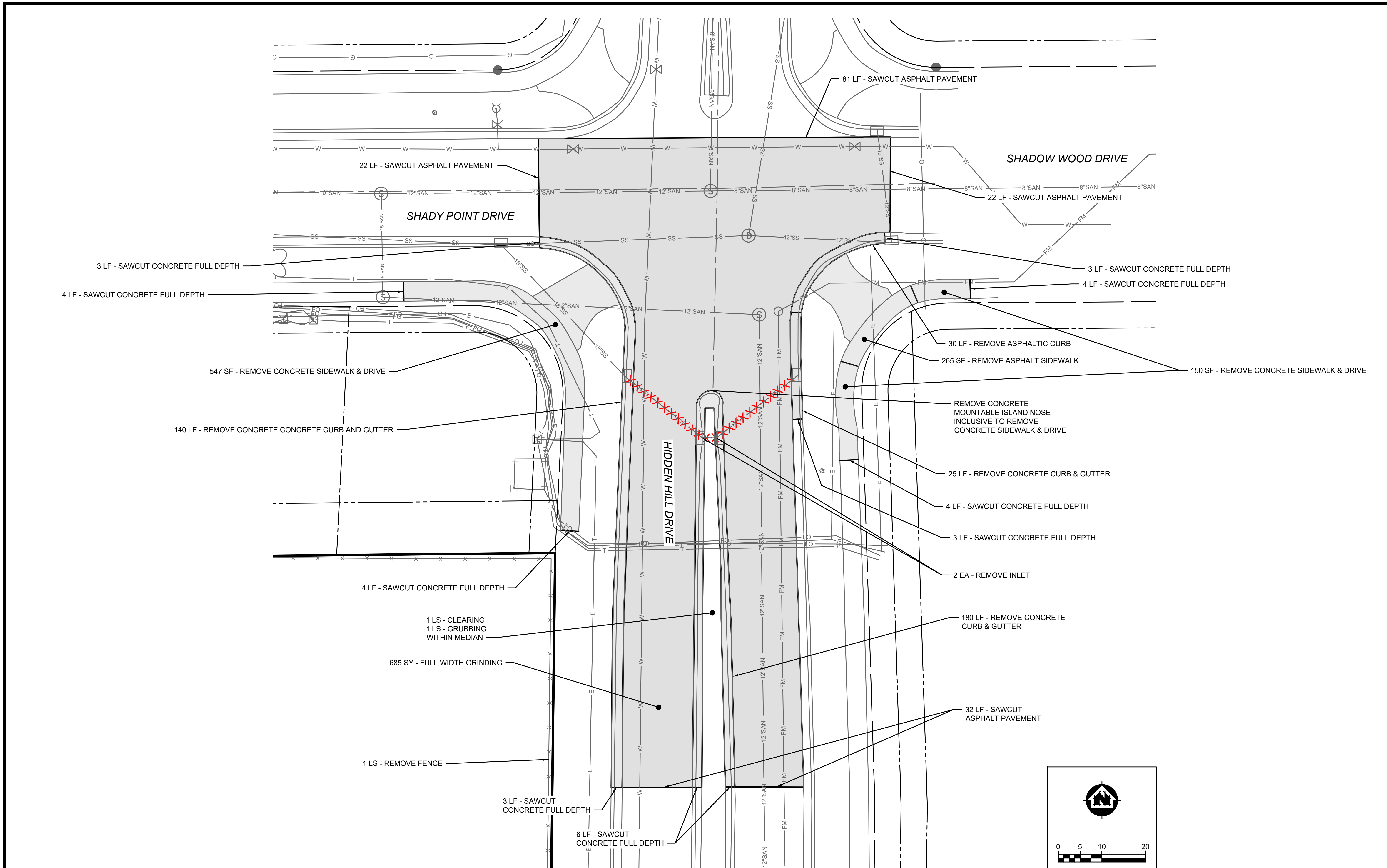
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

DEMOLITION PLAN - HIDDEN HILL DRIVE - PHASE I

PROJECT NO. 00373079

SHEET ST 2



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

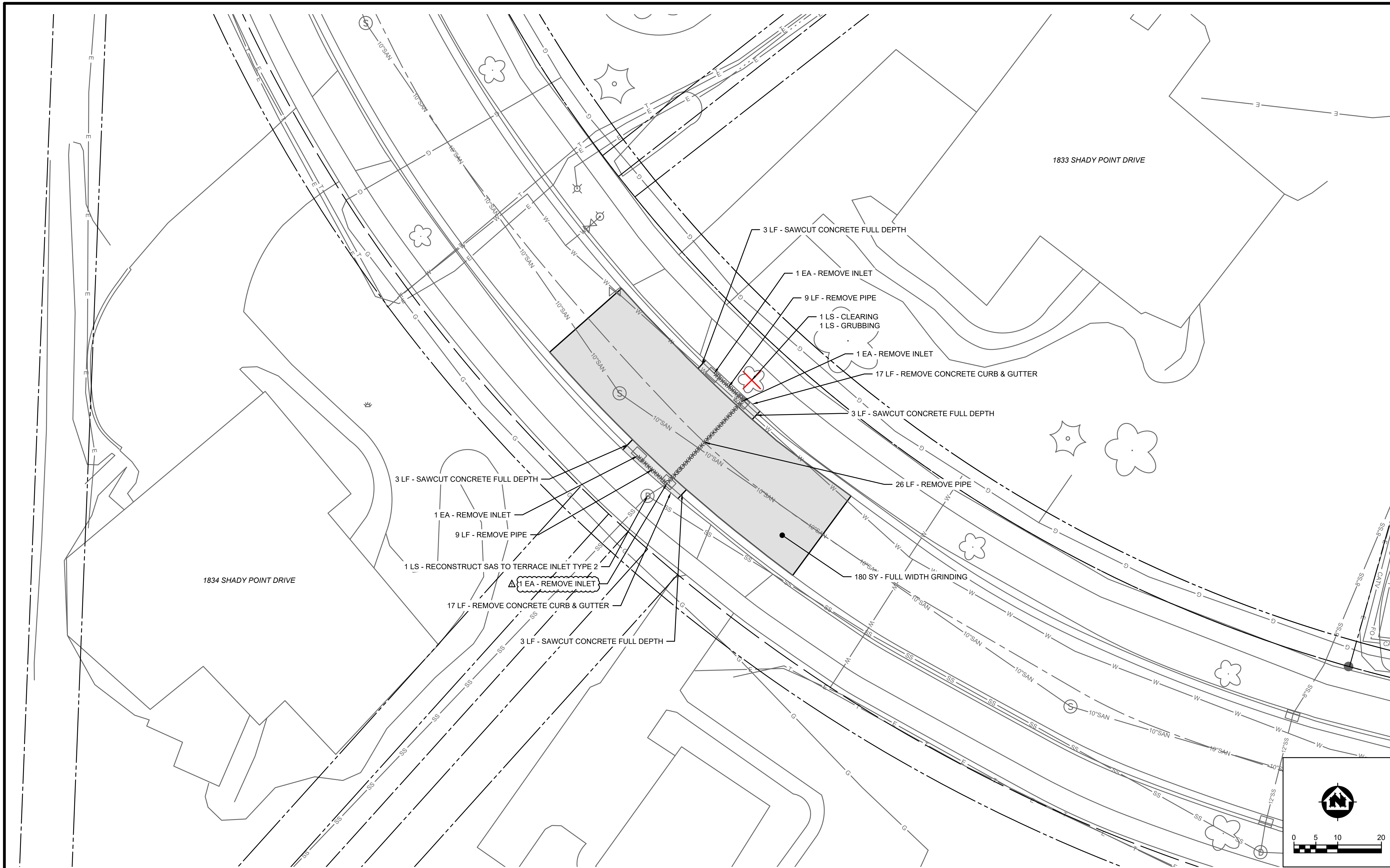
PLOT DATE: Friday, October 4, 2019 2:03:31 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

DEMOLITION PLAN - HIDDEN HILL DRIVE - PHASE II

PROJECT NO. 00373079
SHEET ST 2A



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 2:03:32 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

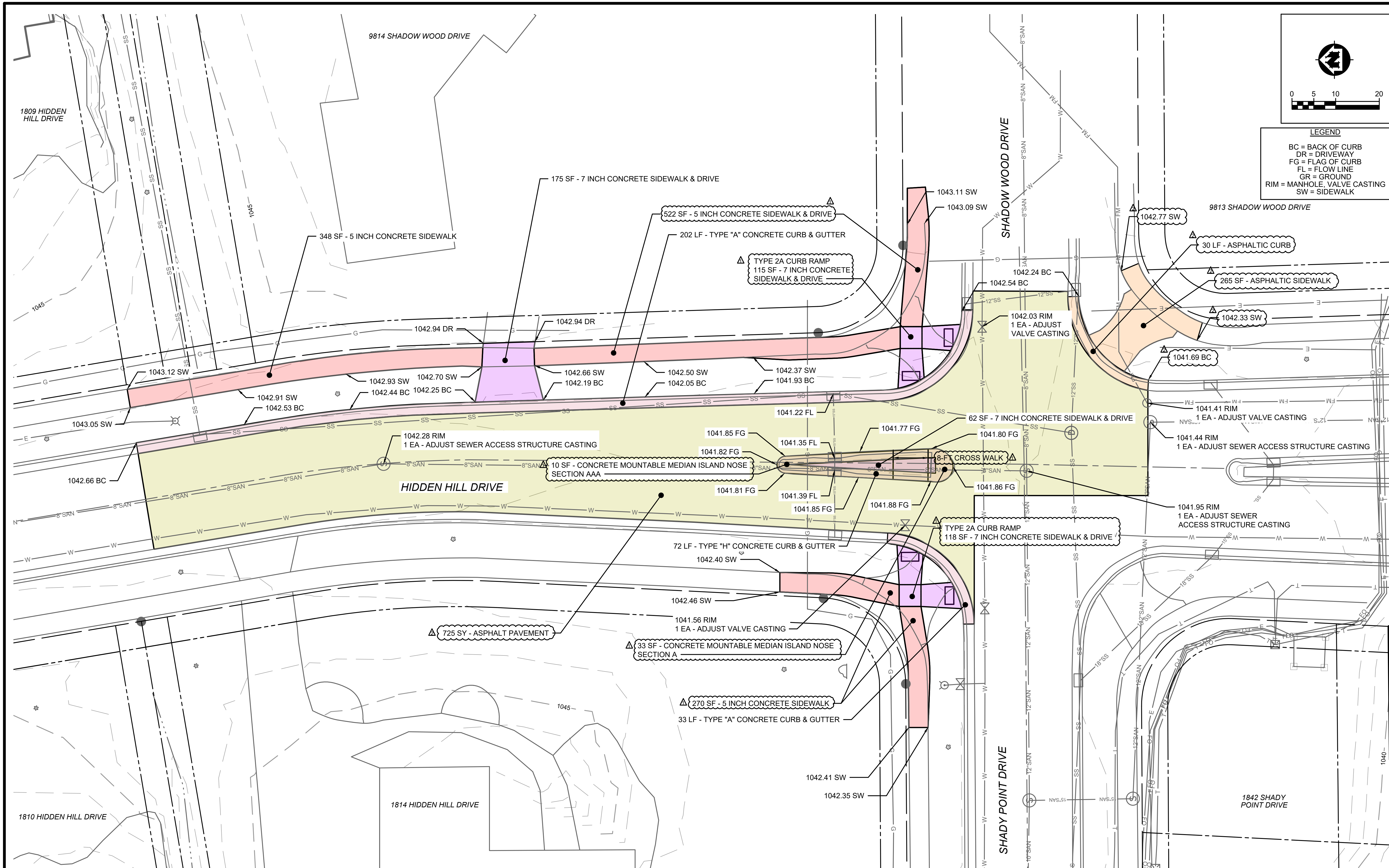
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

