ROUGE OXBOW RESTORATION PROJECT- PHASE III

CONSTRUCTION FUNDED BY EPA THROUGH GLRI AWARD NO. GL-00E02040

FOR BIDDING - OCTOBER, 2017

Working together, restoring the river

PREPARED BY:

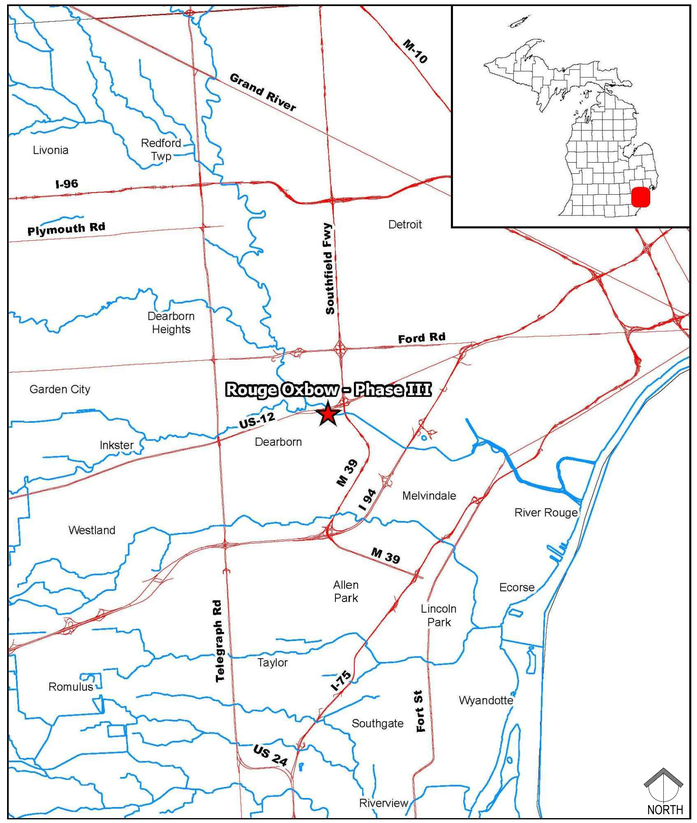
ECT Environmental Consulting & Technology, Inc.

2200 Commonwealth Boulevard, Suite 300
Ann Arbor, Michigan 48105
Phone: 734.769.3004
Fax: 734.769.31664

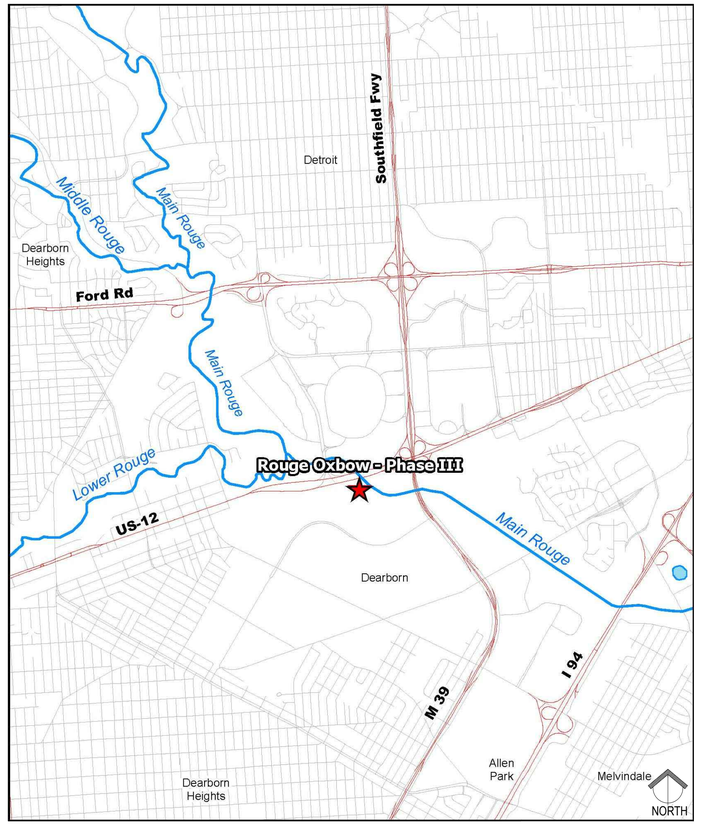
WITH:

Somat Engineering INCORPORATED

Applied Science, Inc. Consulting Engineers



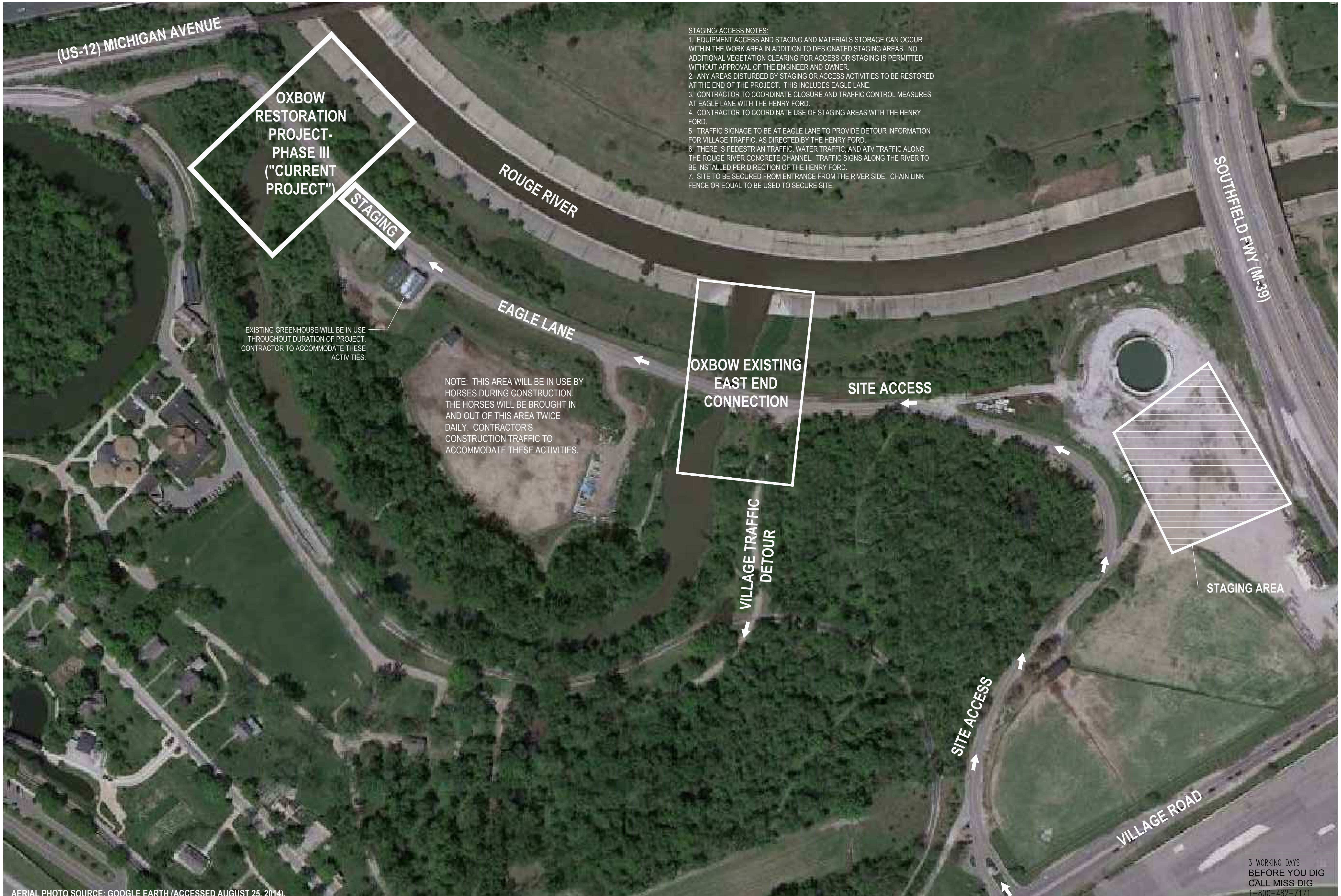
PROJECT LOCATION MAP
NOT TO SCALE



PROJECT VICINITY MAP
NOT TO SCALE

DRAWING INDEX

PROJECT DESIGN FUNDED BY THE NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION THROUGH A GREAT LAKES RESTORATION INITIATIVE GRANT. GLRI NOAA AWARD NO. NA13NMF4630214.
PROJECT CONSTRUCTION FUNDED BY THE ENVIRONMENTAL PROTECTION AGENCY THROUGH A GREAT LAKES RESTORATION INITIATIVE GRANT. GLRI EPA AWARD NO. GL-00E02040-0.



STAGING/ ACCESS NOTES:

1. EQUIPMENT ACCESS AND STAGING AND MATERIALS STORAGE CAN OCCUR WITHIN THE WORK AREA IN ADDITION TO DESIGNATED STAGING AREAS. NO ADDITIONAL VEGETATION CLEARING FOR ACCESS OR STAGING IS PERMITTED WITHOUT APPROVAL OF THE ENGINEER AND OWNER.
2. ANY AREAS DISTURBED BY STAGING OR ACCESS ACTIVITIES TO BE RESTORED AT THE END OF THE PROJECT. THIS INCLUDES EAGLE LANE.
3. CONTRACTOR TO COORDINATE CLOSURE AND TRAFFIC CONTROL MEASURES AT EAGLE LANE WITH THE HENRY FORD.
4. CONTRACTOR TO COORDINATE USE OF STAGING AREAS WITH THE HENRY FORD.
5. TRAFFIC SIGNAGE TO BE AT EAGLE LANE TO PROVIDE DETOUR INFORMATION FOR VILLAGE TRAFFIC, AS DIRECTED BY THE HENRY FORD.
6. THERE IS PEDESTRIAN TRAFFIC, WATER TRAFFIC, AND ATV TRAFFIC ALONG THE ROUGE RIVER CONCRETE CHANNEL. TRAFFIC SIGNS ALONG THE RIVER TO BE INSTALLED PER DIRECTION OF THE HENRY FORD.
7. SITE TO BE SECURED FROM ENTRANCE FROM THE RIVER SIDE. CHAIN LINK FENCE OR EQUAL TO BE USED TO SECURE SITE.

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Somat Engineering Incorporated

Applied Science, Inc. Consulting Engineers

Alliance of Rouge Communities
OURS TO PROTECT
Working together, restoring the river

OXBOW RESTORATION PROJECT-PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

the Henry Ford

FOR BIDDING	10-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
75% DESIGN	8-12-14

130825 ECT PROJECT NUMBER

DESIGNED BY: AAB	CHECKED BY: AAB
DRAWN BY: AAB/PFH	APPROVED BY: JOM

SHEET TITLE

ACCESS & STAGING PLAN

SCALE: 1" = 100' @ 22" x 34"

0 50' 100' 200'

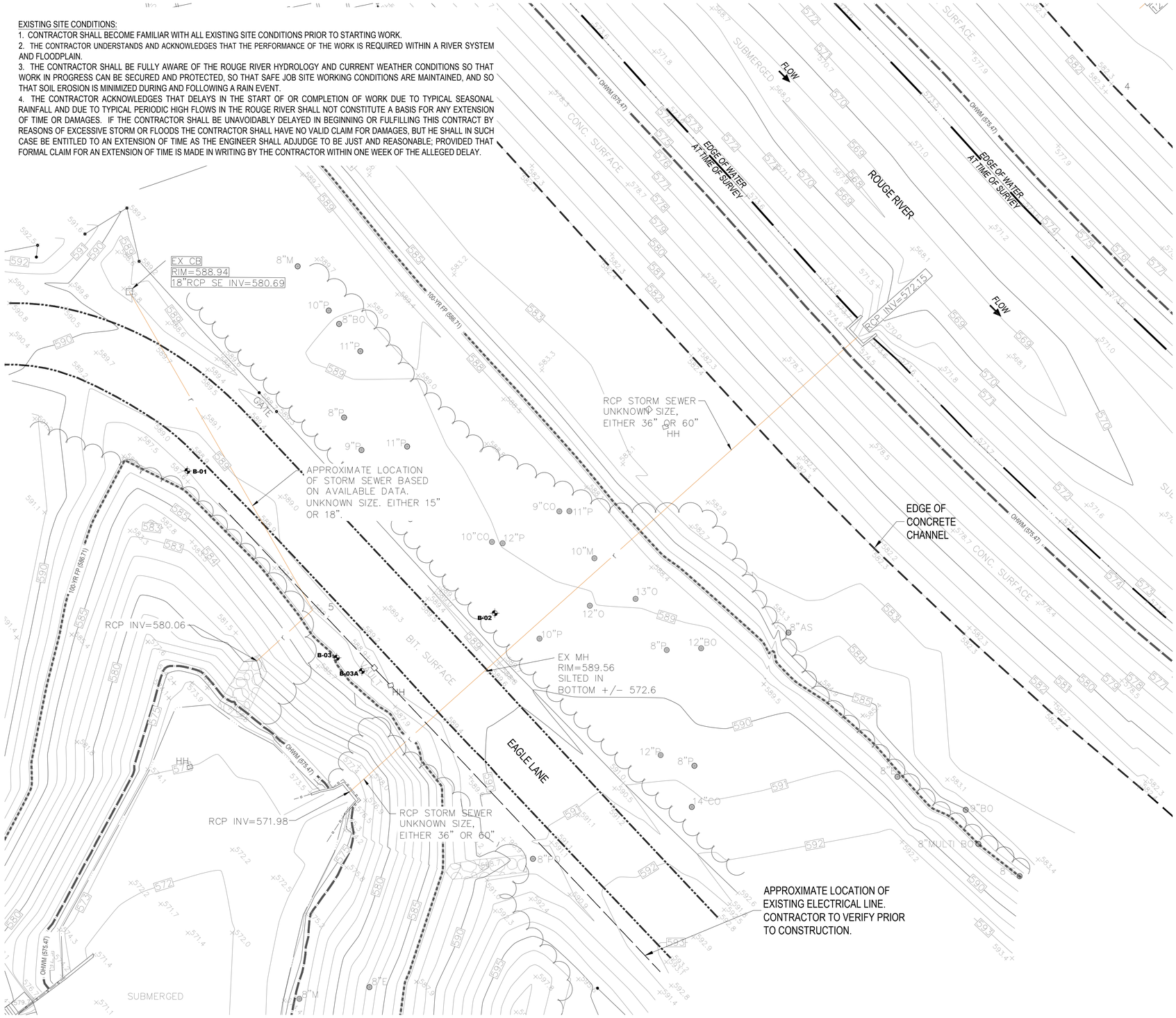
NORTH

SHEET NUMBER

C-2

EXISTING SITE CONDITIONS:

1. CONTRACTOR SHALL BECOME FAMILIAR WITH ALL EXISTING SITE CONDITIONS PRIOR TO STARTING WORK.
2. THE CONTRACTOR UNDERSTANDS AND ACKNOWLEDGES THAT THE PERFORMANCE OF THE WORK IS REQUIRED WITHIN A RIVER SYSTEM AND FLOODPLAIN.
3. THE CONTRACTOR SHALL BE FULLY AWARE OF THE ROUGE RIVER HYDROLOGY AND CURRENT WEATHER CONDITIONS SO THAT WORK IN PROGRESS CAN BE SECURED AND PROTECTED, SO THAT SAFE JOB SITE WORKING CONDITIONS ARE MAINTAINED, AND SO THAT SOIL EROSION IS MINIMIZED DURING AND FOLLOWING A RAIN EVENT.
4. THE CONTRACTOR ACKNOWLEDGES THAT DELAYS IN THE START OF OR COMPLETION OF WORK DUE TO TYPICAL SEASONAL RAINFALL AND DUE TO TYPICAL PERIODIC HIGH FLOWS IN THE ROUGE RIVER SHALL NOT CONSTITUTE A BASIS FOR ANY EXTENSION OF TIME OR DAMAGES. IF THE CONTRACTOR SHALL BE UNAVOIDABLY DELAYED IN BEGINNING OR FULFILLING THIS CONTRACT BY REASONS OF EXCESSIVE STORM OR FLOODS THE CONTRACTOR SHALL HAVE NO VALID CLAIM FOR DAMAGES, BUT HE SHALL IN SUCH CASE BE ENTITLED TO AN EXTENSION OF TIME AS THE ENGINEER SHALL ADJUDGE TO BE JUST AND REASONABLE; PROVIDED THAT FORMAL CLAIM FOR AN EXTENSION OF TIME IS MADE IN WRITING BY THE CONTRACTOR WITHIN ONE WEEK OF THE ALLEGED DELAY.