DEMOLITION PLAN - SHADY POINT DRIVE

PROJECT NO.
00373079

SHEET
ST 3



				NO.	DATE	REVISION	BY
PROJECT DATE:	6/6/19	DRAWN BY:	KH	1	6/11/19	ADDENDUM #1	KNH
		DESIGNED BY:	ET	2	10/4/19	ALIGNMENT REVISION	KNH
		CHECKED BY:	ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

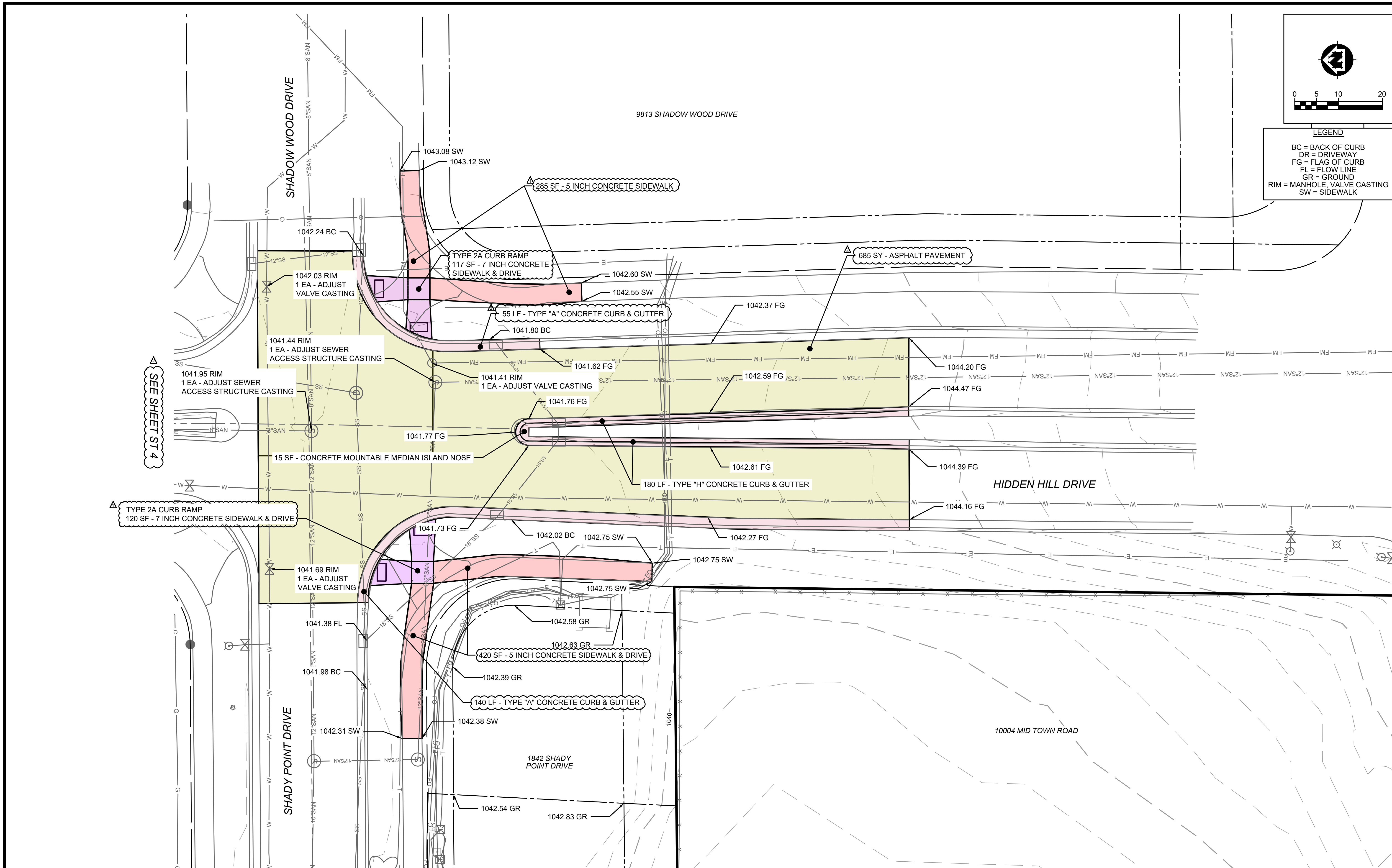
PLOT DATE: Friday, October 4, 2019 2:03:35 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

GRADING PLAN - HIDDEN HILL DRIVE - PHASE I

PROJECT NO. 00373079
SHEET ST 4



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 2:03:37 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

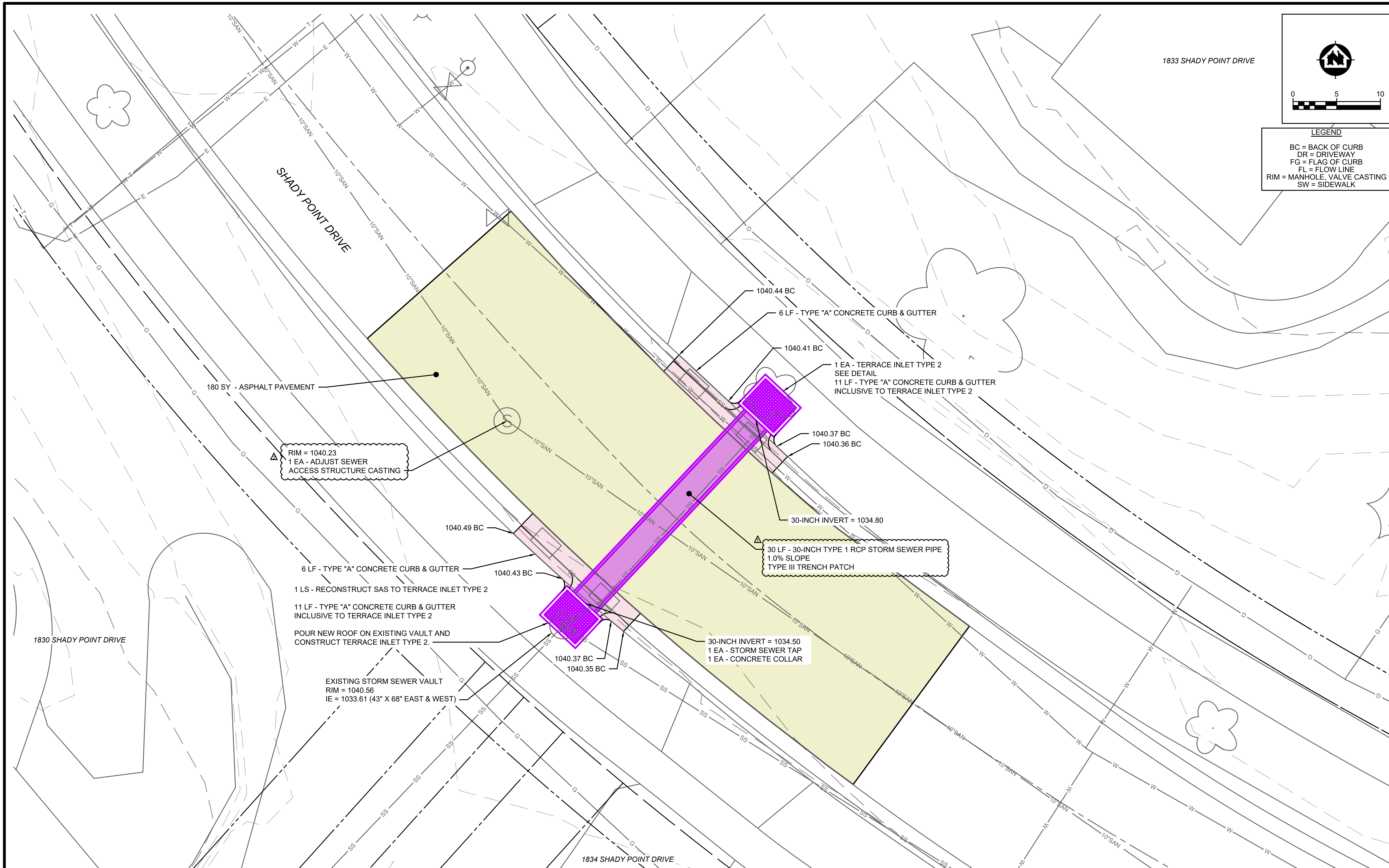
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

GRADING PLAN - HIDDEN HILL DRIVE - PHASE II

PROJECT NO.
00373079

SHEET
ST 4A



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

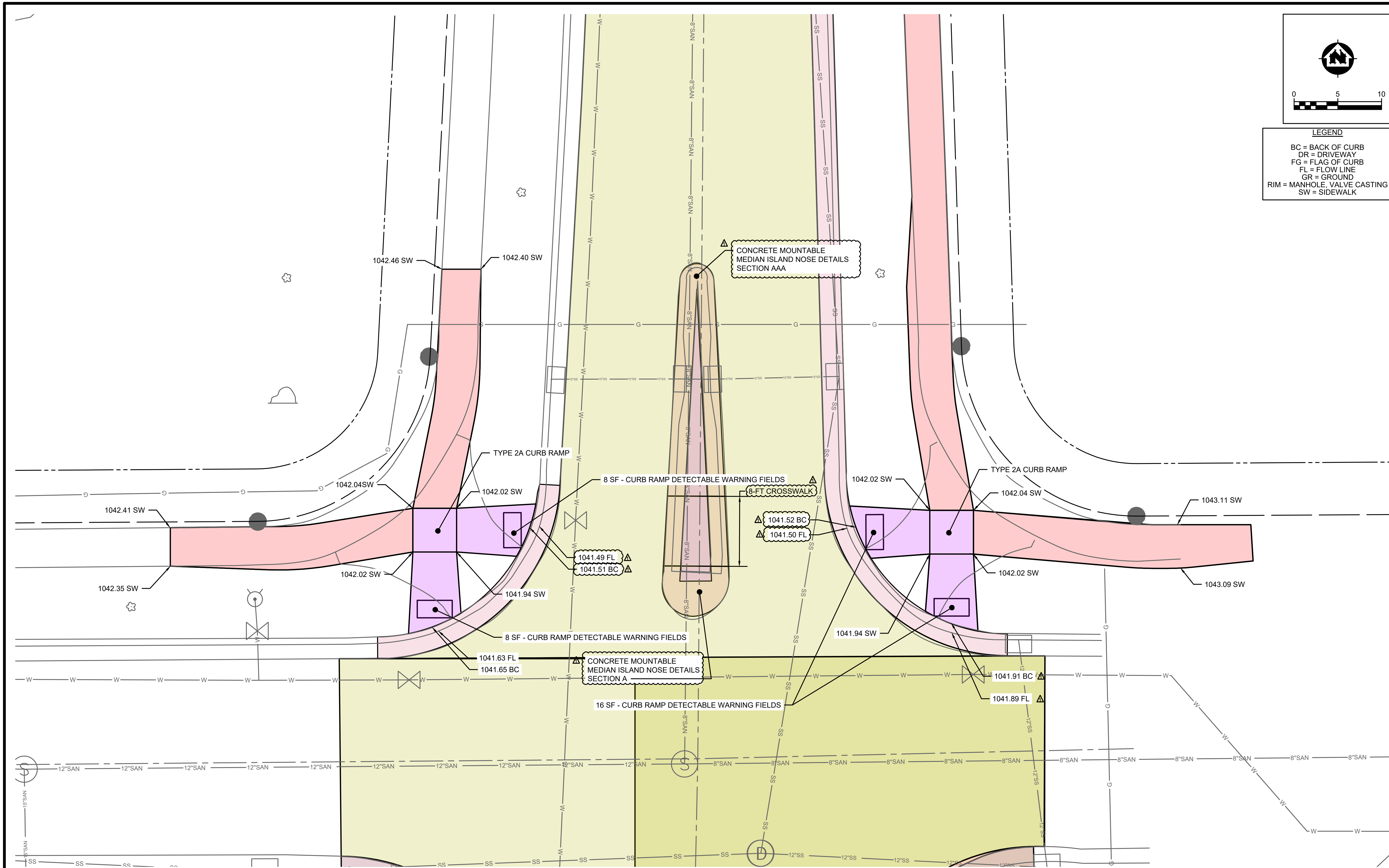
PLOT DATE: Friday, October 4, 2019 2:03:39 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

GRADING PLAN - SHADY POINT DRIVE

PROJECT NO. 00373079
SHEET ST 5



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 2:03:42 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

MSA

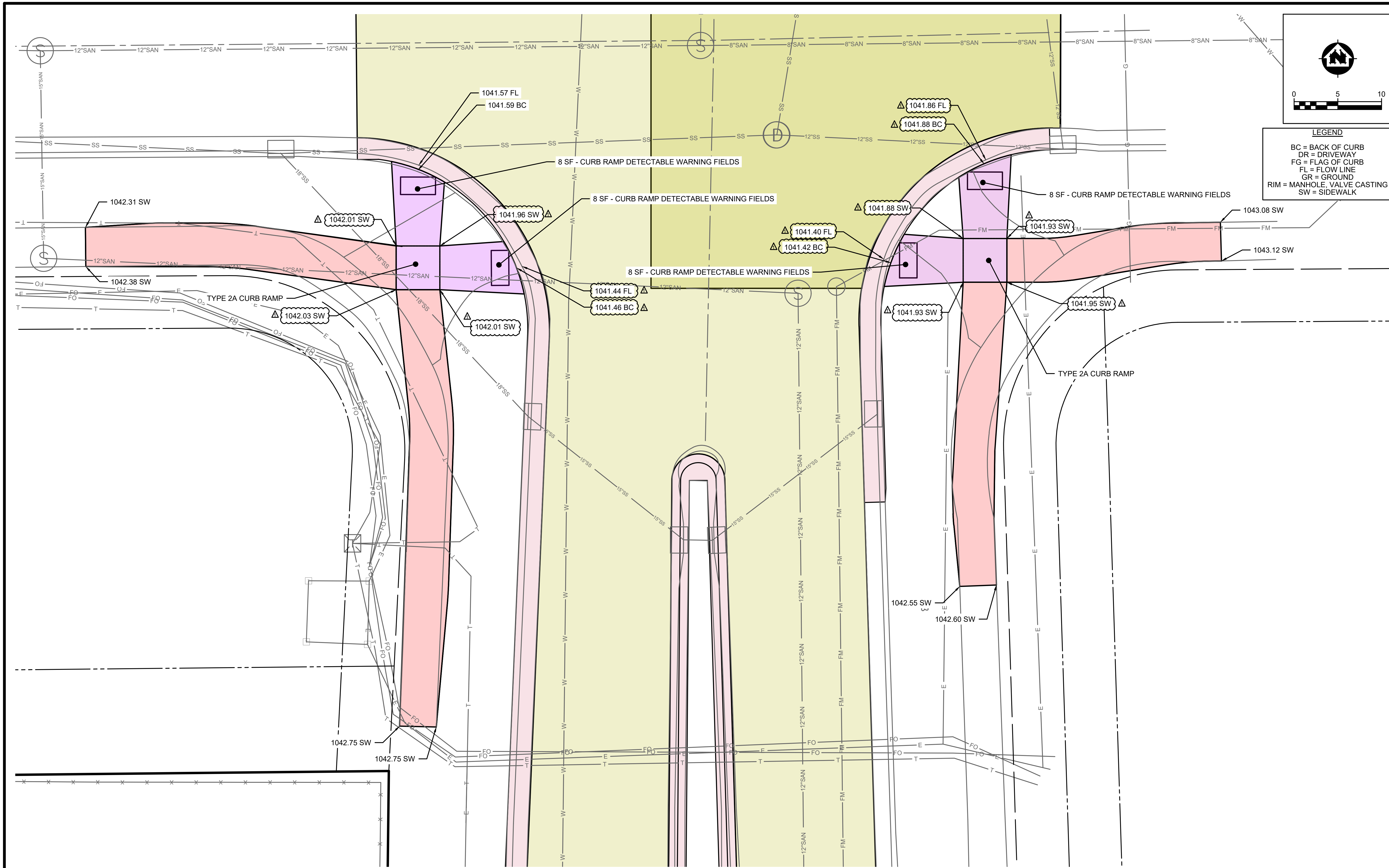
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

GRADING PLAN - CURB RAMPS

PROJECT NO. 00373079

SHEET ST 6



PROJECT DATE: 6/6/19		NO.	DATE	REVISION	BY
	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 2:03:45 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