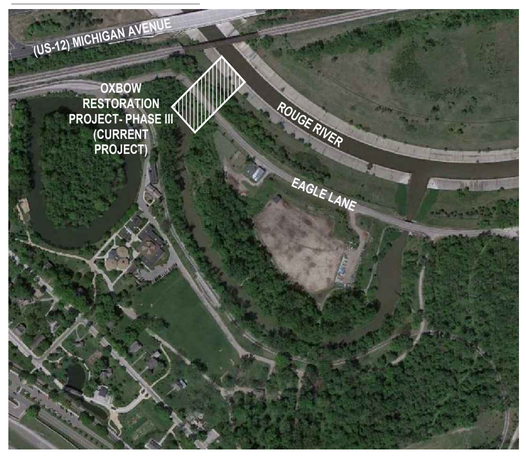
LEGEND

- EXIST. CONTOUR
- EXIST. SPOT ELEVATION
- EXIST. UTILITY POLE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- SIGN
- RAILROAD CROSSING SIGN
- POST
- FENCE
- GUARDRAIL
- BRUSH LIMIT
- SINGLE TREE
- CONTROL PT.
- EDGE OF CONCRETE CHANNEL
- EDGE OF PAVEMENT
- EDGE OF WATER AT TIME OF SURVEY
- 100-YEAR FLOODPLAIN (ELEV. 586.71)
- ORDINARY HIGH-WATER MARK (OHWM) (ELEV. = 575.47)
- SOIL BORING LOCATION

TREE LEGEND

AS	ASH
BO	BOX ELDER
CO	COTTONWOOD
E	ELM
M	MAPLE
O	OAK
P	PINE
PO	POPLAR

SITE INDEX



NOTES:
1. HORIZONTAL DATUM IS NAD83 STATE PLANE (MICHIGAN SOUTH).
2. VERTICAL DATUM IS NAVD88.

3 WORKING DAYS
BEFORE YOU DIG
CALL MISS DIG
1-800-482-7171

BASE SURVEY OF PROJECT AREA PROVIDED BY MIDWESTERN CONSULTANTS, INC., APRIL 2014.

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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

the Henry Ford

FOR BIDDING	10-17
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130825
ECT PROJECT NUMBER

AAB	AAB
DESIGNED BY	CHECKED BY
AAB/PFH	JOM
DRAWN BY	APPROVED BY

SHEET TITLE

EXISTING CONDITIONS

SCALE: 1" = 20' @ 22" x 34"
0 10' 20' 40'

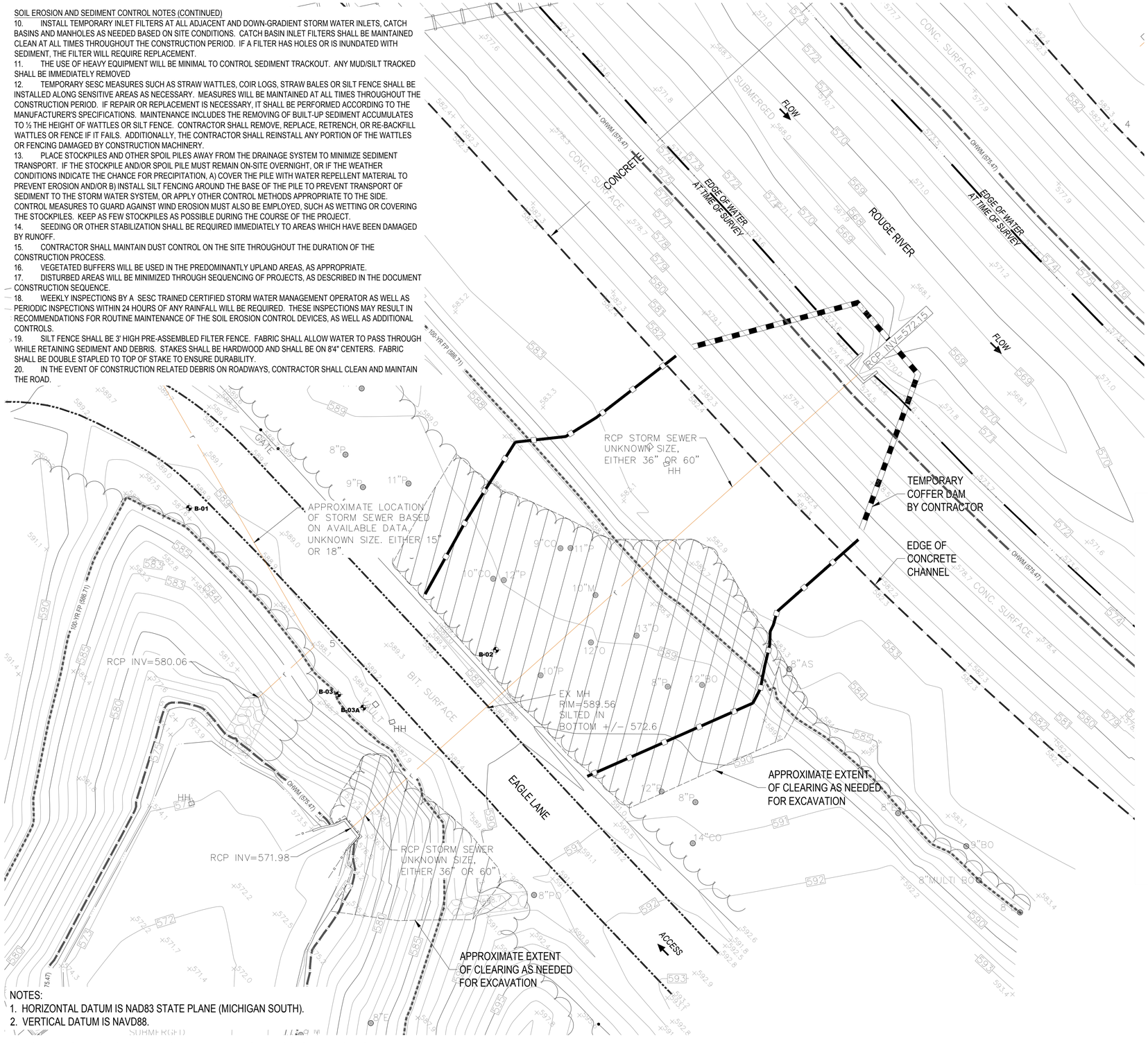
NORTH

SHEET NUMBER
C-3

P:\Alliance of Rouge Communities\Grant Projects\2013 NOAA Oxbow Phase III\CAD\Oxbow_III_100%DesignDrawings_11-7-14.dwg

SOIL EROSION AND SEDIMENT CONTROL NOTES (CONTINUED)

10. INSTALL TEMPORARY INLET FILTERS AT ALL ADJACENT AND DOWN-GRADIENT STORM WATER INLETS, CATCH BASINS AND MANHOLES AS NEEDED BASED ON SITE CONDITIONS. CATCH BASIN INLET FILTERS SHALL BE MAINTAINED CLEAN AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD. IF A FILTER HAS HOLES OR IS INUNDATED WITH SEDIMENT, THE FILTER WILL REQUIRE REPLACEMENT.
11. THE USE OF HEAVY EQUIPMENT WILL BE MINIMAL TO CONTROL SEDIMENT TRACKOUT. ANY MUD/SILT TRACKED SHALL BE IMMEDIATELY REMOVED
12. TEMPORARY SESC MEASURES SUCH AS STRAW WATTLES, COIR LOGS, STRAW BALES OR SILT FENCE SHALL BE INSTALLED ALONG SENSITIVE AREAS AS NECESSARY. MEASURES WILL BE MAINTAINED AT ALL TIMES THROUGHOUT THE CONSTRUCTION PERIOD. IF REPAIR OR REPLACEMENT IS NECESSARY, IT SHALL BE PERFORMED ACCORDING TO THE MANUFACTURER'S SPECIFICATIONS. MAINTENANCE INCLUDES THE REMOVING OF BUILT-UP SEDIMENT ACCUMULATES TO ½ THE HEIGHT OF WATTLES OR SILT FENCE. CONTRACTOR SHALL REMOVE, REPLACE, RETRENCH, OR RE-BACKFILL WATTLES OR FENCE IF IT FAILS. ADDITIONALLY, THE CONTRACTOR SHALL REINSTALL ANY PORTION OF THE WATTLES OR FENCING DAMAGED BY CONSTRUCTION MACHINERY.
13. PLACE STOCKPILES AND OTHER SPOIL PILES AWAY FROM THE DRAINAGE SYSTEM TO MINIMIZE SEDIMENT TRANSPORT. IF THE STOCKPILE AND/OR SPOIL PILE MUST REMAIN ON-SITE OVERNIGHT, OR IF THE WEATHER CONDITIONS INDICATE THE CHANCE FOR PRECIPITATION, A) COVER THE PILE WITH WATER REPELLENT MATERIAL TO PREVENT EROSION AND/OR B) INSTALL SILT FENCING AROUND THE BASE OF THE PILE TO PREVENT TRANSPORT OF SEDIMENT TO THE STORM WATER SYSTEM, OR APPLY OTHER CONTROL METHODS APPROPRIATE TO THE SIDE. CONTROL MEASURES TO GUARD AGAINST WIND EROSION MUST ALSO BE EMPLOYED, SUCH AS WETTING OR COVERING THE STOCKPILES. KEEP AS FEW STOCKPILES AS POSSIBLE DURING THE COURSE OF THE PROJECT.
14. SEEDING OR OTHER STABILIZATION SHALL BE REQUIRED IMMEDIATELY TO AREAS WHICH HAVE BEEN DAMAGED BY RUNOFF.
15. CONTRACTOR SHALL MAINTAIN DUST CONTROL ON THE SITE THROUGHOUT THE DURATION OF THE CONSTRUCTION PROCESS.
16. VEGETATED BUFFERS WILL BE USED IN THE PREDOMINANTLY UPLAND AREAS, AS APPROPRIATE.
17. DISTURBED AREAS WILL BE MINIMIZED THROUGH SEQUENCING OF PROJECTS, AS DESCRIBED IN THE DOCUMENT CONSTRUCTION SEQUENCE.
18. WEEKLY INSPECTIONS BY A SESC TRAINED CERTIFIED STORM WATER MANAGEMENT OPERATOR AS WELL AS PERIODIC INSPECTIONS WITHIN 24 HOURS OF ANY RAINFALL WILL BE REQUIRED. THESE INSPECTIONS MAY RESULT IN RECOMMENDATIONS FOR ROUTINE MAINTENANCE OF THE SOIL EROSION CONTROL DEVICES, AS WELL AS ADDITIONAL CONTROLS.
19. SILT FENCE SHALL BE 3' HIGH PRE-ASSEMBLED FILTER FENCE. FABRIC SHALL ALLOW WATER TO PASS THROUGH WHILE RETAINING SEDIMENT AND DEBRIS. STAKES SHALL BE HARDWOOD AND SHALL BE ON 8'4" CENTERS. FABRIC SHALL BE DOUBLE STAPLED TO TOP OF STAKE TO ENSURE DURABILITY.
20. IN THE EVENT OF CONSTRUCTION RELATED DEBRIS ON ROADWAYS, CONTRACTOR SHALL CLEAN AND MAINTAIN THE ROAD.



NOTES:
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BASE SURVEY OF PROJECT AREA PROVIDED BY MIDWESTERN CONSULTANTS, INC., APRIL 2014.

LEGEND

- 582 — EXIST. CONTOUR
- EXIST. SPOT ELEVATION
- U.P. — EXIST. UTILITY POLE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- SIGN
- RR — RAILROAD CROSSING SIGN
- POST
- FENCE
- GUARDRAIL
- BRUSH LIMIT
- SINGLE TREE
- CONTROL PT.
- EDGE OF CONCRETE CHANNEL
- EDGE OF PAVEMENT
- EDGE OF WATER AT TIME OF SURVEY
- 100-YEAR FLOODPLAIN (ELEV. 586.71)
- ORDINARY HIGH-WATER MARK (OHWM) (ELEV. = 575.47)
- TEMPORARY COFFER DAM BY CONTRACTOR
- B-4 — SOIL BORING LOCATION
- APPROXIMATE EXTENT OF CLEARING AS NEEDED FOR EXCAVATION

TREE LEGEND

AS	ASH
BO	BOX ELDER
CO	COTTONWOOD
E	ELM
M	MAPLE
O	OAK
P	PINE
PO	POPLAR

TEMPORARY CONSTRUCTION SIGN

WHITE BACKGROUND

Rouge Oxbow Restoration Project

Wayne County
and
Alliance of Rouge Communities

This project is funded by the U.S. Environmental Protection Agency through a portion of a $6,500,000 Great Lake Restoration Initiative Grant

BLACK LETTERING

SIGN DIMENSIONS: 1200 mm x 2400 mm x 19 mm (approx. 4' x 8' x ¾")
PLYWOOD PANEL (APA RATED A-B GRADE–EXTERIOR)

CLEARING NOTE:
THREATENED AND ENDANGERED SPECIES RESTRICTION: "ANY TREES 5 INCHES DBH OR LARGER ARE TO BE CONSIDERED POTENTIAL BAT HABITAT. ANY TREES OF THIS SIZE SHALL NOT BE CUT BETWEEN APRIL 1 AND SEPTEMBER 30 IN ANY YEAR TO AVOID TAKE OF INDIANA BAT (MYOTIS SODALIST), A FEDERALLY LISTED ENDANGERED SPECIES. TREE REMOVALS WITHIN THE APRIL 1 TO SEPTEMBER 30 TIMEFRAME ARE ALLOWED IF AN APPROVED METHOD OF INDIANA BAT SURVEY/ ASSESSMENT HAS BEEN COMPLETED AND IS APPROVED BY THE U.S. FISH & WILDLIFE SERVICE.