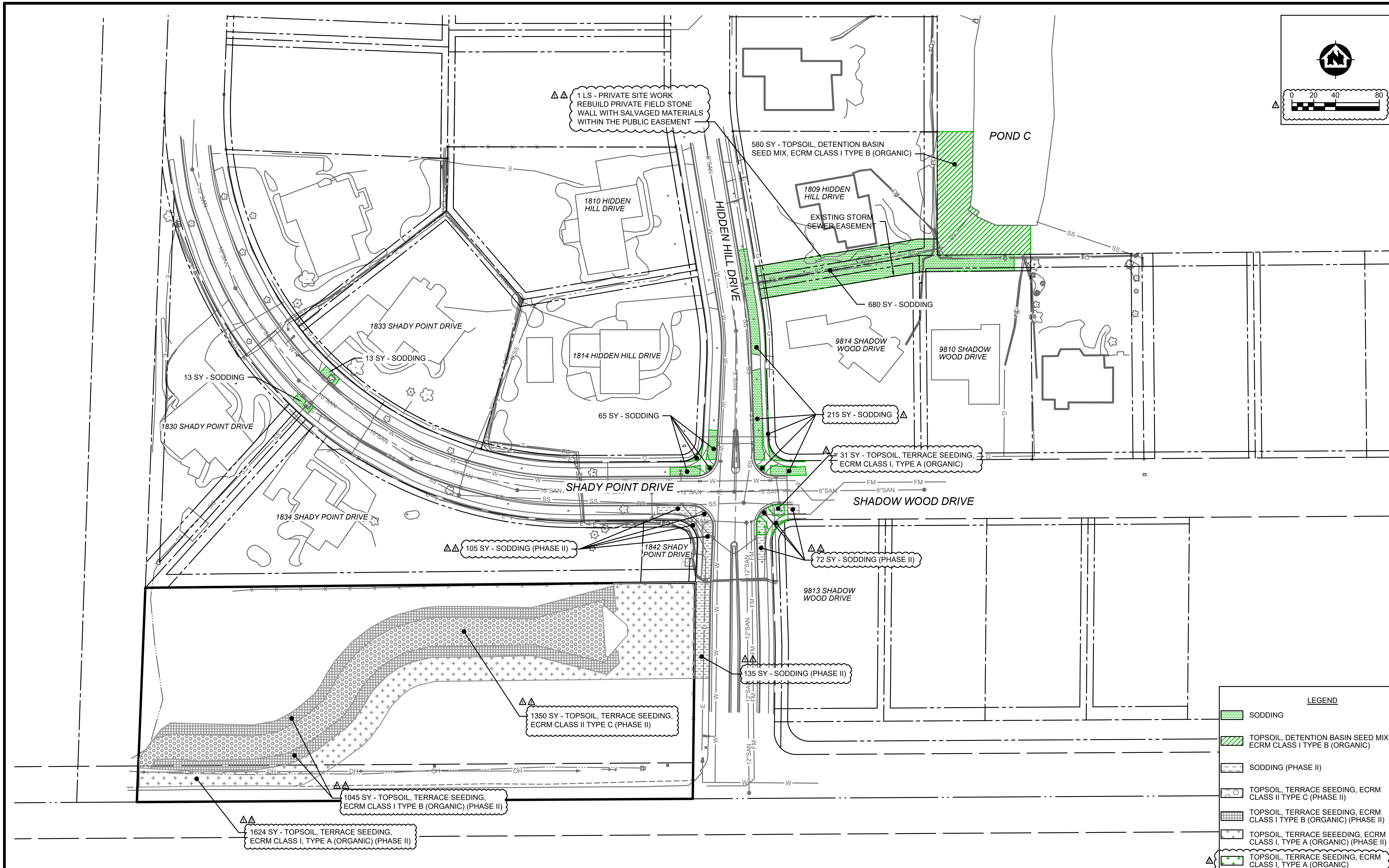
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

GRADING PLAN - CURB RAMPS

PROJECT NO. 00373079

SHEET ST 7



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMENT REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Monday, May 11, 2020 5:39:29 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

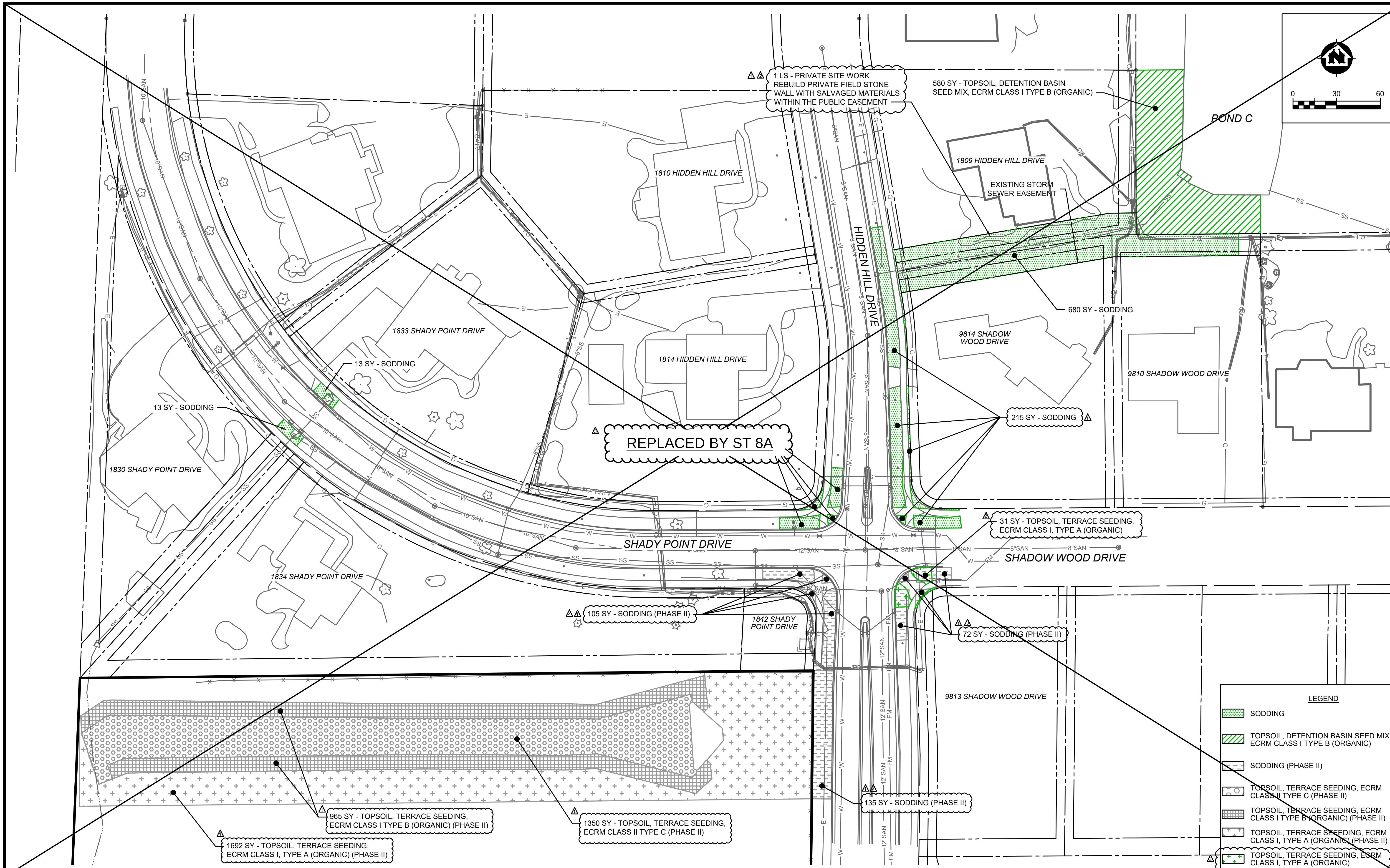
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

RESTORATION PLAN

PROJECT NO. 00373079

SHEET ST 8A



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Monday, October 7, 2019 1:59:03 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Erosion Control_Demo & Restoration.dwg

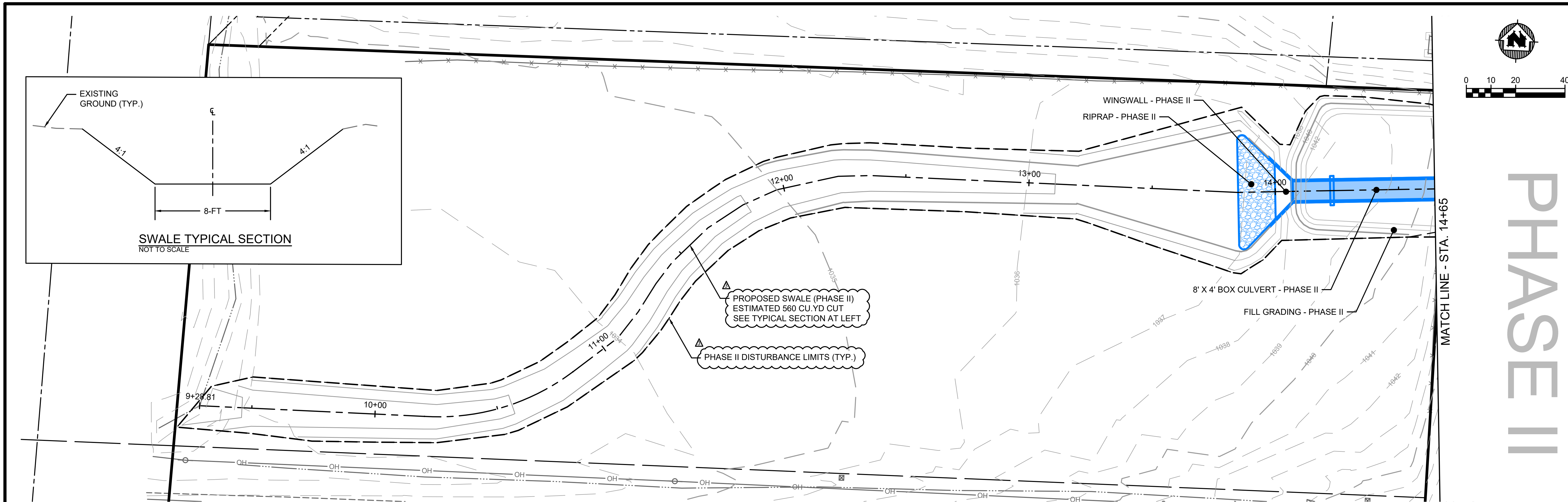
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