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130825
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AAB	AAB
DESIGNED BY	CHECKED BY
AAB/PFH	JOM
DRAWN BY	APPROVED BY

SHEET TITLE

SITE PREPARATION PLAN

SCALE: 1" = 20' @ 22" x 34"
0 10' 20' 40'

NORTH

SHEET NUMBER **C-4**

P:\Alliance of Rouge Communities\Great Projects\2013 NOAA Oxbow Phase III\CAD\Oxbow_III_100%DesignDrawings_11-14.dwg

EX CB
RIM=588.94
18"RCP SE INV=580.69

REMOVE EXISTING STORM SEWER (MAY BE USED DURING CONSTRUCTION TO MAINTAIN FLOW)

PROPOSED OXBOW CHANNEL CONSTRUCTION ℄

APPROXIMATE LOCATION OF STORM SEWER BASED ON AVAILABLE DATA. UNKNOWN SIZE. EITHER 15" OR 18".

RCP INV=580.06

RCP STORM SEWER UNKNOWN SIZE, EITHER 36" OR 60"

EX MH
RIM=589.56
SILTED IN
BOTTOM +/- 572.6

REMOVE EXISTING WING WALLS

RCP INV=572.15

REMOVE EXISTING TREES AND SHRUBS WITHIN CONSTRUCTION AREA

REMOVE EXISTING WING WALLS

RCP INV=571.98

RCP STORM SEWER UNKNOWN SIZE, EITHER 36" OR 60"

CONCRETE REMOVAL

SAWCUT EDGE OF CONCRETE CHANNEL

REMOVE EXISTING TREES AND SHRUBS WITHIN CONSTRUCTION AREA

SITE MUST BE COMPLETELY SECURE FROM TRAFFIC FROM THE RIVER SO ENTRY TO THE HENRY FORD PROPERTY IS NOT ACCESSIBLE. USE TEMPORARY CHAIN LINK FENCE TO SECURE SITE.

LIMITS OF EXCAVATION

ASPHALT REMOVAL

EXISTING FENCE TO BE REMOVED

SAWCUT

APPROXIMATE LIMITS OF WORK

EXCAVATION

CONCRETE

ROUGE RIVER

EDGE OF WATER AT TIME OF SURVEY

OHWM (575.47)

100-YR FP (586.71)

CONC. SURFACE

EAGLE LANE

FLOW

SUBMERGED

0+00

0+50

1+00

LEGEND

- EXIST. CONTOUR
- EXIST. UTILITY POLE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- SIGN
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- EDGE OF PAVEMENT
- EDGE OF WATER AT TIME OF SURVEY
- 100-YEAR FLOODPLAIN (ELEV. 586.71)
- ORDINARY HIGH-WATER MARK (OHWM) (ELEV. = 575.47)
- TEMPORARY COFFER DAM BY CONTRACTOR
- LIMITS OF EXCAVATION
- STORM SEWER TO BE REMOVED
- FENCE TO BE REMOVED
- PAVEMENT (ASPHALT OR CONCRETE) REMOVAL
- EXCAVATION AREA

TREE LEGEND

AS	ASH
BO	BOX ELDER
CO	COTTONWOOD
E	ELM
M	MAPLE
O	OAK
P	PINE
PO	POPLAR

CLEARING AND GRUBBING NOTES

1. REVIEW CLEARING LIMITS AND TREE REMOVALS WITH PROJECT ENGINEER PRIOR TO BEGINNING WORK.
2. ALL SILT FENCE AND PROTECTIVE FENCE SHALL BE INSTALLED PRIOR TO CLEARING OPERATIONS. ALL FENCING SHALL BE MAINTAINED THROUGHOUT DURATION OF PROJECT. FENCING SHALL BE REMOVED ONLY UPON APPROVAL BY ENGINEER.
3. ALL PLANT MATERIAL NOT MARKED FOR REMOVAL SHALL BE DISTURBED AS LITTLE AS POSSIBLE DURING THE CLEARING AND CONSTRUCTION OPERATIONS. NO EXCAVATION SHALL BE DONE WITHIN THE DRIP LINE (LIMIT OF OVERHANGING BRANCHES) OF TREES TO BE SAVED, UNLESS SPECIFICALLY APPROVED BY THE ENGINEER.THE LOWER BRANCHES OF ALL TREES TO REMAIN SHALL NOT BE REMOVED, OR DAMAGED BY CONSTRUCTION EQUIPMENT. AVOID COMPACTION OF ROOTS.
4. HYDRO AXE AND/OR SIMILAR CLEARING EQUIPMENT SHALL NOT BE PERMITTED ON SITE.

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. THE CONTRACTOR SHALL BE RESPONSIBLE FOR OBTAINING A SOIL EROSION AND SEDIMENT CONTROL PERMIT.
2. ALL ASPECTS OF THE SOIL EROSION AND SEDIMENT CONTROL PERMIT SHALL BE ADHERED TO THROUGHOUT THE DURATION OF THE PROJECT. AL EROSION AND SEDIMENT CONTROL MEASURES SHALL BE INSTALLED BY THE CONTRACTOR AND INSPECTED BY THE ENGINEER PRIOR TO THE BEGINNING OF EARTHWORK.
3. DESIGN, CONSTRUCT, AND COMPLETE THE EARTH CHANGE IN A MANNER THAT LIMITS THE EXPOSED AREA OF DISTURBED LAND FOR THE SHORTEST PERIOD OF TIME.
4. TEMPORARY OR PERMANENT CONTROL MEASURES SHALL BE DESIGNED AND INSTALLED TO CONVEY WATER AROUND, THROUGH OR FROM THE EARTH CHANGE AT A NON-EROSIVE VELOCITY.
5. REMOVE SEDIMENT CAUSED BY ACCELERATED SOIL EROSION FROM RUNOFF WATER BEFORE IT LEAVES THE SITE OF THE EARTH CHANGE.
6. INSTALL TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES BEFORE OR UPON COMMENCEMENT OF THE EARTH CHANGE ACTIVITY AND MAINTAIN THE MEASURES ON A DAILY BASIS. REMOVE TEMPORARY SOIL EROSION AND SEDIMENTATION CONTROL MEASURES AFTER PERMANENT SOIL EROSION MEASURES ARE IN PLACE AND THE AREA IS STABILIZED. ("STABILIZED" MEANS THE ESTABLISHMENT OF VEGETATION OR THE PROPER PLACEMENT, GRADING OR COVERING OF SOIL TO ENSURE ITS RESISTANCE TO SOIL EROSION, SLIDING, OR OTHER EARTH MOVEMENT.)
7. CONTRACTOR IS RESPONSIBLE FOR MAINTAINING SITE DRAINAGE
8. CONTRACTOR IS RESPONSIBLE TO PROTECT ADJACENT WATER COURSES FROM THE DISCHARGE OF SEDIMENT DURING CONSTRUCTION.
9. INSTALL PERMANENT EROSION CONTROL MEASURES WITHIN 5 DAYS OF COMPLETING FINAL GRADING OR MAINTAIN TEMPORARY MEASURES UNTIL PERMANENT MEASURES ARE INSTALLED.

WAYNE COUNTY GENERAL NOTES:

1. ALL WORK WITHIN THE WAYNE COUNTY ROAD RIGHT-OF-WAY SHALL BE IN ACCORDANCE WITH THE CURRENT STANDARDS AND GENERAL SPECIFICATIONS, INCLUDING SOIL EROSION AND SEDIMENTATION CONTROL OF THE WAYNE COUNTY DEPARTMENT OF PUBLIC SERVICES, AND MDOT 2012 SPECIFICATIONS FOR CONSTRUCTION.
2. THESE PLANS ARE NOT VALID WITHOUT ATTACHMENT OF THE WAYNE COUNTY PERMIT SPECIFICATIONS FOR CONSTRUCTION WITHIN ROAD RIGHT-OF-WAY, PARKS, DRAIN EASEMENT OR SANITARY SEWER UNDER JURISDICTION OF THE WAYNE COUNTY (07/01/93) REVISED 12/15/2004.

NOTES:

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2. VERTICAL DATUM IS NAVD88.

3 WORKING DAYS
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DRAWN BY	APPROVED BY

SHEET TITLE

DEMOLITION PLAN

SCALE: 1" = 20' @ 22" x 34"
0 10' 20' 40'

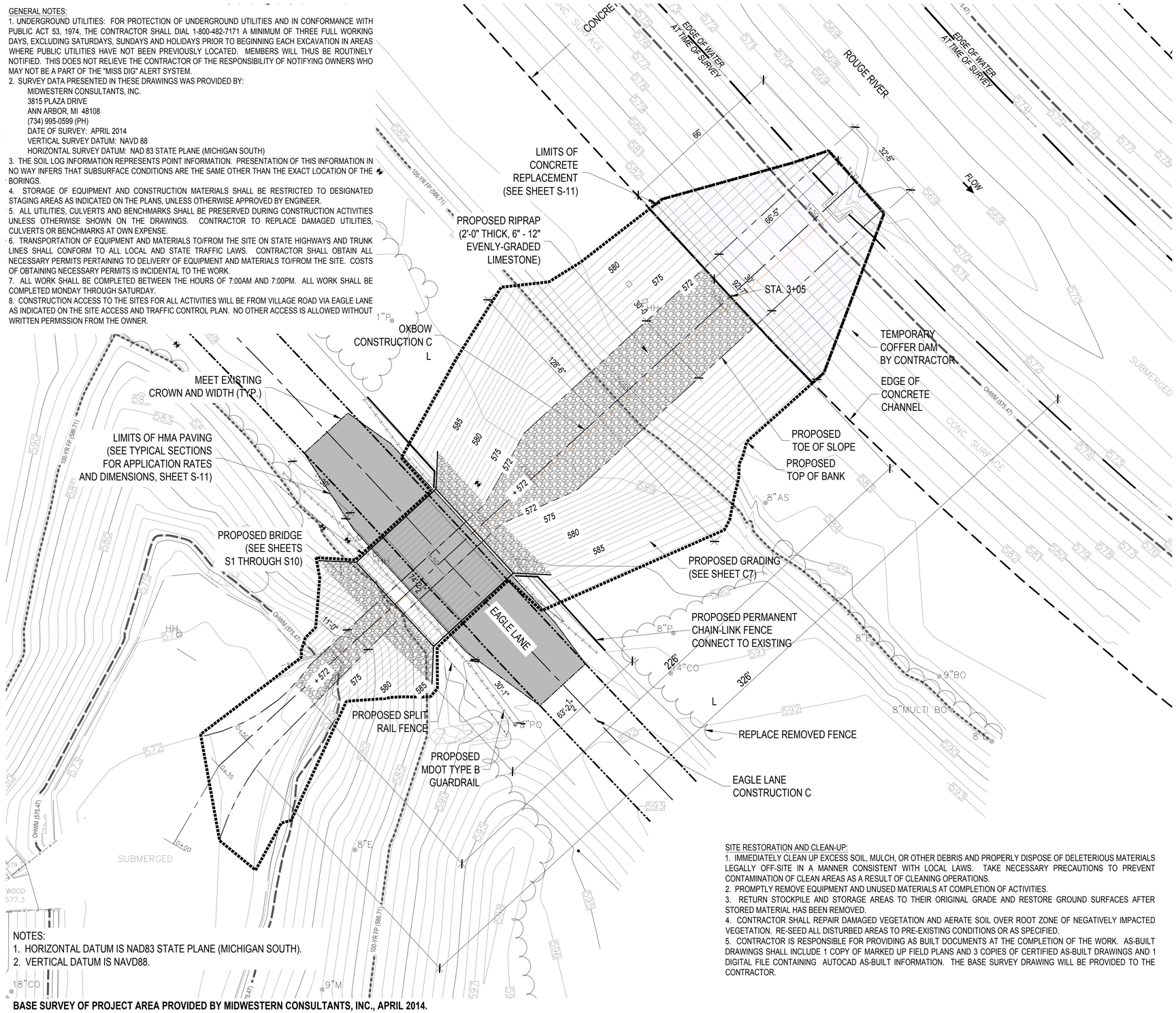
NORTH

SHEET NUMBER
C-5

P:\Alliance of Rouge Communities\Grant Projects\2013 NOAA Oxbow Phase III\CAD\Oxbow_III_100%DesignDrawings_12-14.dwg

GENERAL NOTES:

1. UNDERGROUND UTILITIES: FOR PROTECTION OF UNDERGROUND UTILITIES AND IN CONFORMANCE WITH PUBLIC ACT 53, 1974, THE CONTRACTOR SHALL DIAL 1-800-482-7171 A MINIMUM OF THREE FULL WORKING DAYS, EXCLUDING SATURDAYS, SUNDAYS AND HOLIDAYS PRIOR TO BEGINNING EACH EXCAVATION IN AREAS WHERE PUBLIC UTILITIES HAVE NOT BEEN PREVIOUSLY LOCATED. MEMBERS WILL THUS BE ROUTINELY NOTIFIED. THIS DOES NOT RELIEVE THE CONTRACTOR OF THE RESPONSIBILITY OF NOTIFYING OWNERS WHO MAY NOT BE A PART OF THE "MISS DIG" ALERT SYSTEM.
2. SURVEY DATA PRESENTED IN THESE DRAWINGS WAS PROVIDED BY:
   MIDWESTERN CONSULTANTS, INC.
   3815 PLAZA DRIVE
   ANN ARBOR, MI 48108
   (734) 995-0599 (PH)
   DATE OF SURVEY: APRIL 2014
   VERTICAL SURVEY DATUM: NAVD 88
   HORIZONTAL SURVEY DATUM: NAD 83 STATE PLANE (MICHIGAN SOUTH)
3. THE SOIL LOG INFORMATION REPRESENTS POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY INFERS THAT SUBSURFACE CONDITIONS ARE THE SAME OTHER THAN THE EXACT LOCATION OF THE BORINGS.
4. STORAGE OF EQUIPMENT AND CONSTRUCTION MATERIALS SHALL BE RESTRICTED TO DESIGNATED STAGING AREAS AS INDICATED ON THE PLANS, UNLESS OTHERWISE APPROVED BY ENGINEER.
5. ALL UTILITIES, CULVERTS AND BENCHMARKS SHALL BE PRESERVED DURING CONSTRUCTION ACTIVITIES UNLESS OTHERWISE SHOWN ON THE DRAWINGS. CONTRACTOR TO REPLACE DAMAGED UTILITIES, CULVERTS OR BENCHMARKS AT OWN EXPENSE.
6. TRANSPORTATION OF EQUIPMENT AND MATERIALS TO/FROM THE SITE ON STATE HIGHWAYS AND TRUNK LINES SHALL CONFORM TO ALL LOCAL AND STATE TRAFFIC LAWS. CONTRACTOR SHALL OBTAIN ALL NECESSARY PERMITS PERTAINING TO DELIVERY OF EQUIPMENT AND MATERIALS TO/FROM THE SITE. COSTS OF OBTAINING NECESSARY PERMITS IS INCIDENTAL TO THE WORK.
7. ALL WORK SHALL BE COMPLETED BETWEEN THE HOURS OF 7:00AM AND 7:00PM. ALL WORK SHALL BE COMPLETED MONDAY THROUGH SATURDAY.
8. CONSTRUCTION ACCESS TO THE SITES FOR ALL ACTIVITIES WILL BE FROM VILLAGE ROAD VIA EAGLE LANE AS INDICATED ON THE SITE ACCESS AND TRAFFIC CONTROL PLAN. NO OTHER ACCESS IS ALLOWED WITHOUT WRITTEN PERMISSION FROM THE OWNER.