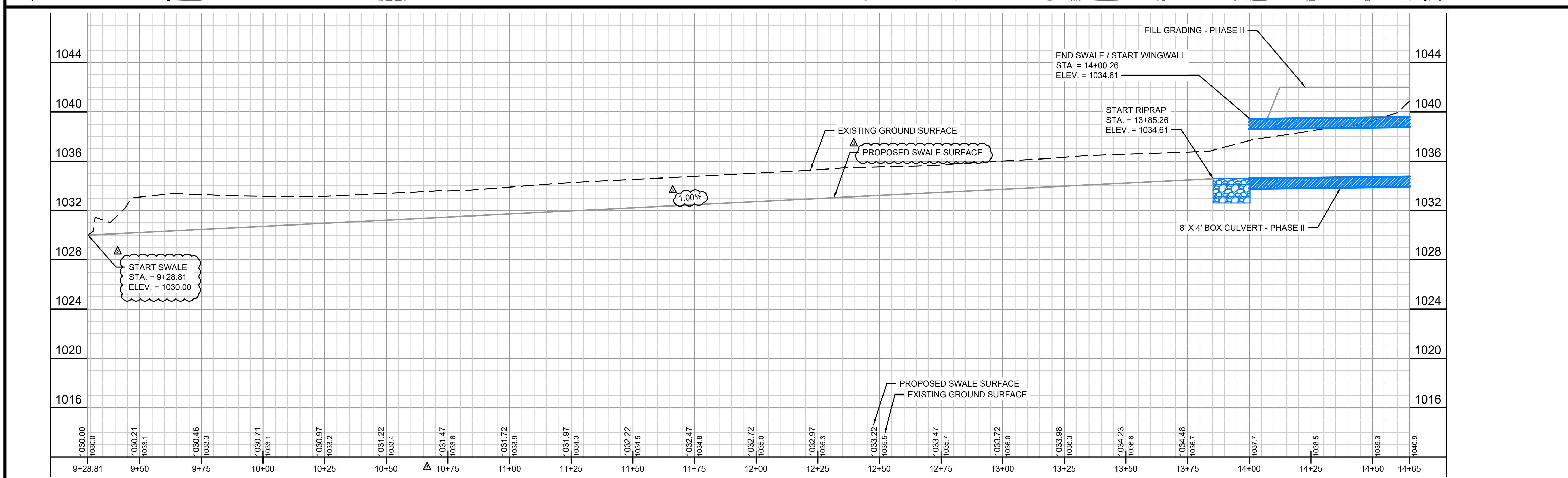
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

RESTORATION PLAN

PROJECT NO. 00373079

SHEET ST 8





PROJECT DATE: 6/6/19		NO.	DATE	REVISION	BY
DRAWN BY:	KH	1	6/11/19	ADDENDUM #1	KNH
DESIGNED BY:	ET	2	10/4/19	ALIGNMENT REVISION	KNH
CHECKED BY:	ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

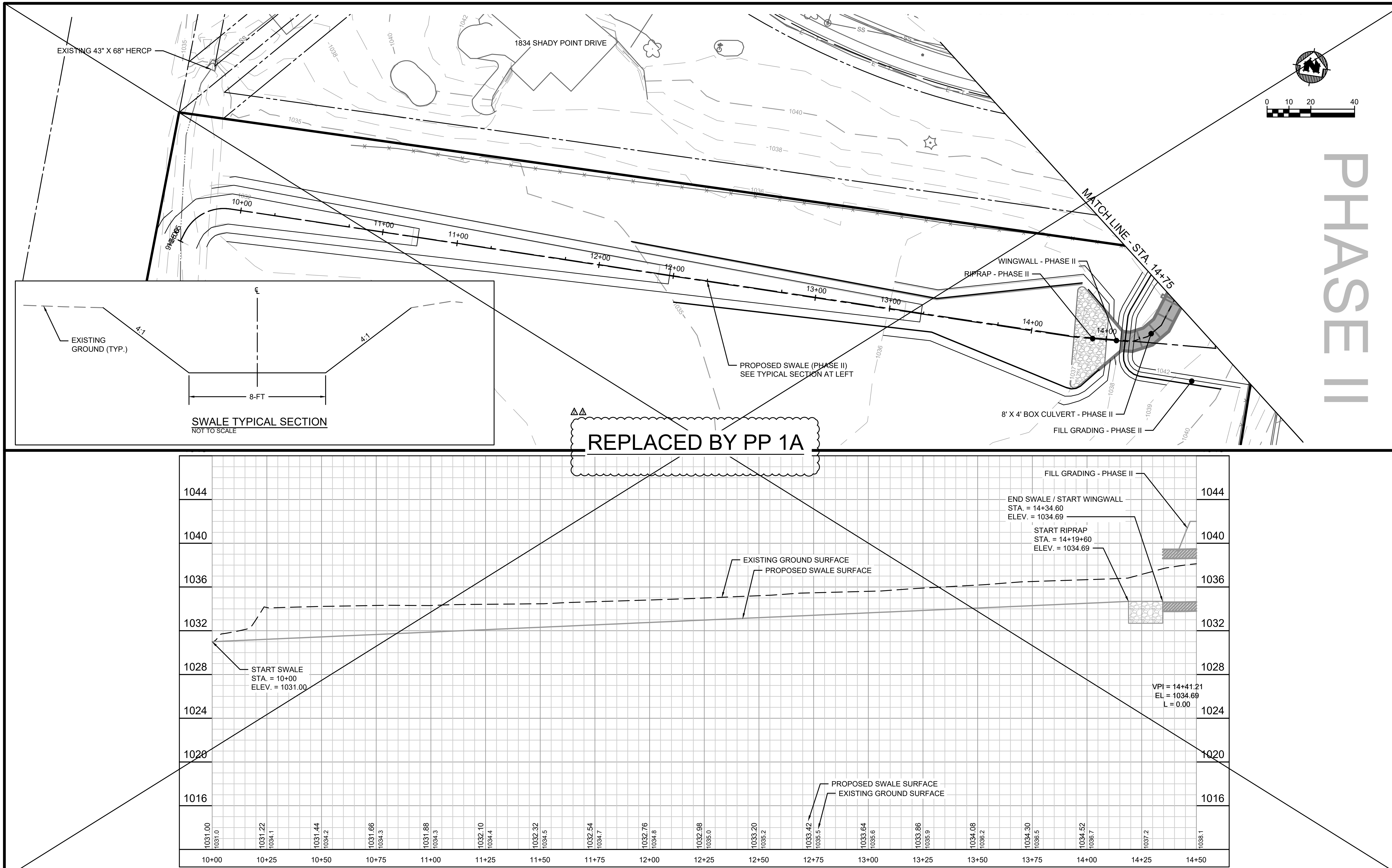
PLOT DATE: Monday, May 11, 2020 5:40:34 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\VFG - Hidden Hill Storm Sewer - Revision - (3) - (2).dwg

MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com
© MSA Professional Services, Inc.

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER

PROJECT NO. 00373079
SHEET PP 1A



			NO.	DATE	REVISION	BY
PROJECT DATE:	6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
		DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
		CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 12:12:35 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\VFG - Hidden Hill - (1) - (1).dwg

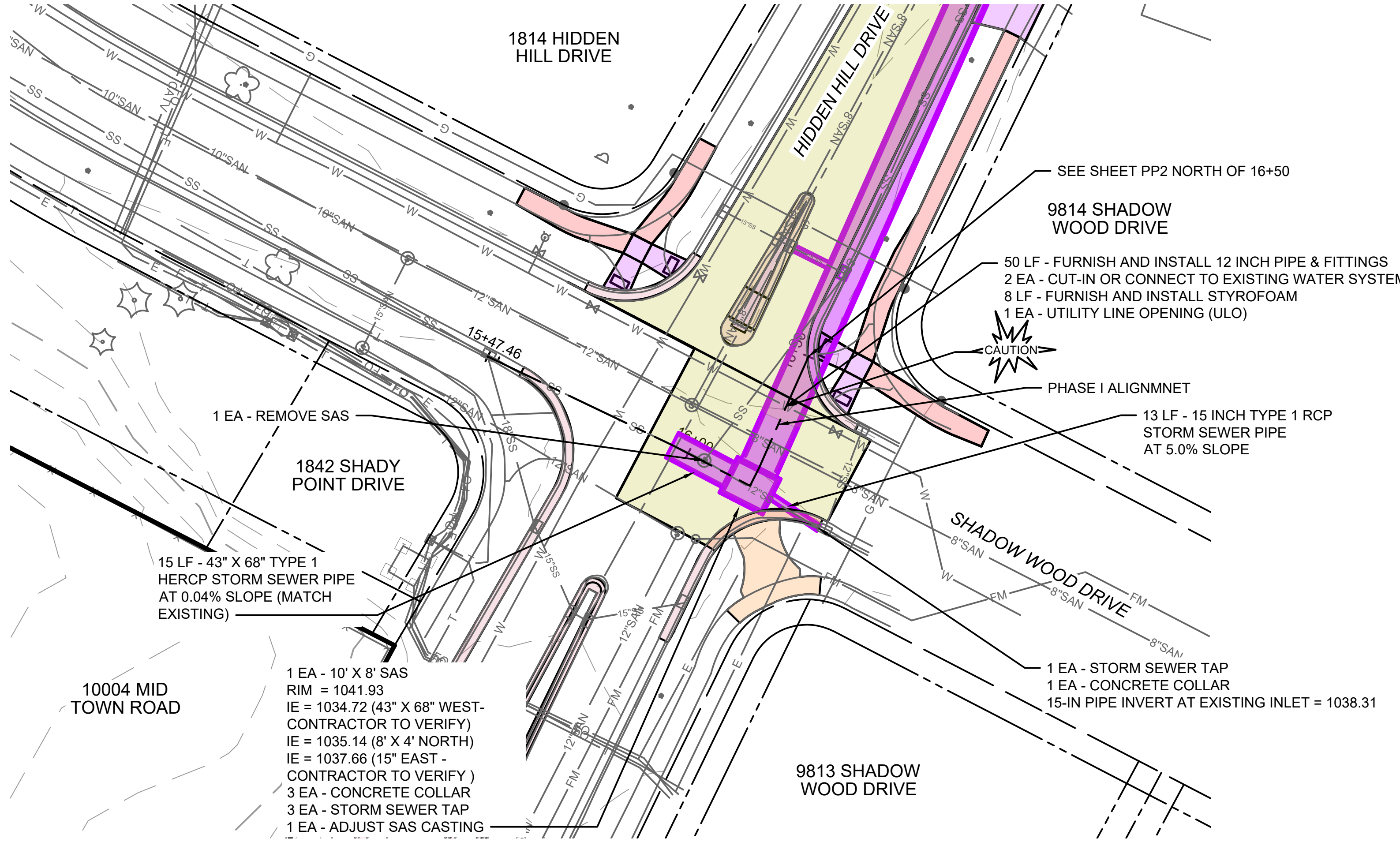
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