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BASE SURVEY OF PROJECT AREA PROVIDED BY MIDWESTERN CONSULTANTS, INC., APRIL 2014.

SITE RESTORATION AND CLEAN-UP:
1. IMMEDIATELY CLEAN UP EXCESS SOIL, MULCH, OR OTHER DEBRIS AND PROPERLY DISPOSE OF DELETERIOUS MATERIALS LEGALLY OFF-SITE IN A MANNER CONSISTENT WITH LOCAL LAWS. TAKE NECESSARY PRECAUTIONS TO PREVENT CONTAMINATION OF CLEAN AREAS AS A RESULT OF CLEANING OPERATIONS.
2. PROMPTLY REMOVE EQUIPMENT AND UNUSED MATERIALS AT COMPLETION OF ACTIVITIES.
3. RETURN STOCKPILE AND STORAGE AREAS TO THEIR ORIGINAL GRADE AND RESTORE GROUND SURFACES AFTER STORED MATERIAL HAS BEEN REMOVED.
4. CONTRACTOR SHALL REPAIR DAMAGED VEGETATION AND AERATE SOIL OVER ROOT ZONE OF NEGATIVELY IMPACTED VEGETATION. RE-SEED ALL DISTURBED AREAS TO PRE-EXISTING CONDITIONS OR AS SPECIFIED.
5. CONTRACTOR IS RESPONSIBLE FOR PROVIDING AS BUILT DOCUMENTS AT THE COMPLETION OF THE WORK. AS-BUILT DRAWINGS SHALL INCLUDE 1 COPY OF MARKED UP FIELD PLANS AND 3 COPIES OF CERTIFIED AS-BUILT DRAWINGS AND 1 DIGITAL FILE CONTAINING AUTOCAD AS-BUILT INFORMATION. THE BASE SURVEY DRAWING WILL BE PROVIDED TO THE CONTRACTOR.

LEGEND

- EXIST. CONTOUR (582)
- EXIST. UTILITY POLE (U.P.)
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- SIGN
- RAILROAD CROSSING SIGN (RR)
- POST
- FENCE
- GUARDRAIL
- BRUSH LIMIT
- CONTROL PT.
- EDGE OF CONCRETE CHANNEL
- EDGE OF WATER AT TIME OF SURVEY
- 100-YEAR FLOODPLAIN (ELEV. 586.71)
- ORDINARY HIGH-WATER MARK (OHWM) (ELEV. = 575.47)
- EDGE OF PAVEMENT
- TEMPORARY COFFER DAM BY CONTRACTOR
- LIMITS OF WORK
- PROPOSED GUARDRAIL
- PROPOSED SPLIT RAIL FENCE
- PROPOSED CONTOUR (585)
- PROPOSED SPOT ELEVATION (+ 585)
- CONCRETE REPLACEMENT AREA
- PROPOSED HMA PAVING
- PROPOSED RIPRAP

GENERAL NOTES (CONTINUED):
9. ALL MATERIALS REMOVED, EXCEPT WHERE OTHERWISE INDICATED ON THE PLANS, SHALL BE LEGALLY DISPOSED OF OFF SITE.
10. ALL EXCESS SOIL AND FILL GENERATED DURING REQUIRED EXCAVATION AS SHOWN ON DRAWINGS SHALL BE LEGALLY DISPOSED OF OFF-SITE.
11. THE CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED TO COMPLETE THE WORK:
12. ALL WORK SHALL BE DONE TO MEET THE REQUIRMENTS OF THE MDEQ PERMITS ISSUED FOR THIS PROJECT.

GRADING AND LAYOUT NOTES
1. ALL PROPOSED ELEVATIONS SHOWN ARE FINISHED GRADE. FINAL DESIGN GRADES MAY BE ADJUSTED TO MINIMIZE GRADING ACCORDINGLY.
2. CONTRACTOR SHALL PROVIDE GRADE VERIFICATION STAKES AT ALL PROPOSED SPOT ELEVATIONS SHOWN ON THE PLANS AND EVERY 50 FEET ALONG PROPOSED CONTOURS AS DIRECTED BY THE ENGINEER.
3. THE CONTRACTOR SHALL MINIMIZE DISTURBANCE TO EXISTING VEGETATION ON THE ADJACENT SLOPES. ALL DISTURBED AREAS SHALL BE REVEGETATED AND RESTORED TO EXISTING CONDITIONS.
4. ALL FILL SHALL BE AS SPECIFIED. ALL IMPORTED FILL SOIL SOURCES SHALL BE APPROVED BY THE ENGINEER IN WRITING PRIOR TO DELIVERY TO THE PROJECT SITE.

MAINTENANCE AND GUARANTEE PERIOD:
1. CONTRACTOR SHALL GUARANTEE ALL MATERIALS AND WORKMANSHIP FOR A PERIOD OF ONE YEAR FOLLOWING THE APPROVAL OF CONSTRUCTION INSPECTION AT SUBSTANTIAL COMPLETION. THE CONTRACTOR SHALL RESPOND WITHIN TWO WEEKS OF WRITTEN REQUESTS BY THE OWNER FOR REPLACEMENT/REPAIR. IF THE CONTRACTOR FAILS TO RESPOND WITHIN THIS TIME, THE OWNER MAY PROCEED WITH REPLACEMENT WORK AND BILL THE CONTRACTOR.
2. NOTIFY THE OWNER PRIOR TO AND FOLLOWING ANY MAINTENANCE ACTIVITY.
3. FINAL ACCEPTANCE OF WORK WILL BE SUBJECT TO ACCEPTANCE BY PROJECT MANAGER AND OWNER AT THE END OF GUARANTEE PERIOD.

MATERIAL NOTES:
1. ALL MATERIALS SHALL CONFORM TO DETAILS AND SPECIFICATIONS IN THE DRAWINGS.

SUBMITTALS
1. SUBMITTALS FOR APPROVAL BY ENGINEER ARE REQUIRED FOR ALL MATERIALS PRIOR TO MOBILIZATION. ALL EXPENSES INCURRED BY CONTRACTOR PRIOR TO ENGINEER'S APPROVAL SHALL NOT BE PAID BY OWNER.

3 WORKING DAYS
BEFORE YOU DIG
CALL MISS DIG
1-800-482-7171

ECT Environmental Consulting & Technology, Inc.
2200 Commonwealth Boulevard, Suite 300
Ann Arbor, Michigan 48105
Phone: 734.769.3004
Fax: 734.769.31664

Somat Engineering INCORPORATED

Applied Science, Inc.
Consulting Engineers

Alliance of Rouge Communities
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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

the Henry Ford

FOR BIDDING	10-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
75% DESIGN	8-12-14

130825
ECT PROJECT NUMBER

AAB	AAB
DESIGNED BY	CHECKED BY
AAB/PFH	JOM
DRAWN BY	APPROVED BY

SHEET TITLE

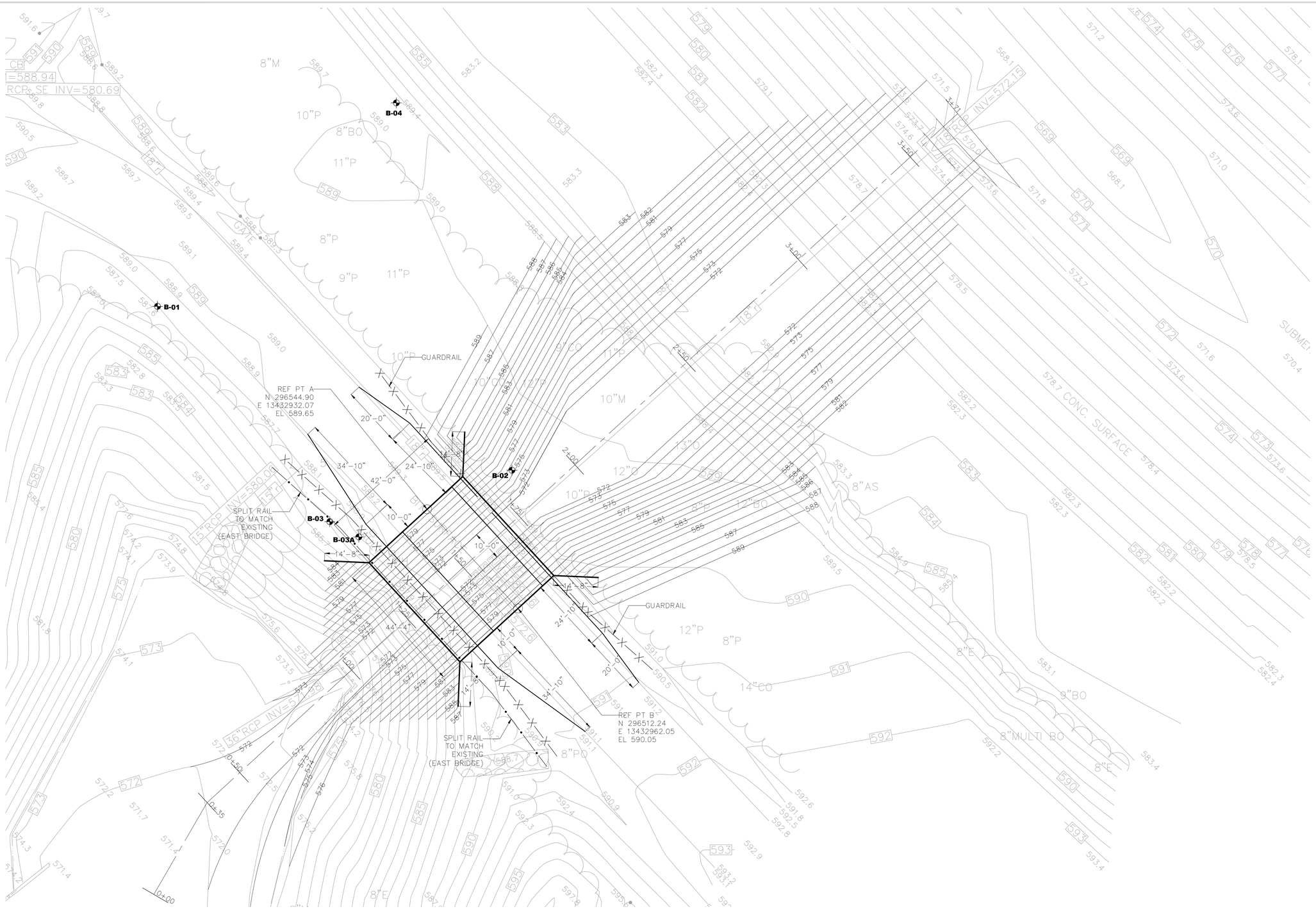
PROPOSED PLAN

SCALE: 1" = 40' @ 22" x 34"
0 20' 40' 80'

NORTH

SHEET NUMBER
C-6

P:\Alliance of Rouge Communities\Grant\Projects\2013\NOAA Oxbow Phase III\CAD\Oxbow_III_100%DesignDrawings_11-14.dwg



GRADING PLAN

1/16"=1'-0"

LEGEND:

BORING LOCATION

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130825
ECT PROJECT NUMBER

LA	MM/CS
DESIGNED BY	CHECKED BY
LA	JZ
DRAWN BY	APPROVED BY

SHEET TITLE

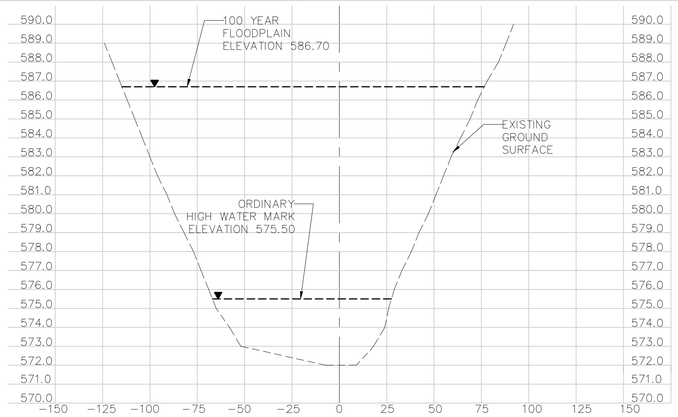
GRADING PLAN

AS SHOWN

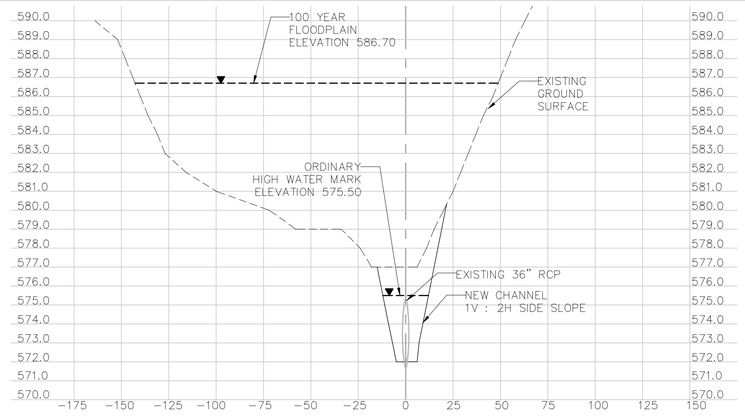
NORTH

SHEET NUMBER

C-7



SECTION 0+50
1/4"=1'-0" VERT.
1/4"=10'-0"HORIZ.
C1



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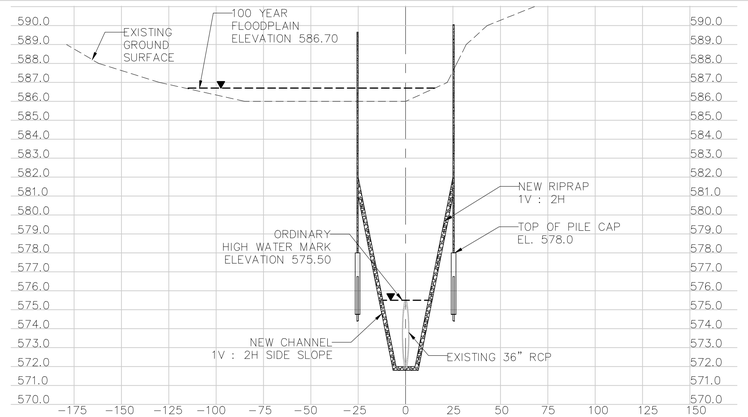
C1



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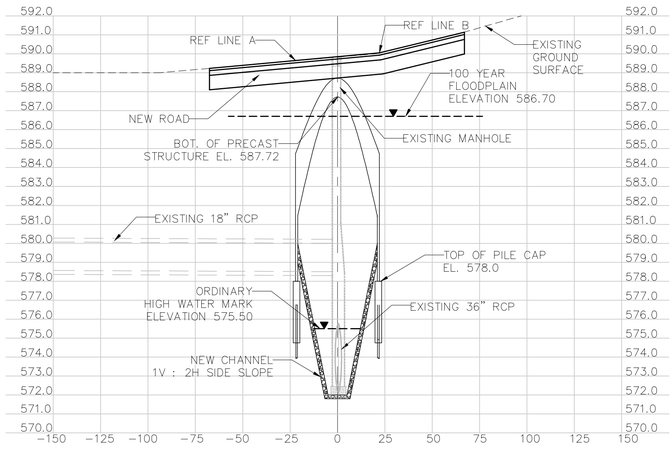
1/4"=10'-0"HORIZ.
C1



SECTION 1+50
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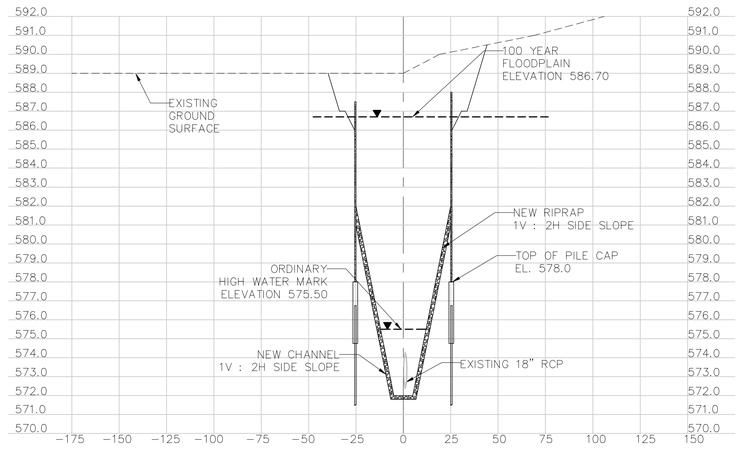
1/4"=10'-0"HORIZ.
C1



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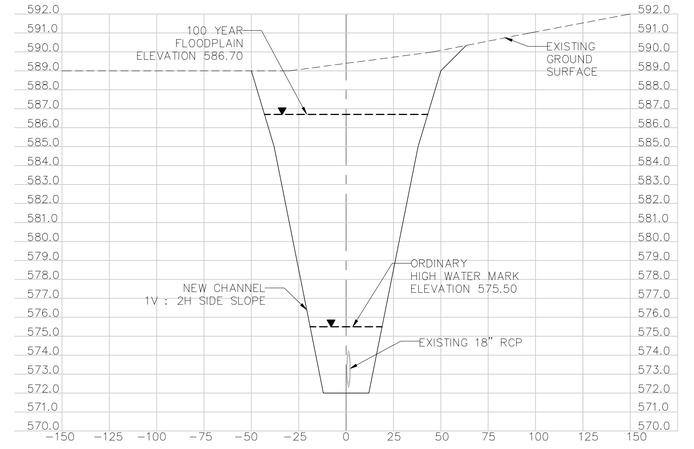
1/4"=10'-0"HORIZ.
C1



SECTION 2+00
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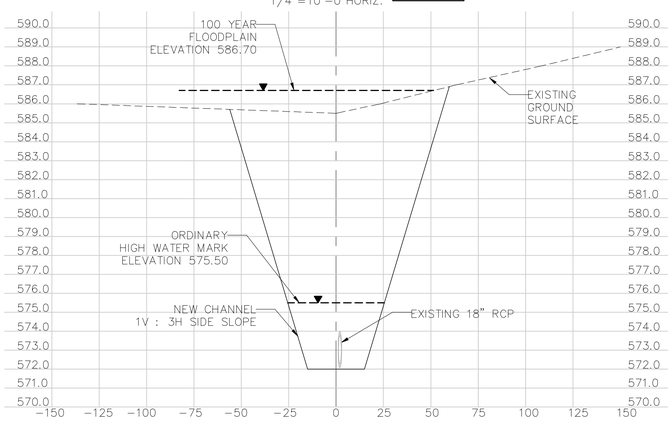
1/4"=10'-0"HORIZ.
C1



SECTION 2+50
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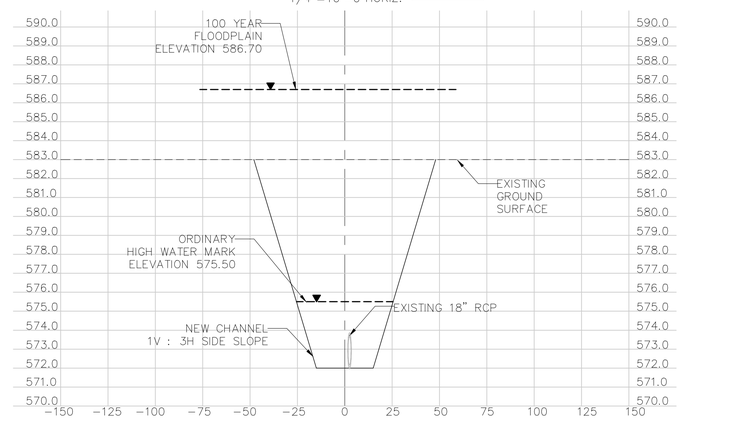
1/4"=10'-0"HORIZ.
C1



SECTION 3+00
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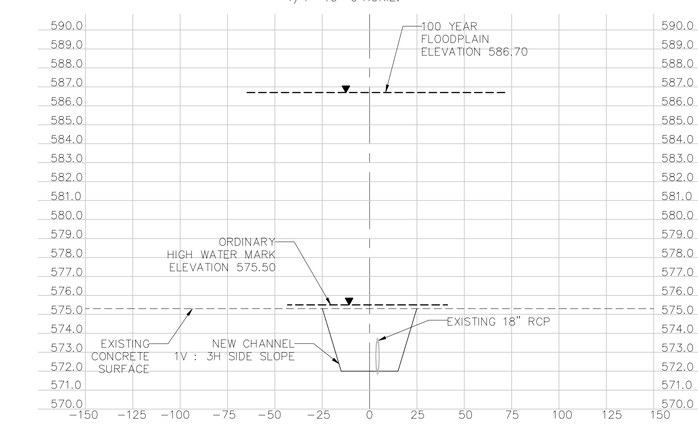
1/4"=10'-0"HORIZ.
C1



SECTION 3+50
1/4"=1'-0" VERT.
1/4"=10'-0"HORIZ.
C1

LEGEND

EXISTING PROFILE

PROPOSED PROFILE

ECT
Environmental Consulting & Technology, Inc.
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130825
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LA	MM/CS
DESIGNED BY	CHECKED BY
LA	JZ
DRAWN BY	APPROVED BY

SHEET TITLE

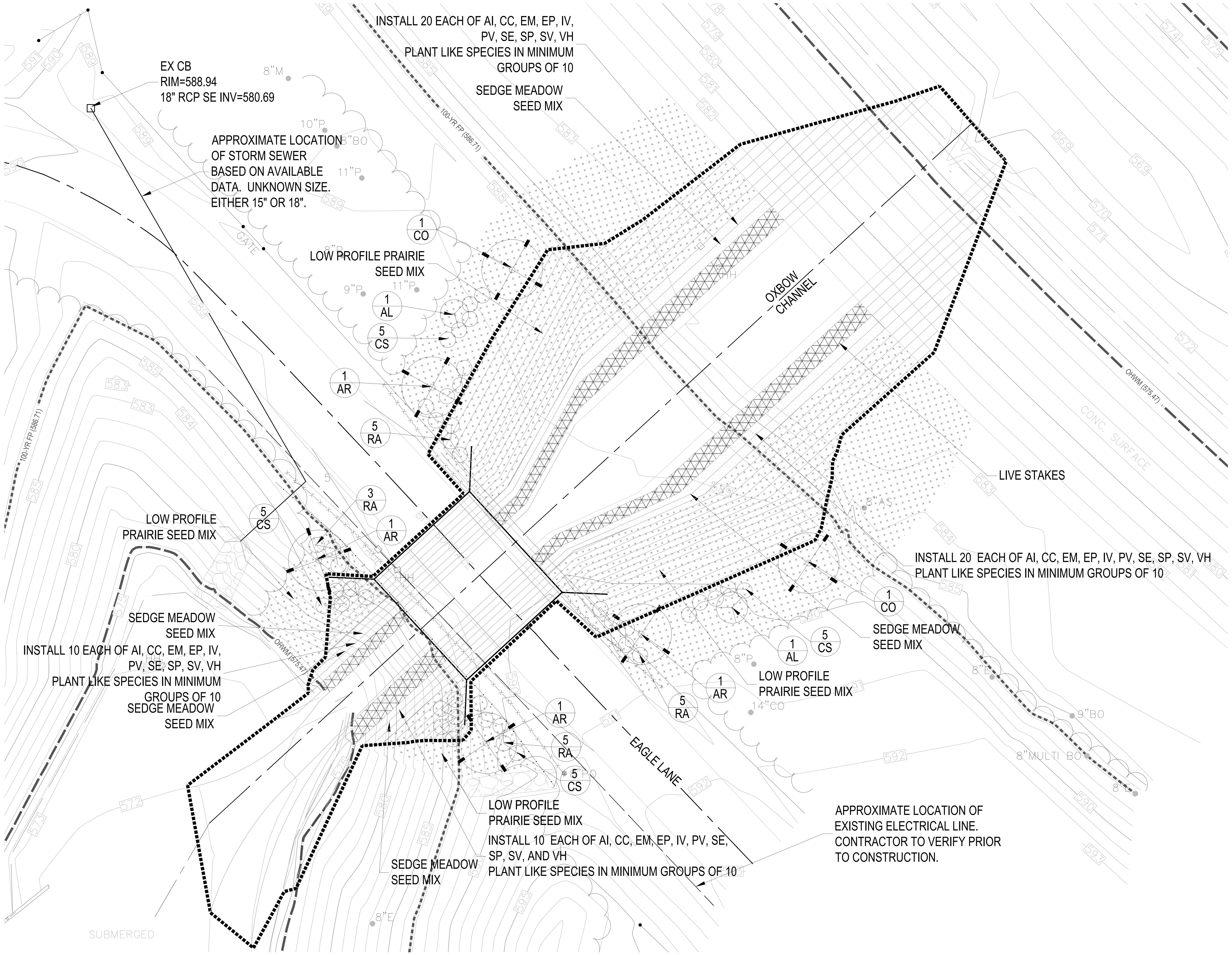
CROSS SECTIONS

AS SHOWN

NORTH

SHEET NUMBER
C-8

...ECT-CAD Details\2010 CAD Titleblock Templates\22x34 ECT Template.dwg



LEGEND

- EXIST. CONTOUR
- EXIST. UTILITY POLE
- EXIST. LIGHT POLE
- EXIST. STORM SEWER
- EXIST. CATCH BASIN OR INLET
- SIGN
- RAILROAD CROSSING SIGN
- POST
- FENCE
- GUARDRAIL
- BRUSH LIMIT
- SINGLE TREE
- CONTROL PT.
- LIVE STAKES

LIVE STAKE SPECIES LIST:

SCIENTIFIC NAME	COMMON NAME
CORNUS SERICEA	RED-OSIER DOGWOOD
CORNUS AMOMUM	SILKY DOGWOOD
PHYSOCARPUS OPULIFOLIUS	NINEBARK
SALIX EXIGUA	SANDBAR WILLOW
SALIX DISCOLOR	PUSSY WILLOW
SALIX SERICEA	SILKY WILLOW
SALIX NIGRA	BLACK WILLOW
SALIX AMYGDALOIDE S	PEACH-LEAF WILLOW

TREE LEGEND

AS	ASH
BO	BOX ELDER
CO	COTTONWOOD
E	ELM
M	MAPLE
O	OAK
P	PINE
PO	POPLAR

- PROPOSED TREE
- PROPOSED SHRUB
- LOW PROFILE PRAIRIE SEED MIX (0.35 ACRES)
- SEDGE MEADOW SEED MIX (0.05 ACRES)

GENERAL NOTES:

1. RESTORE ALL DISTURBED AREAS WITH 6-INCHES TOPSOIL, SEED AND MULCH SPECIFIED SEED MIX.
2. SEEDING LIMITS VARY BASED ON PRIOR DISTURBANCE.
3. WOODY PLANTS SHALL BE INSTALLED PRIOR TO SEEDING.
4. MAINTAIN SOIL EROSION CONTROL MEASURES DURING ALL PLANTING AS PER PERMIT REQUIREMENTS. NO WORK OUTSIDE LIMIT OF WORK WITHOUT AUTHORIZATION.
5. CONTRACTOR SHALL PROTECT ALL EXISTING VEGETATION DURING PLANTING ACTIVITIES.
6. ALL SUBSITUTIONS SHALL BE MADE, IN WRITING, TO ENGINEER TWO WEEKS PRIOR TO INSTALLATION.
7. ALL PLANTINGS SHALL BE INSTALLED PER DETAILS (SEE SHEET 11).
8. ALL AREAS TO BE SEEDED SHALL BE PREPARED PRIOR TO SEEDING INSTALLATION. PREPARATION SHALL CONSIST OF DEBRIS REMOVAL, FINAL GRADE APPROVAL, TOPSOIL PLACEMENT, LOOSEN TOP 4" OF SOIL, ETC.
9. ALL PLANTS TO BE INSTALLED SHALL BE OF GOOD HEALTH AND VIGOR. ENGINEER MAY REJECT MATERIAL THAT SHOWS SIGNS OF DISEASE, DISTRESS OR DAMAGE.
10. INSTALL SEEDING AT RATES PER NURSERY RECOMMENDATIONS. INSTALLATION METHODOLOGY SHALL BE PER NURSERY REQUIREMENTS AND WILL NEED TO INCLUDE COVER CROP AND MULCH.
11. SEE SHEET 11 FOR PLANT LIST

NOTES:

1. HORIZONTAL DATUM IS NAD83 STATE PLANE (MICHIGAN SOUTH).
2. VERTICAL DATUM IS NAVD88.

BASE SURVEY OF PROJECT AREA PROVIDED BY MIDWESTERN CONSULTANTS, INC., APRIL 2014.