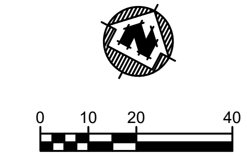
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER

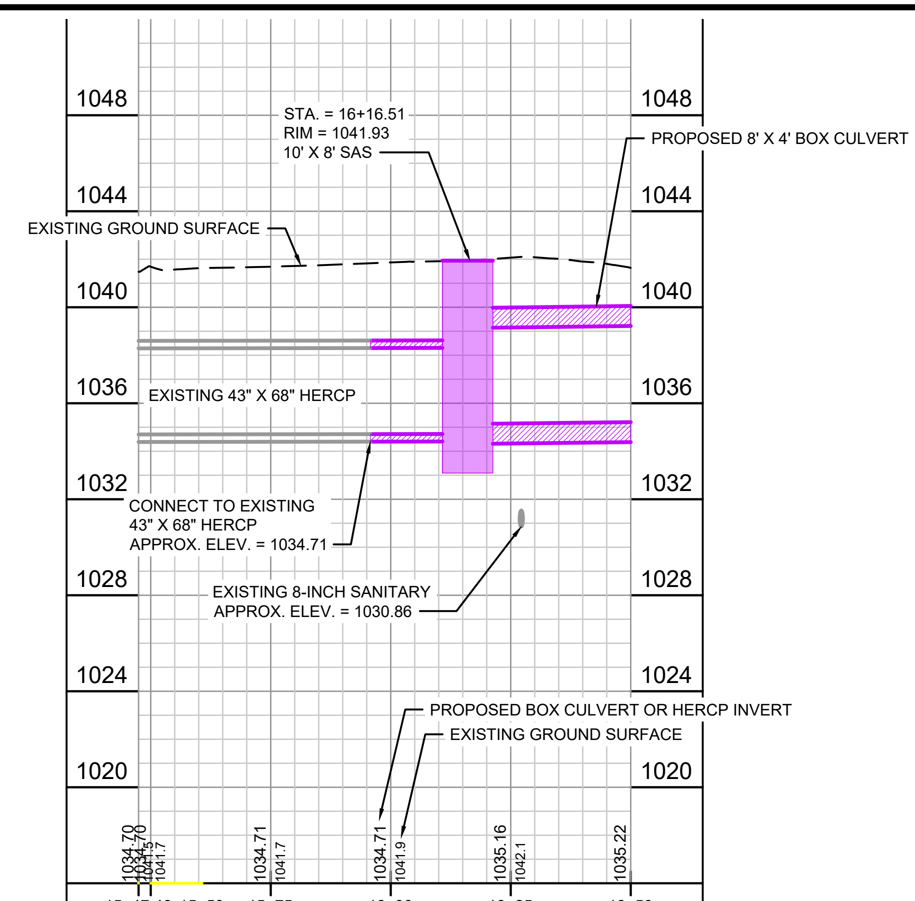
PROJECT NO. 00373079

SHEET PP 1





PHASE I



		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 12:12:39 PM, P:\370s\373\00373079\CADD\Construction Drawings\VFG - Hidden Hill Phase 1 - (4) - (6).dwg

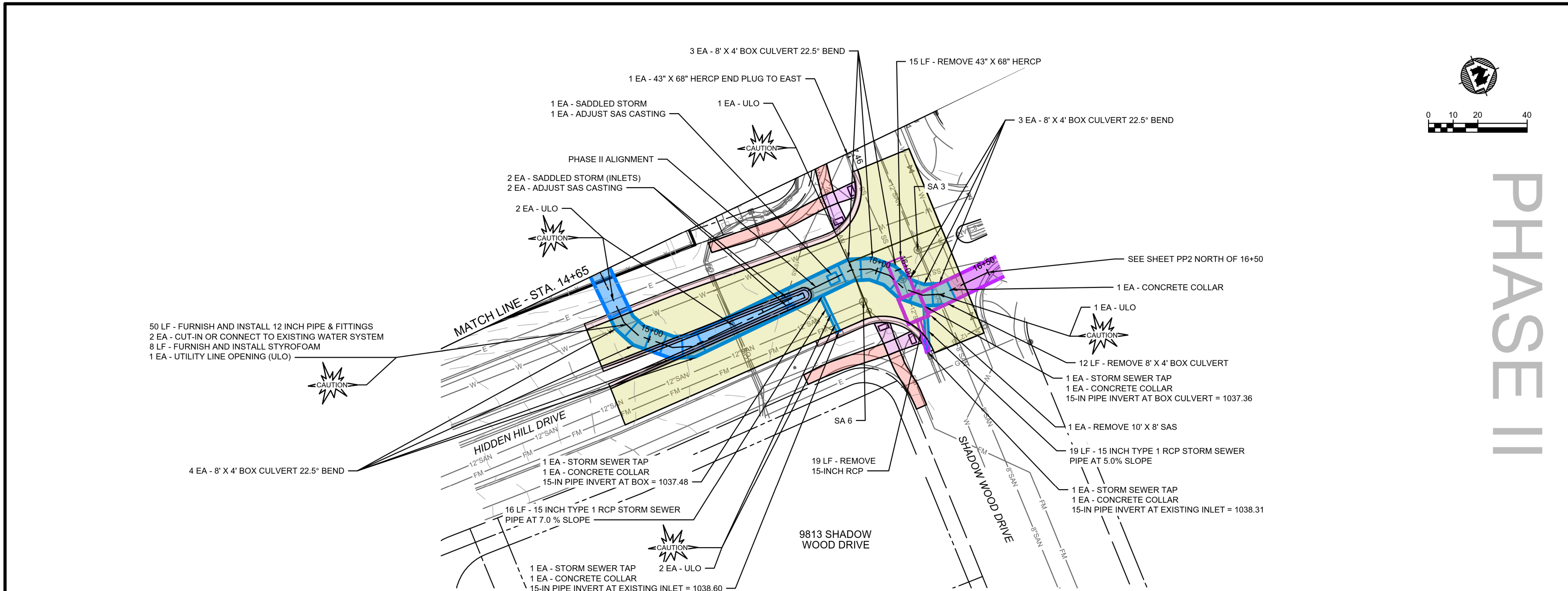
MSA

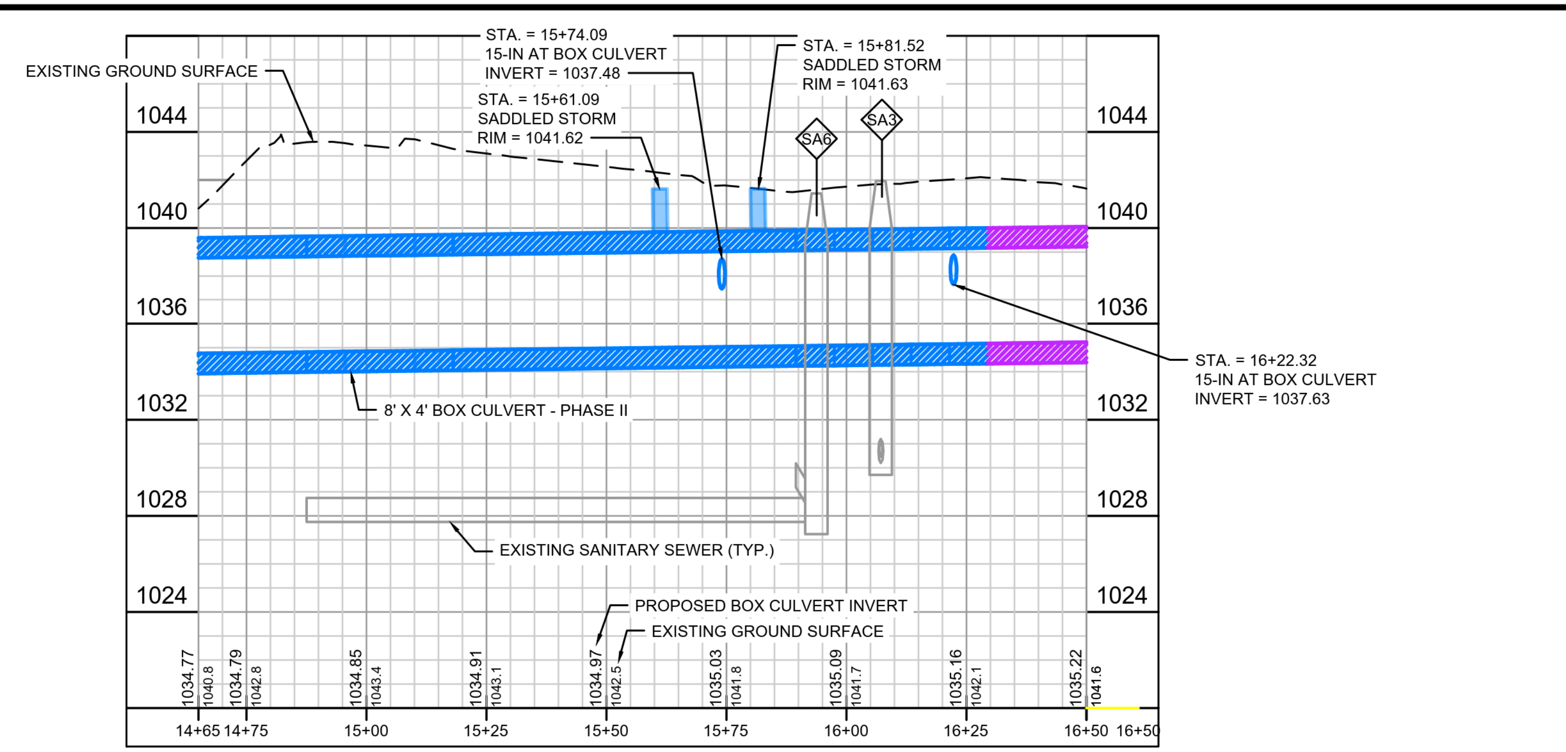
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER

PROJECT NO.
00373079
SHEET
PP 2A





			NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY:	KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY:	ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY:	ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

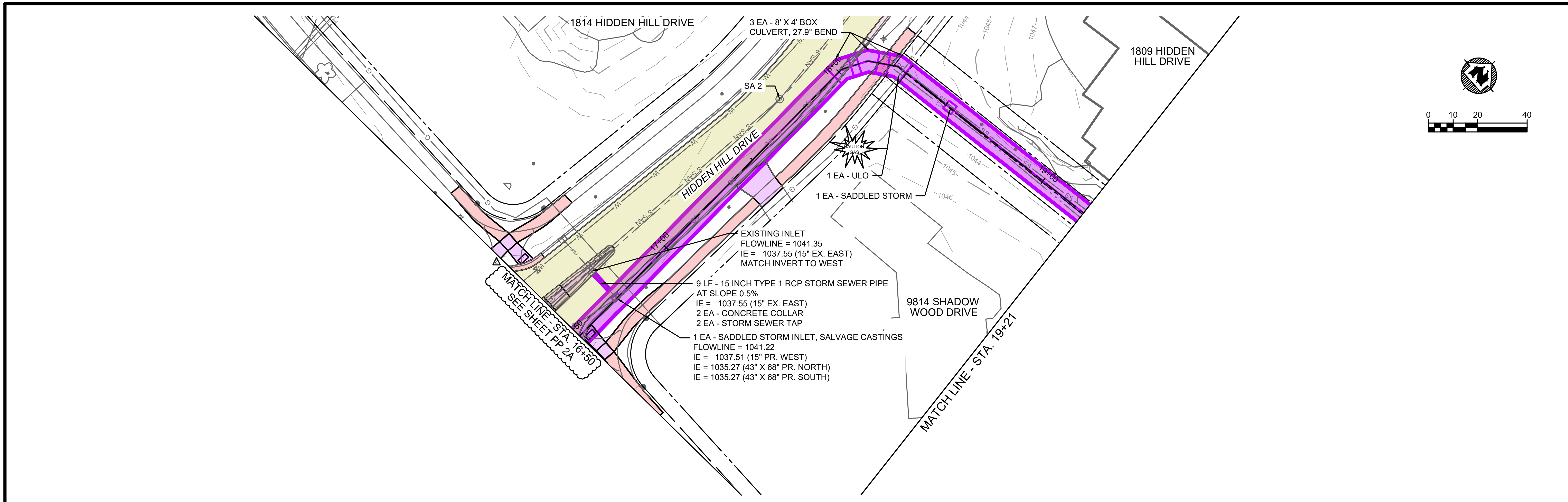
PLOT DATE: Tuesday, October 8, 2019 9:17:22 AM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\VFG - Hidden Hill Storm Sewer - Revision - (3) - (2).dwg

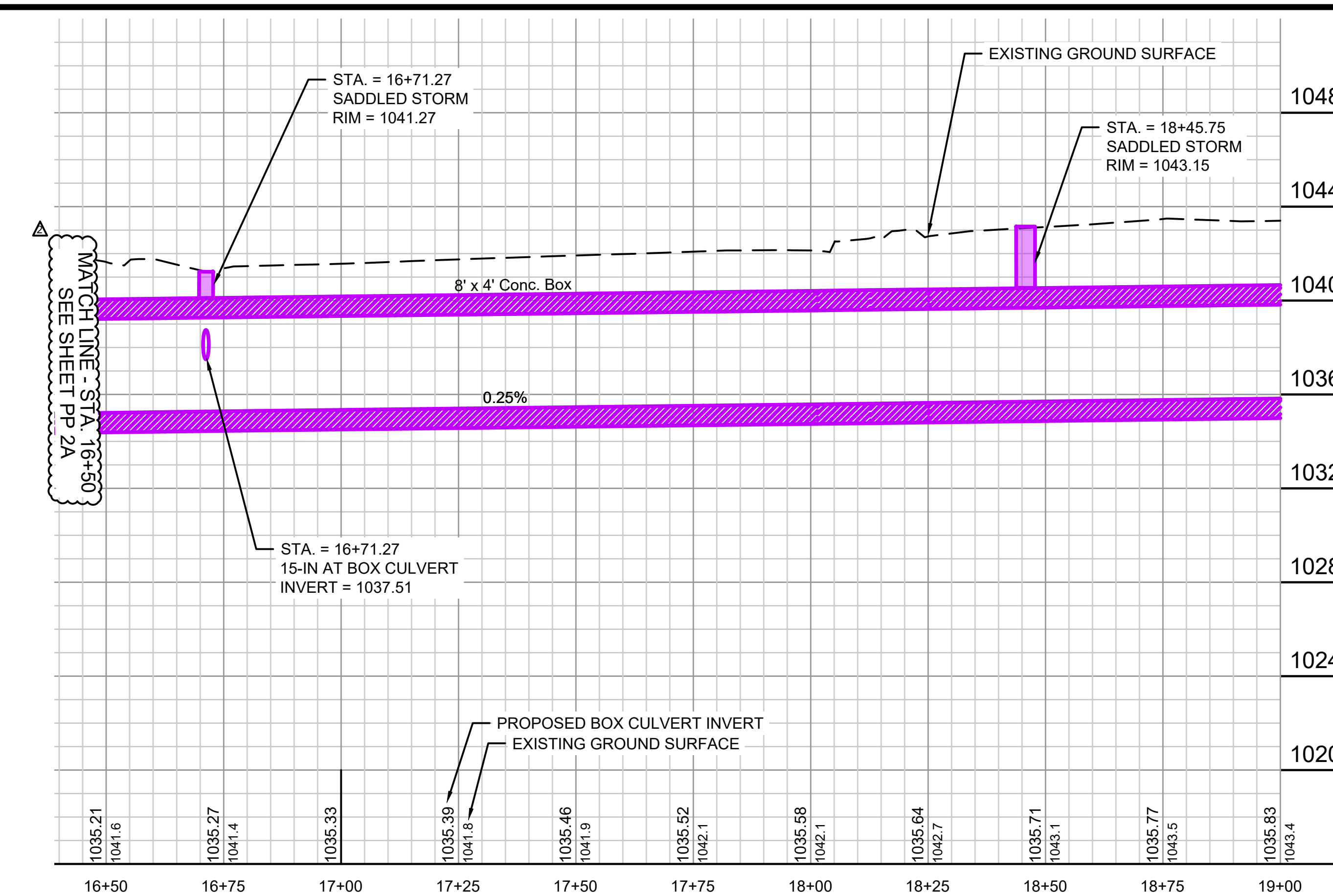
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER

PROJECT NO. 00373079
SHEET PP 2B





		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 12:12:48 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\VFG - Hidden Hill - (1) - (1).dwg

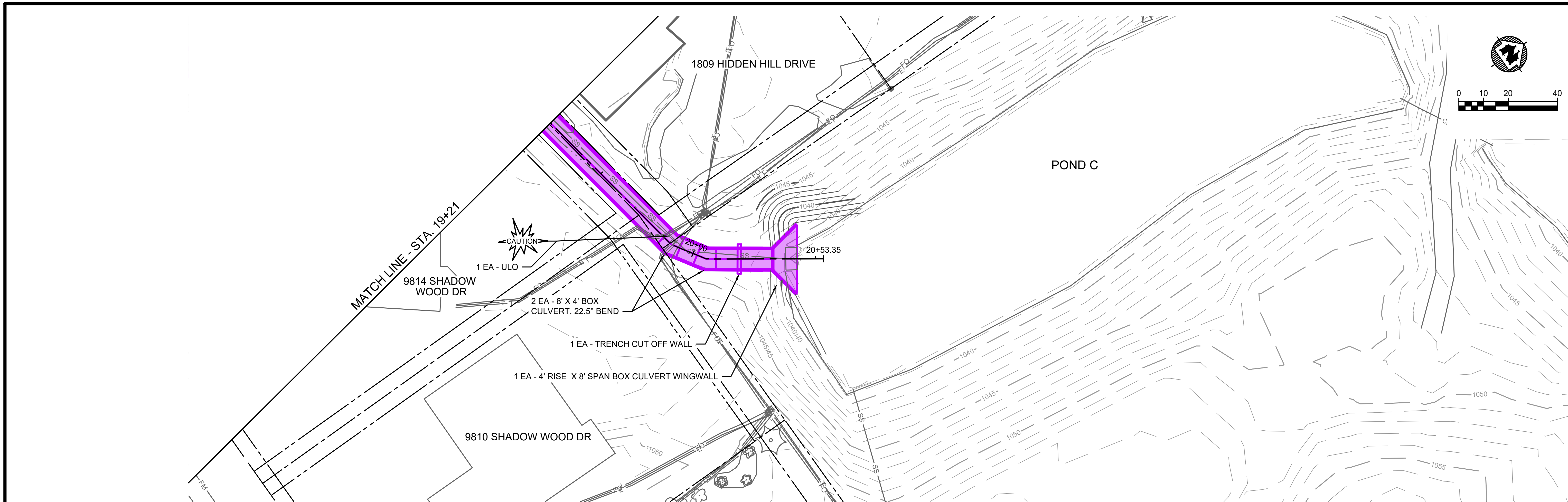
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