SEEDING:

1. SEED SHALL BE FRESH, CLEAN, NEW SEED OF NATIVE PLANT MATERIAL OF GENOTYPES FROM THE NORTH CENTRAL STATES ONLY (IL, IN, IA, MI, OH), AND FROM A RECOGNIZED NURSERY OF THIS REGION.
2. NATIVE SEED AREAS SHALL BE SEEDED AFTER MAY 1, (WHEN SOIL IS FREE OF FROST AND IN WORKABLE CONDITION), BUT BEFORE JUNE 30 OR AFTER OCTOBER 1, BUT BEFORE NOVEMBER 30 (OR PRIOR TO FREEZE-UP) OR AS APPROVED BY THE ENGINEER.
3. SEEDBED PREPARATION: CUT ANY EXISTING VEGETATION TO 4 (FOUR) INCH HEIGHT AND APPLY HERBICIDE AS NECESSARY. PRIOR TO SOWING NATIVE SEED, LIGHTLY SCARIFY SO THAT THE BED IS SMOOTH AND FREE OF LARGE CLUMPS. SEED BED SHALL BE FIRM, BUT NOT COMPACT. SEED IMMEDIATELY AFTER SCARIFYING. DO NOT FERTILIZE.
4. ALL SEEDED AREAS SHALL BE HYDROSEEDED. A HYDROMULCH CONSISTING OF CELLULOSE OR SIMILAR MULCH WITH TACKIFIER SUITABLE FOR HYDROSEEDING SHALL BE USED AS A SEEING METHOD. NO STRAW MULCH SHALL BE USED.
5. ALL WATER USED IN HYDROMULCH SHALL BE FREE OF SUBSTANCES DETRIMENTAL TO PLANT GROWTH AND SHALL BE SUITABLE FOR DISCHARGE INTO SURFACE WATERS BASED ON LOCAL, STATE, AND FEDERAL REGULATORY REQUIREMENTS. SEEDING METHOD SHALL ENSURE COMPLETE COVERAGE OF DESIGNATED AREA. RE-SEED AREAS WITH GAPS IN SEEDING AT NO ADDITIONAL COST TO OWNER.
6. DO NOT SOW SEED WHERE STANDING WATER IS PRESENT.
7. SOW NATIVE SEED AT A SPECIES RATE OF POUNDS PER ACRE INDICATED ON THE DRAWING. LIGHTLY RAKE TO INCORPORATE SEED INTO SOIL. DO NOT COVER SEED MORE THAN 1/4 INCH WITH SOIL. SEED DRILLING IS ALSO ACCEPTABLE.
8. CONTRACTOR SHALL REPAIR DAMAGED VEGETATION AND AERATE SOIL OVER ROOT ZONE OF NEGATIVELY IMPACTED VEGETATION. RE-SEED ALL DISTURBED AREAS TO PRE-EXISTING CONDITIONS.

REVEGETATION NOTES:

MAINTENANCE AND WARRANTY PERIOD:

1. WARRANTY PERIOD: WARRANT THAT ALL TREES, SHRUBS, SEEDING, AND PLUG PLANTINGS INSTALLED UNDER THIS CONTRACT WILL BE HEALTHY AND IN FLOURISHING CONDITION OF ACTIVE GROWTH FOR ONE (1) FULL GROWING SEASON (APRIL THROUGH NOVEMBER) FROM DATE OF FINAL ACCEPTANCE. THE CONTRACTOR SHALL RESPOND WITHIN TWO (2) WEEKS OF WRITTEN REQUESTS BY THE OWNER FOR REPLACEMENT OR REPAIR. IF THE CONTRACTOR FAILS TO RESPOND WITHIN THIS TIME, THE OWNER MAY PROCEED WITH REPLACEMENT WORK AND BILL THE CONTRACTOR.
2. ALL DELAYS IN COMPLETION OF PLANTING OPERATIONS WHICH EXTEND THE PLANTING INTO MORE THAN ONE PLANTING SEASON SHALL EXTEND THE WARRANTY PERIOD CORRESPONDINGLY.
3. REPLACEMENTS: AS SOON AS WEATHER CONDITIONS PERMIT, REPLACE, WITHOUT COST TO OWNER, ALL DEAD PLANTS AND ALL PLANTS NOT IN A VIGOROUS, THRIVING CONDITION, AS DETERMINED BY THE CONSULTANT DURING AND AT THE END OF THE WARRANTY PERIOD.
4. PATCHY OR BARE AREAS (IN EXCESS OF 8 SQUARE FEET) WHERE SEED MIX FAILED TO CREATE SUFFICIENT DENSITY OF COVER SHALL BE RESEEDED BY HAND AT THE RECOMMENDED APPLICATION RATE AT NO ADDITIONAL COST TO OWNER.
5. INCORRECT MATERIALS: DURING WARRANTY PERIOD, REPLACE AT NO COST TO OWNER ALL PLANTS REVEALED AS BEING UNTRUE TO NAME. PROVIDE REPLACEMENTS OF A SIZE AND QUALITY TO MATCH THE PLANTED MATERIALS AT THE TIME THE MISTAKE IS DISCOVERED.
6. ALL PLANT STOCK SHALL BE WATERED BY THE CONTRACTOR TO ENSURE THE HEALTH AND VIGOR OF THE PLANTED MATERIALS. THE CONTRACTOR SHALL WATER AS NEEDED BASED ON NATURAL RAINFALL DURING THE WARRANTY PERIOD. WATERING SHALL CONTINUE SO SEEDLINGS DO NOT DRY OUT ONCE WATERING HAS BEGUN. THE WATERING SHALL BE DONE FROM SURFACE METHODS AT A PRESSURE NOT TO EXCEED THE INFILTRATION RATE OF THE SOIL, LIMITING RUNOFF DURING THE WATERING PERIOD. EACH AREA WILL BE WATERED WITH SUFFICIENT WATER TO COMPLETELY SATURATE THE ROOT ZONE. THE CONTRACTOR SHALL INSPECT ALL PLANTS FOR INSECT INFESTATION AND DAMAGE.
7. EROSION SHALL BE REPAIRED BY THE CONTRACTOR.
8. PROTECTION FROM TRAFFIC AND EROSION IN NEWLY SEEDED AREAS AND THE MITIGATION AREAS IS THE RESPONSIBILITY OF THE CONTRACTOR. SAFETY FENCES AND/OR OTHER BARRIER METHODS WITH APPROPRIATE SIGNAGE MAY BE USED FOR ONE YEAR FROM COMPLETION OF CONSTRUCTION ACTIVITIES. ALL COSTS ASSOCIATED WITH THIS IS INCLUSIVE OF CONTRACTOR'S PRICING.
9. NOTIFY THE OWNER PRIOR TO AND FOLLOWING ANY MAINTENANCE ACTIVITY.
10. FINAL ACCEPTANCE OF WORK WILL BE SUBJECT TO ACCEPTANCE BY PROJECT MANAGER AND OWNER AT THE END OF GUARANTEE PERIOD.

NATIVE PLANTINGS:

1. TREES, SHRUBS, AND PLUGS SHALL BE OF NATIVE PLANT MATERIAL OF GENOTYPES FROM THE NORTH CENTRAL STATES ONLY (IL, IN, IA, MI, OH), AND FROM A RECOGNIZED NURSERY OF THIS REGION. MICHIGAN SOURCES FOR TREE, SHRUBS, AND PLUGS SHALL BE LOCATED BEFORE BRANCHING OUT TO OTHER NORTH CENTRAL STATES. NATIVE PLANTINGS INCLUDE ALL TREES, SHRUBS, AND PLUGS INSTALLED IN THE WETLAND MITIGATION AND WETLAND ENHANCEMENT AREAS.
2. PLANTS SHALL BE NURSERY GROWN IN ACCORDANCE WITH GOOD HORTICULTURAL PRACTICES AND MUST MEET APPLICABLE REQUIREMENTS OF ICBN AND ICNCP. PLANTS SHALL BE SOUND, HEALTHY AND VIGOROUS, WELL BRANCHED AND DENSELY FOLIATED WHEN IN LEAF. PLANTS SHALL BE FREE OF DISEASE, INSECT PESTS, EGGS, OR LARVAE. PLANTS SHALL BE FREE OF KINKED, CIRCLING OR GIRDLING TRUNK SURFACE AND CENTER ROOTS, AND SHALL NOT BE ROOT-BOUND. RESPECT MAXIMUM STORAGE TIMES FOR PLANT STOCK.
3. NATIVE PLANTING AREAS SHALL BE INSTALLED AFTER MAY 15 (WHEN SOIL IS FREE OF FROST AND IN WORKABLE CONDITION), BUT BEFORE JUNE 30 OR AFTER SEPT. 1 BUT BEFORE OCTOBER 30 OR AS APPROVED BY THE ENGINEER.
4. FURNISH PLANT SPECIES AND SIZES AS INDICATED ON THE PLANS. PLANT STOCK SHALL BE TRUE TO THEIR NAME (GENUS AND SPECIES), AS SPECIFIED. CULTIVARS AND SPECIMENS SHALL NOT BE USED WITHOUT PRIOR APPROVAL BY CONSULTANT.
5. NATIVE PLANTINGS TO BE INSTALLED PER DETAILS.
6. PLUGS, CONTAINERIZED PLANTS, AND ROOT STOCKS WHICH ARE TO BE PLACED IN SATURATED OR FLOODED SOIL CONDITIONS SHALL BE PRE-CONDITIONED FOR THIS PLACEMENT BY BEING HELD UNDER SIMILAR CONDITIONS IN A WET ENVIROMENT AT THE NURSERY PRIOR TO SHIPMENT TO THE SITE.
7. REMOVE ALL CONTAINERS AND PACKAGING MATERIAL AND DISPOSE OF LEGALLY OFF-SITE.
8. WATER PLANT STOCK IMMEDIATELY AFTER PLANTING SUCH THAT ROOT ZONE IS THOROUGHLY SOAKED. CONTRACTOR SHALL BE RESPONSIBLE TO KEEP PLUGS ADEQUATELY WATERED , IF NECESSARY, TO ENSURE THEIR SURVIVAL.
9. IF EROSION CONTROL BLANKET IS NEEDED IN AREAS WHERE PLUGS ARE PRESENT, INSTALL EROSION CONTROL BLANKET AFTER SEEDING, BUT PRIOR TO PLANTING. EROSION CONTROL BLANKET SHALL BE INSTALLED WHERE THE CONTRACTOR FEELS IT NECESSARY TO STABILIZE THE SITE AT NO ADDITIONAL COST TO THE OWNER.
10. FIELD ADJUST PLANTINGS TO DIVERSIFY SPECIES ACROSS THE PLANTING AREAS AND TO MEET FINISH GRADE OF THE STREAMBANKS WITH PLANTING REQUIREMENTS FOR SPECIES BASED ON DEPTH. ANY ADJUSTMENTS WILL BE SHOWN ON AN AS-BUILT PLAN AND SUBMITTED TO THE CONSULTANT UPON COMPLETION.
11. MULCH FOR TREES AND SHRUBS SHALL BE COARSE GRADE OAK OR MAPLE BARK AGED AT LEAST ONE YEAR AND UNIFORM IN COLOR AND TEXTURE.

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Somat Engineering Incorporated

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OXBOW RESTORATION PROJECT-PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

SEAL OF THE CHARTER COUNTY OF WAYNE MICHIGAN 1796

the Henry Ford

FOR BIDDING	10-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
75% DESIGN	8-12-14

130825
ECT PROJECT NUMBER

AAB DESIGNED BY	AAB CHECKED BY
AAB/PFH DRAWN BY	JOM APPROVED BY

SHEET TITLE

REVEGETATION PLAN

SCALE: 1" = 20' @ 22" x 34"
0 10' 20' 40'

NORTH

SHEET NUMBER
C-9

TREE AND SHRUB LIST:

SYMBOL	QUAN.	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING	CONDITION
AL	2	AMELANCHIER LAEVIS	ALLEGHENY SERVICEBERRY	6'-10' HT.	AS SHOWN	B & B
AR	4	ACER RUBRUM	RED MAPLE	2"-4" CAL.	AS SHOWN	TREE SPADE
CO	2	CELTIS OCCIDENTALIS	HACKBERRY	2"-4" CAL.	AS SHOWN	TREE SPADE
CS	20	CORNUS STOLONIFERA	RED-OSIER DOGWOOD	36"-48" HT.	AS SHOWN	3 GAL. CONT.
RA	18	RHUS AROMATICA 'GRO-LOW'	'GRO-LOW' FRAGRANT SUMAC	36"-48" HT.	AS SHOWN	3 GAL. CONT.

PLANT LIST:

SYMBOL	QUAN.	SCIENTIFIC NAME	COMMON NAME	SIZE	SPACING
AI	60	ASCLEPIAS INCARNATA	SWAMP MILKWEED	QUART	24" O.C.
CC	60	CALAMOGROSTIS CANADENSIS	BLUE JOINT GRASS	QUART	24" O.C.
EM	60	EUPATORIUM MACULATUM	JOE PYE WEED	QUART	24" O.C.
EP	60	EUPATORIUM PERFOLIATUM	COMMON BONESET	QUART	24" O.C.
IV	60	IRIS VIRGINIANA	BLUE FLAG IRIS	QUART	24" O.C.
PV	60	PANICUM VIRGATUM	SWITCH GRASS	QUART	24" O.C.
SE	60	SPARGANIUM EURYCARPUM	COMMON BUR REED	QUART	24" O.C.
SP	60	SPARTINA PECTINATA	PRAIRIE CORD GRASS	QUART	24" O.C.
SV	60	SCIRPUS VALIDUS	GREAT BULRUSH	QUART	24" O.C.
VH	60	VERBENA HASTATA	BLUE VERVAIN	QUART	24" O.C.

SEDGE MEADOW SEED MIX

SCIENTIFIC NAME	COMMON NAME	OZ/AC
GRASSES/SEDGES		
AVENA SATIVA	COMMON OAT	500.0
CALAMAGROSTIS CANADENSIS	BLUEJOINT GRASS	1.000
CAREX COMOSA	BRISTLY SEDGE	2.000
CAREX CRISTATELLA	CRESTED OVAL SEDGE	2.000
CAREX FRANKII	BRISTLY CATTAIL SEDGE	1.500
CAREX LUPULINA	COMMON HOP SEDGE	2.500
CAREX LURIDA	BOTTLEBRUSH SEDGE	4.000
CAREX STIPATA	COMMON FOX SEDGE	1.000
CAREX VULPINOIDEA	BROWN FOX SEDGE	4.000
ELYMUS VIRGINICUS	VIRGINIA WILD RYE	30.00
GLYCERIA STRIATA	FOWL MANNA GRASS	0.500
JUNCUS EFFUSUS	COMMON RUSH	0.250
LEERSIA ORYZOIDES	RICE CUT GRASS	1.250
PANICUM VIRGATUM	SWITCH GRASS	1.500
SCIRPUS ATROVIRENS	DARK GREEN RUSH	0.750
SCIRPUS PENDULUS	BULRUSH	0.250
SCIRPUS VALIDUS	GREAT BULRUSH	1.000
SPARTINA PECTINATA	PRAIRIE CORD GRASS	2.000
FORBS		
ALISMA SUBCORDATA	COMMON WATER PLANTAIN	2.000
ASCLEPIAS INCARNATA	SWAMP MILKWEED	1.000
BIDENS CERNUA	NODDING BUR MARIGOLD	2.000
COREOPSIS TRIPTERIS	TALL COREOPSIS	2.000
DOELLINGERIA UMBELLATA	FLAT TOPPED ASTER	0.250
EUPATORIUM MACULATUM	JOE PYE WEED	1.000
EUPATORIUM PERFOLIATUM	COMMON BONESET	0.500
GLYCERIA STRIATA	FOWL MANNA GRASS	0.500
HELENIUM AUTUMNALE	SNEEZEWEED	2.000
HIBISCUS LAEVIS	SMOOTH ROSE MALLOW	2.000
IRIS VIRGINICA	BLUE FLAG IRIS	3.000
LIATRIS SPICATA	MARSH BLAZING STAR	2.000
LOBELIA CARDINALIS	CARDINAL FLOWER	0.250
LOBELIA SIPHILITICA	GREAT BLUE LOBELIA	2.000
LYCOPUS AMERICANUS	COMMON WATER HOREHOUND	0.250
PENTHORUM SEDOIDES	DITCH STONECROP	0.500
PHYSOSTEGIA VIRGINIANA	OBEDIENT PLANT	0.250
POLYGONUM LAPATHIFOLIUM	NODDING SMARTWEED	0.500
POLYGONUM PENSYLVANICUM	GIANT SMARTWEED	0.500
PYCNANTHEMUM VIRGINIANUM	COMMON MOUNTAIN MINT	0.500
RUDBECKIA LACINATA	GREEN CONEFLOWER	1.000
SAGITTARIA LATIFOLIA	COMMON ARROWHEAD	1.000
SPARGANIUM EURYCARPUM	COMMON BUR REED	4.000
SPIREA ALBA	MEADOWSWEET	0.250
SYMPHYOTRICHUM NOVAE-ANGLIAE	NEW ENGLAND ASTER	0.500
SYMPHYOTRICHUM PUNICEUM	BRISTLY ASTER	1.000
VERBENA HASTATA	BLUE VERVAIN	2.000
VERONIA MISSURICA	IRONWEED	1.000
ZIZIA AUREA	GOLDEN ALEXANDERS	1.000
	TOTAL	590.25