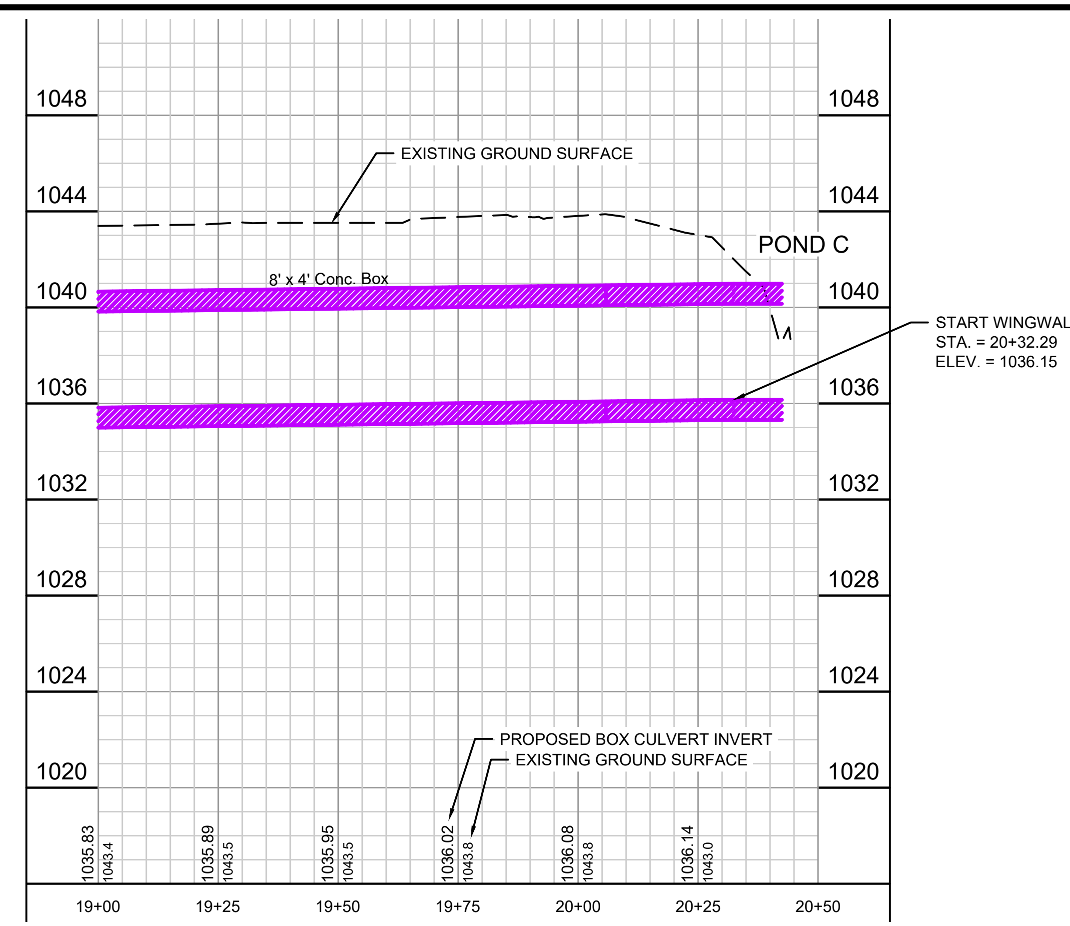
HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER

PROJECT NO. 00373079

SHEET PP 2





		NO.	DATE	REVISION	BY
PROJECT DATE: 6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
	DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
	CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

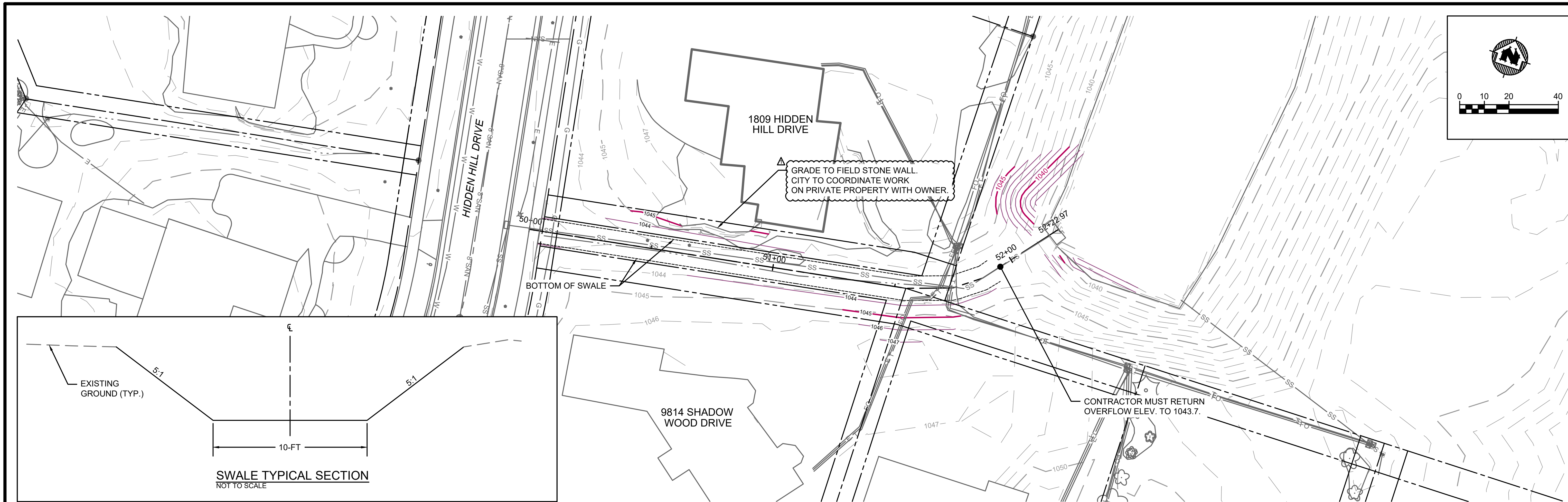
PLOT DATE: Friday, October 4, 2019 12:12:52 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\VFG - Hidden Hill - (1) - (1).dwg

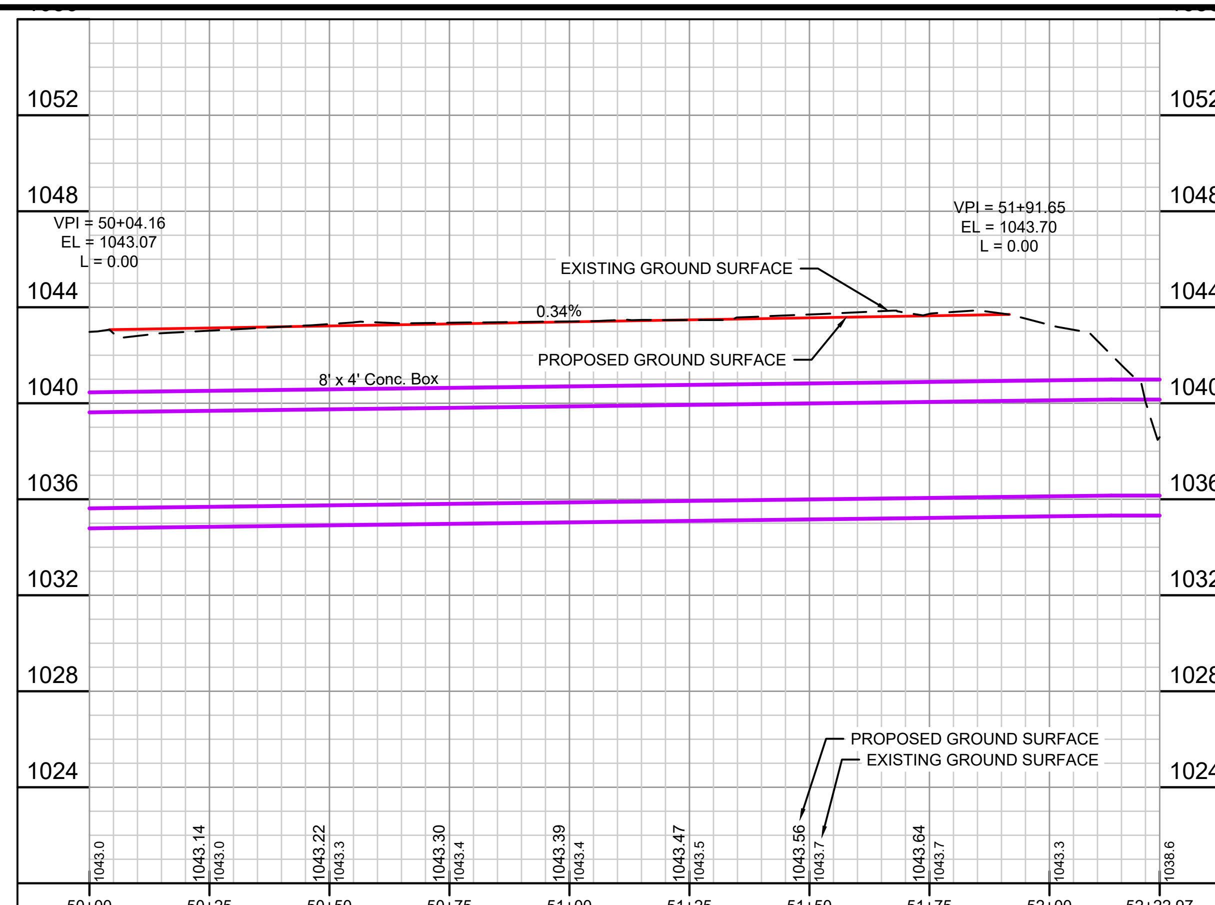
MSA
ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL
1702 Pankratz St Madison, WI 53704
(608) 242-7779 www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - HIDDEN HILL STORM SEWER

PROJECT NO. 00373079
SHEET PP 3





			NO.	DATE	REVISION	BY
PROJECT DATE:	6/6/19	DRAWN BY: KH	1	6/11/19	ADDENDUM #1	KNH
		DESIGNED BY: ET	2	10/4/19	ALIGNMNET REVISION	KNH
		CHECKED BY: ET	3	5/13/20	DREGER PARCEL OUTLET CHANNEL ALIGNMENT	CJP

PLOT DATE: Friday, October 4, 2019 12:13:04 PM, P:\370s\373\00373079\CADD\C3D\2019\Hidden Hill Storm Sewer\373079_Hidden Hill Storm Sewer Design.dwg

MSA

ENGINEERING | ARCHITECTURE | SURVEYING
FUNDING | PLANNING | ENVIRONMENTAL

www.msa-ps.com

HAWKS LANDING FLOOD MITIGATION - SOUTHWEST
CITY OF MADISON
DANE COUNTY, WISCONSIN

PLAN & PROFILE SHEET - STORMWATER EASEMENT

PROJECT NO. 00373079

SHEET PP 4