LOW PROFILE PRAIRIE SEED MIX

SCIENTIFIC NAME	COMMON NAME	OZ/AC
GRASSES/SEDGES		
AVENA SATIVA	**COMMON OAT**	**360.0**
BOUTELOUA CURTIPENDULA	**SIDE-OATS GRAMA**	**14.00**
BROMUS KALMII	**PRAIRIE BROME**	**10.00**
CAREX MOLESTA	**FIELD OVAL SEDGE**	**0.250**
ELYMUS CANADENSIS	**CANADA WILD RYE**	**15.25**
KOELERIA CRISTATA	**JUNE GRASS**	**0.500**
SCHIZACHYRIUM SCOPARIUM	**LITTLE BLUESTEM**	**31.00**
SPOROBOLUS HETEROLEPIS	**PRAIRIE DROPSEED**	**1.000**
FORBS		
ALLIUM CERNUUM	**NODDING WILD ONION**	**0.250**
AMORPHA CANESCENS	**LEADPLANT**	**1.000**
ANEMONE CYLINDRICA	**THIMBLEWEED**	**0.200**
AQUILEGIA CANADENSIS	**WILD COLUMBINE**	**0.250**
ASCLEPIAS TUBEROSA	**BUTTERFLY WEED**	**3.000**
COREOPSIS LANCEOLATA	**LANCE-LEAF COREOPSIS**	**4.000**
HELIANTHUS OCCIDENTALIS	**WESTERN SUNFLOWER**	**0.500**
LIATRIS ASPERA	**ROUGH BLAZING STAR**	**0.600**
LUPINUS PERNNIS	**LUPINE**	**4.000**
MONARDA FISTULOSA	**BERGAMOT**	**1.750**
MONARDA PUNCTATA	**HORSEMINT**	**2.000**
PENSTEMON DIGITALIS	**FOXGLOVE BEARDTONGE**	**2.000**
PENSTEMON HIRSUTUS	**HAIRY BEARDTONGUE**	**0.300**
PYCNANTHEMUM VIRGINIANUM	**MOUNTAIN MINT**	**1.000**
RATIBIDA PINNATA	**YELLOW CONEFLOWER**	**4.000**
RUDBECKIA HIRTA	**BLACK EYED SUSAN**	**4.000**
SOLIDAGO RIGIDA	**STIFF GOLDENROD**	**1.500**
SOLIDAGO SPECIOSA	**SHOWY GOLDENROD**	**0.500**
SYMPHYOTRICHUM ERICOIDES	**HEATH ASTER**	**0.250**
SYMPHYOTRICHUM LAEVE	**SMOOTH BLUE ASTER**	**1.000**
TRADESCANTIA OHIENSIS	**COMMON SPIDERWORT**	**2.000**
VERBENA STRICTA	**HOARY VERVAIN**	**4.000**
	TOTAL	**470.1**

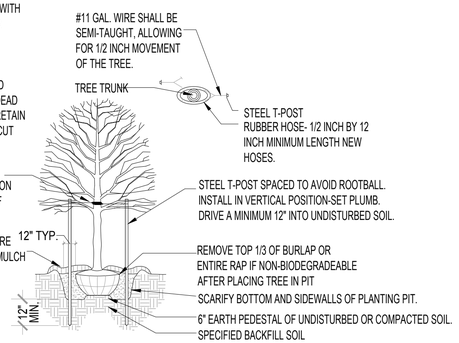
NOTES:

TREE SHALL BE PLANTED WITH TOP OF ROOT BALL AT OR SLIGHTLY ABOVE FINISH GRADE - NEVER LOWER.

PRUNE ONLY AS DIRECTED EXCEPT FOR REMOVING DEAD OR BROKEN BRANCHES; RETAIN NATURAL FORM; DO NOT CUT LEADER.

#11 GALVANIZED WIRE WRAPPED ONE REVOLUTION AND BETWEEN RIDGES OF T-POST

4" MULCH TO COVER ENTIRE PLANTING HOLE. TAPER MULCH TO TRUNK. CREATE CONTINUOUS 6" EARTH SAUCER.



1 / C-10 DECIDUOUS TREE PLANTING
NOT TO SCALE

PLANT ALL SHRUBS VERTICAL.

PRUNE ALL DEAD OR DAMAGED BRANCHES

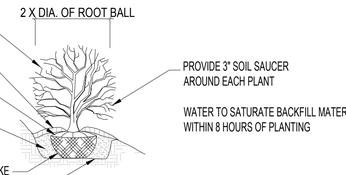
4" BARK MULCH TO COVER ENTIRE PLANTING HOLE. TAPER MULCH TO BASE OF PLANT.

REMOVE ROPE & TOP 1/3 OF BURLAP PRIOR TO BACKFILLING.

BACKFILL WITH MIX OF 50% IMPORTED TOPSOIL AND 50% EXCAVATED SITE SOIL & TAMP LIGHTLY

IF CONTAINER STOCK IS ROOT BOUND, MAKE 4 VERTICAL CUTS IN EACH ROOT BALL WITH SHARP BLADE

SCARIFY BOTTOM AND SIDEWALLS OF PLANTING PIT.



2 / C-10 SHRUB PLANTING
NOT TO SCALE

INSTALL ALL PLANTS VERTICAL.

ROOT COLLAR SQUARE TO FINISH GRADE

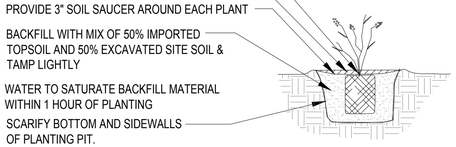
MULCH

PROVIDE 3" SOIL SAUCER AROUND EACH PLANT

BACKFILL WITH MIX OF 50% IMPORTED TOPSOIL AND 50% EXCAVATED SITE SOIL & TAMP LIGHTLY

WATER TO SATURATE BACKFILL MATERIAL WITHIN 1 HOUR OF PLANTING

SCARIFY BOTTOM AND SIDEWALLS OF PLANTING PIT.



3 / C-10 HERBACEOUS PLANTING
NOT TO SCALE

3 WORKING DAYS
BEFORE YOU DIG
CALL MISS DIG
1-800-482-7171

ECT Environmental Consulting & Technology, Inc.
2200 Commonwealth Boulevard, Suite 300
Ann Arbor, Michigan 48105
Phone: 734.769.3004
Fax: 734.769.31664

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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

the Henry Ford

FOR BIDDING	**10-17**
100% DESIGN	**11-07-14**
PERMIT APPLICATION	**9-12-14**
75% DESIGN	**8-12-14**

130825
ECT PROJECT NUMBER

AAB DESIGNED BY	**AAB** CHECKED BY
AAB/PFH DRAWN BY	**JOM** APPROVED BY

SHEET TITLE

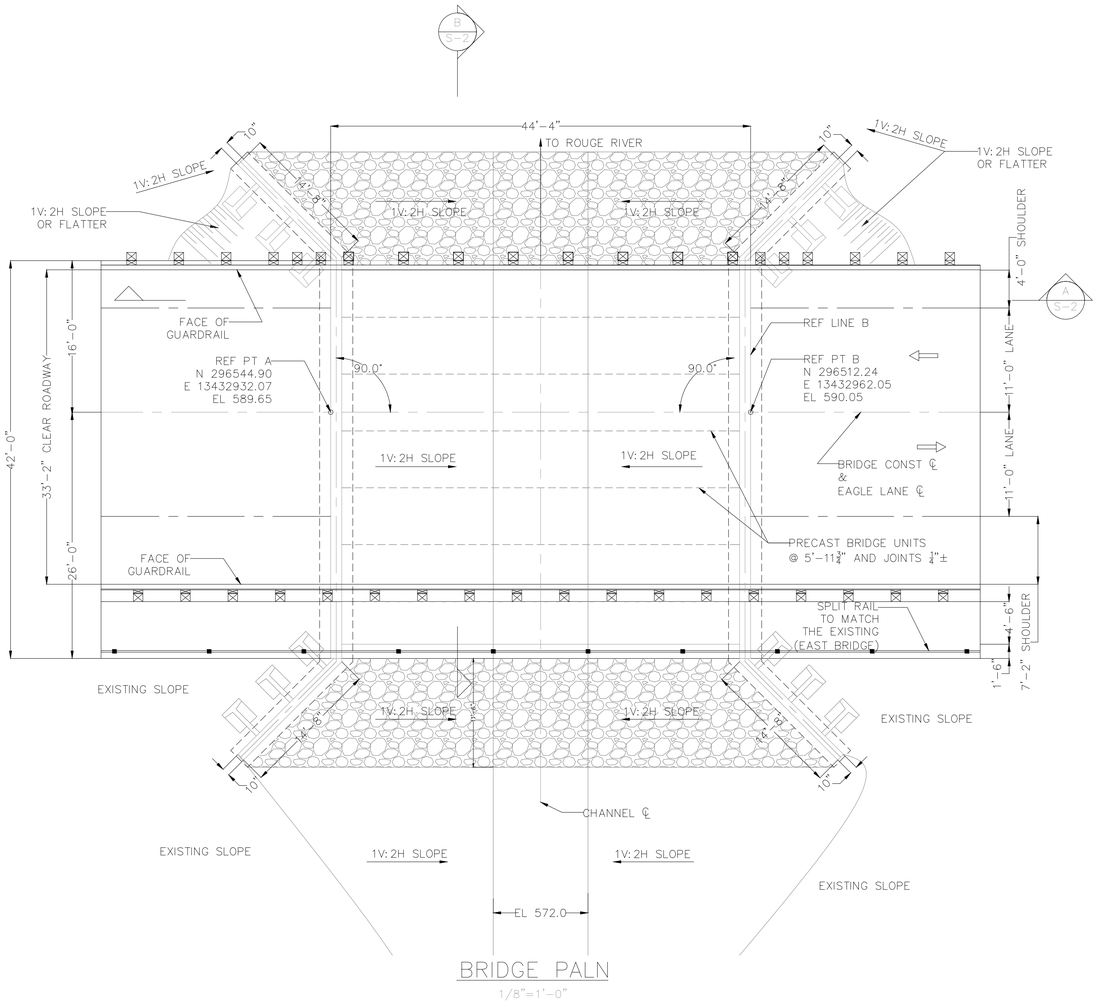
REVEGETATION DETAILS

SCALE: AS SHOWN

NORTH

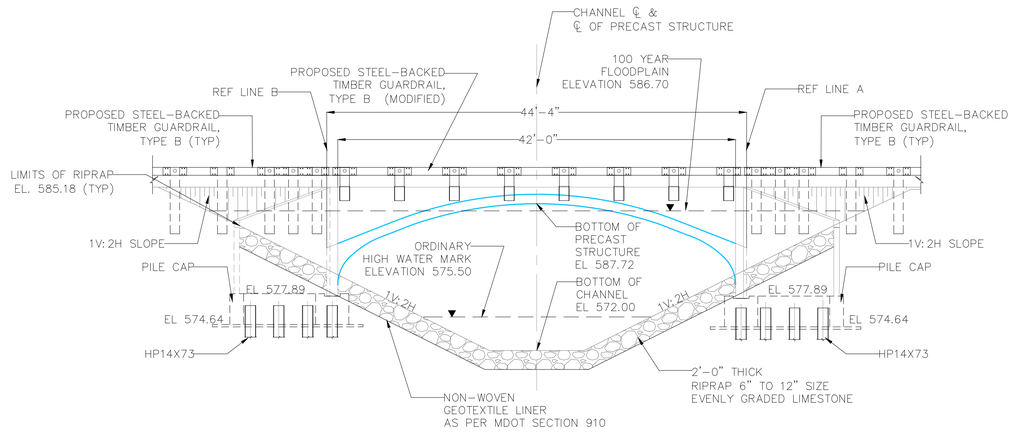
SHEET NUMBER **C-10**

P:\Alliance of Rouge Communities\Grant Projects\2013 NOAA Oxbow Phase III\CAD\Oxbow_III_100%Design\Drawings_14.dwg



BRIDGE PALN

1/8"=1'-0"

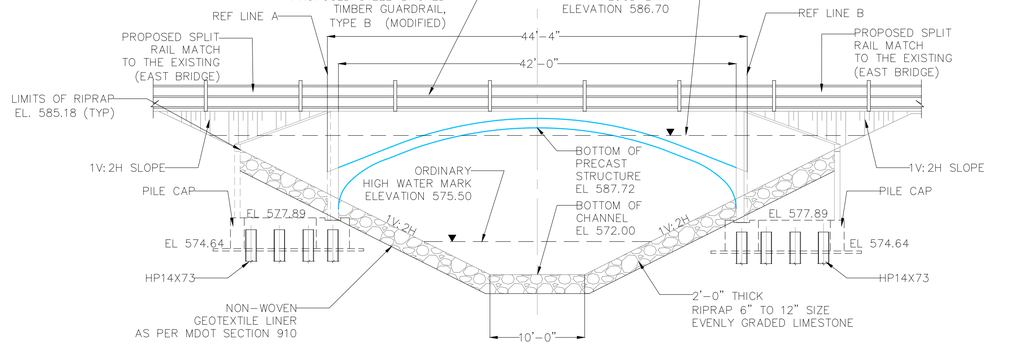


NORTH ELEVATION

1/8"=1'-0"

NOTES

A. WATER PROOFING ON TOP OF PRECAST UNIT JOINTS SHALL BE AS PER TYPICAL JOINT SEAL DETAIL IN SHEET S-6.
B. IF THE DISTANCE BETWEEN TOP OF ROADWAY AND TOP OF BRIDGE PRECAST SEGMENTS IS LESS THAN 4'-9", USE CONCRETE ANCHOR FOR SHORT GUARDRAILS.



SOUTH ELEVATION

1/8"=1'-0"

GRAPHIC SCALE

8 0 2 4 8 16

(IN FEET)

1/8 inch = 1 ft.

3 WORKING DAYS
BEFORE YOU DIG
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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN,
WAYNE COUNTY,
MICHIGAN

the Henry Ford

FOR BIDDING	07-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
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130825
ECT PROJECT NUMBER

AAB	AAB
DESIGNED BY	CHECKED BY
AAB/PFH	JOM
DRAWN BY	APPROVED BY

SHEET TITLE

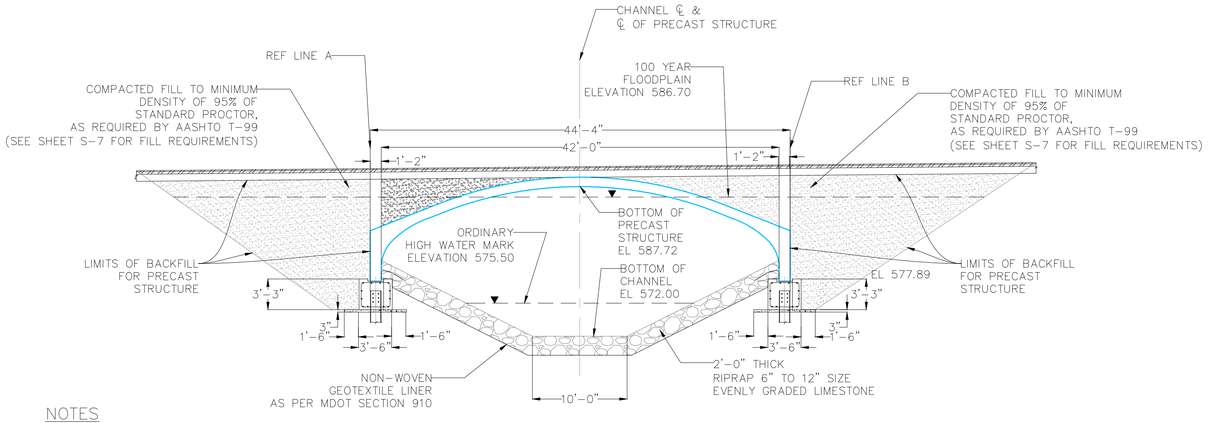
BRIDGE PLAN & ELEVATIONS

AS SHOWN

NORTH

SHEET NUMBER

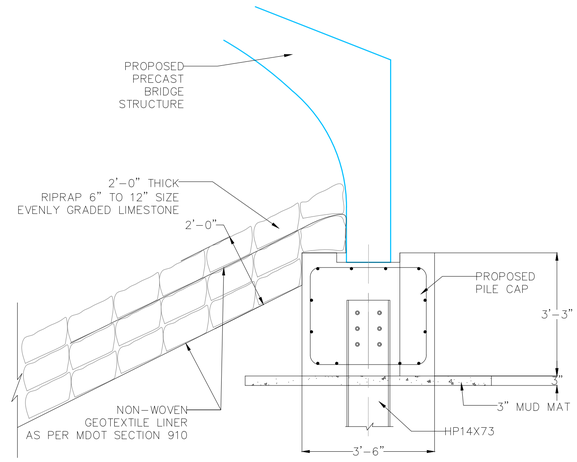
S-1



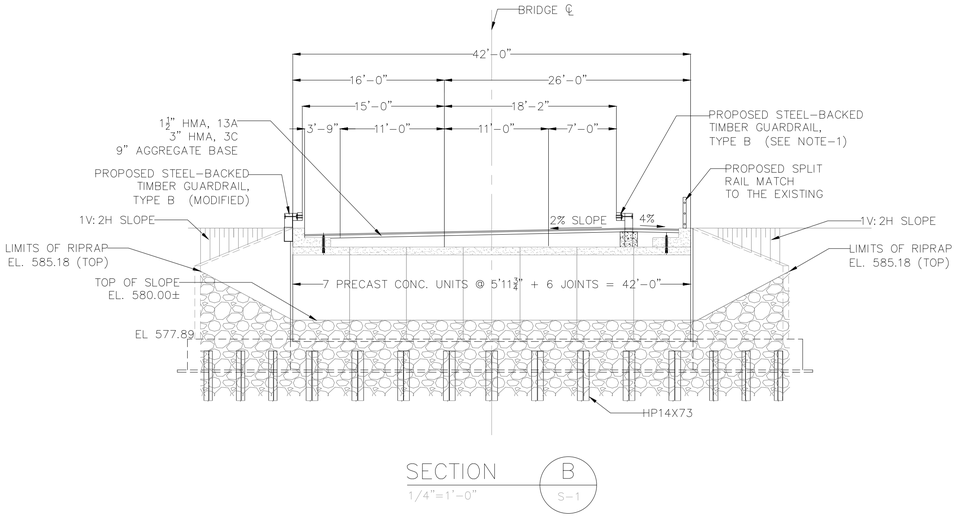
NOTES

A. EXCAVATION PLAN FOR BRIDGE SUBSTRUCTURE SHALL BE SUBMITTED BY THE CONTRACTOR PRIOR TO EXCAVATION FOR ENGINEER APPROVAL.

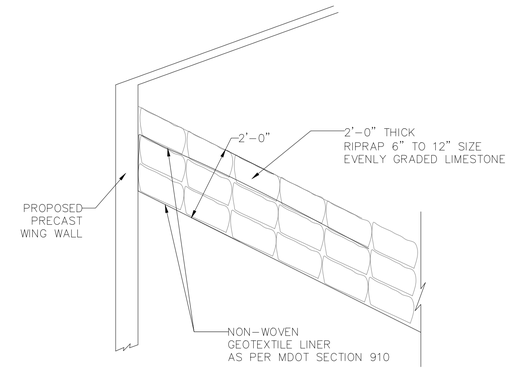
SECTION A
1/4"=1'-0"
S-1



RIPRAP END DETAIL AT BRIDGE (TYP)
1/2"=1'-0"



SECTION B
1/4"=1'-0"
S-1



RIPRAP END DETAIL AT WING WALL (TYP)
1/2"=1'-0"

GRAPHIC SCALE
2 0 0.5 1 2 4
(IN FEET)
1/2 inch = 1 ft.

GRAPHIC SCALE
4 0 1 2 4 8
(IN FEET)
1/4 inch = 1 ft.

3 WORKING DAYS
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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

the Henry Ford

FOR BIDDING	07-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
75% DESIGN	8-12-14

130825
ECT PROJECT NUMBER

AAB	AAB
DESIGNED BY	CHECKED BY
AAB/PFH	JQM
DRAWN BY	APPROVED BY

SHEET TITLE

BRIDGE SECTIONS

AS SHOWN

NORTH

SHEET NUMBER
S-2

TEST BORING NO. B–01

GROUND SURFACE ELEVATION: 587.5 ft

ELEV				
587.5				
586.5	6 8 5			FILL – Mixed medium dense sand and gravel, trace silt, clay, topsoil and brick pieces, dark brown, moist (Road Material)
585.0				FILL – Silty sandy clay, trace to some gravel, trace brick pieces, dark brown (CL)
584.0	2 2 2	14.2	<>	
582.5				FILL – Very loose fine to medium sand, trace silt and gravel, brown, wet (SP)
581.5	2 2 2			
579.5				FILL – Stiff silty clay, some sand, trace gravel and roots/vegetation, dark brown and brown (CL)
579.0	3 3 3	20.0	2000+*	
577.5				PROPOSED BOTTOM OF FOOTING EL 574.75 FT
574.0	15 40 43			FILL – Alternating layers of loose silty fine to medium sand, brick pieces and garbage (misc. rubber debris, golf ball)
569.0	2 3 4			
567.5				
564.0	4 6 7	20.3	1200#	
559.0	2 2 3	21.3	1000#	
554.0	2 2 2	26.6	800#	Medium to soft SILTY CLAY, trace sand and gravel, gray (CL)
549.0		23.4	1130	
547.0	3 3 3	30.2	600#	
544.0	0 0 0	34.9	<>	
539.0	15 35 32			Very dense SANDY SILT, gray, moist (ML)
537.5				
534.0	40 43 39	11.3	6500+*	
529.0	10 15 25	13.8	9000+*	Very stiff to hard SILTY CLAY, some sand, trace gravel, trace shale pieces below 60 ft., gray (CL)
524.0	12 14 21	13.9	8500+*	
522.5				ESTIMATED PILE TIP EL 522.0 FT FOR RN=350 KIP

E.O.B. 65.0 ft.
BORING DATE: 05/06/2014

Ground surface estimated from existing survey.

TEST BORING NO. B–02

GROUND SURFACE ELEVATION: 589.5 ft

ELEV				
589.5				
588.5	3 3 3	13.5	<>	FILL – Silty clay, some sand, trace gravel, brick pieces and wood pieces, dark gray (CL)
586.0	3 3 3	15.2	<>	
583.5	4 4 6		<>	
581.5				Stiff SILTY CLAY, trace sand, gravel and organics, trace roots above 10 ft., occasional fine sand partings below 10 ft., dark gray(CL) (An LOI Test an sample at 10 ft depth indicated an organic content of 7.1%) (An LOI test on sample at 15 ft depth indicated an organic content of 3.5%)
581.0	2 2 2	42.0	2000+*	
576.0	1 1 1	33.1	<>	
574.5				PROPOSED BOTTOM OF FOOTING EL 574.75 FT
571.0	2 4 6			Medium dense FINE SAND, trace silt, coarse sand and gravel, gray, wet (SP)
569.5				
566.0	0 2 3	21.0	800#	
561.0	0 3 3	22.5	1000#	
558.0		19.8	2300	Soft to stiff SILTY CLAY with occasional very soft layers, trace sand and gravel, gray (CL)
554.0	0 6 2	25.7	1200#	
551.0	0 0 0	30.8	400#	
546.0	0 0 2	30.1	1200#	
544.5				
541.0	25 26 20			Dense to very dense SANDY SILT, trace clay, gray, moist (ML)
536.0	40 30 29			
534.5				
531.0	12 25 39	12.4	9000+*	
526.0	10 15 33	16.0	8500+*	ESTIMATED PILE TIP EL 526.0 FT FOR RN=350 KIP
521.0	5 15 17	10.7	9000+*	Hard SILTY CLAY, some sand, trace gravel, occasional sand and silt partings below 80 ft., gray (CL)
516.0	37 25 39	11.0	9000+*	
511.0	24 39 50	11.4	9000+*	
506.0	12 24 31	11.3	9000+*	
501.0	13 16 28	13.7	9000+*	
499.5				

E.O.B. 90.0 ft.
BORING DATE: 05/07/2014

Ground surface estimated from existing survey.

TEST BORING NO. B–03 & B–03A

GROUND SURFACE ELEVATION: 587 ft

ELEV				
587.0				
586.0	12 10 6			FILL – Mixed silty sand, clay and gravel, trace brick pieces, occasional sandy clay layers, brown and gray (SM)(CL)(GP)
583.5	59 44 23			
581.0	2 6 29			
579.0				
578.5	2 4 6	19.3	6000+*	FILL – Very stiff silty clay, some sand, trace gravel and roots, brick layer 14.5–15 ft., dark gray (CL)
573.5	3 8 7		<>	
572.0				
568.5	2 4 2			
563.5	0 2 3	20.7	1400#	Medium SILTY CLAY, trace sand and gravel, gray (CL)
558.5	0 12 6	19.9	1600#	
553.5	0 2 3	23.9	1000#	
552.0				

E.O.B. 35.0 ft.
BORING DATE: 05/08/2014

Ground surface estimated from existing survey. Obstruction encountered at 4 ft depth, boring moved 13.5 North and continued as B–03A. Shelby tube attempted at 28.5 ft. but no recovery, 30 ft sample driven through ST attempt. Foreign odor in samples at depths 5 ft and 7.5 ft.

TEST BORING NO. B–04

GROUND SURFACE ELEVATION: 589 ft

ELEV				
589.0				
588.0	50	19.6	4500+*	FILL – Very stiff silty clay, trace sand and gravel, brown (CL)
586.0				
585.5	2 4 4	13.5	7000+*	FILL – Very stiff silty clay, trace to some sand, trace gravel, roots and brick pieces, frequent fine sand partings and seams, wood pieces at 7.5 ft., gray (CL)
583.0	3 4 6	14.7	<>	
580.5	4 4 6	17.0	4500+*	
579.0				Loose SILTY FINE SAND, trace clay and gravel, gray, moist (SM) (Possible Fill)
575.5	2 2 3			
574.0				
570.5	5 5 4			
565.5	0 0 12	19.7	<>	Medium SILTY CLAY, trace sand and gravel, gray (CL)
560.5	1 3 4	21.8	1000#	
555.5	0 2 3	22.8	1400#	
554.0				

E.O.B. 35.0 ft.
BORING DATE: 05/08/2014

Ground surface estimated from existing survey. Obstruction encountered at 1 ft depth, boring moved 1 ft North and continued. Shelby tube attempted at 23 ft. but no recovery, sample at 25 ft depth driven through Shelby tube attempt.

GENERAL NOTES

ELEV 1st 2nd 3rd — N 0 0 0 — % Wc UCC(psf)

ELEV Elevation at top of sample
* Pocket Penetrometer
\# Torvane
<> Disturbed Sample

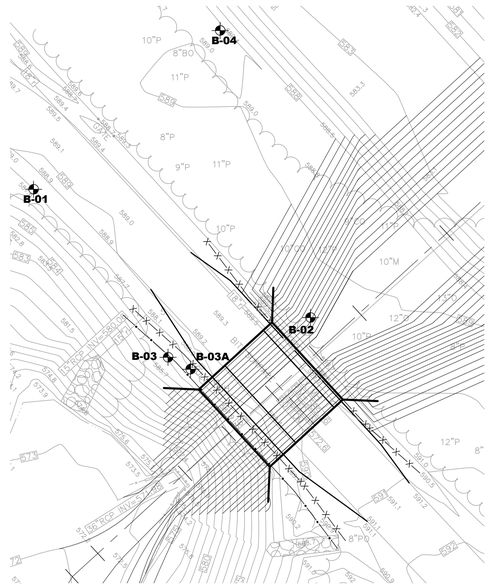
NUMBERS IN CIRCLES DENOTE NUMBER OF BLOWS REQUIRED TO DRIVE A 2" O.D. (1.5" I.D.) SPLIT SPOON SAMPLER 3 SUCCESSIVE 6" INCREMENTS USING A 140 lb HAMMER FALLING 30"

THE SOIL BORING LOGS REPRESENT POINT INFORMATION. PRESENTATION OF THIS INFORMATION IN NO WAY IMPLIES THAT THE SUBSURFACE CONDITIONS ARE THE SAME AT LOCATIONS OTHER THAN THE EXACT LOCATION OF THE BORING.

CONSISTENCY DETERMINED BY INSPECTION OF SAMPLES AND BY SOIL RESISTANCE TO PENETRATION BY JET ROD AND CASING OR AUGER.

▼ WATER LEVEL DURING DRILLING

WATER LEVELS MAY BE INFLUENCED BY RESIDUAL BORING WATER



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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN,
WAYNE COUNTY,
MICHIGAN

the Henry Ford

FOR BIDDING	10-17
100%	11-07-14
PERMIT APPLICATION	09-16-14
75% DESIGN	08-06-14

130825
ECT PROJECT NUMBER

CS DESIGNED BY	MM CHECKED BY
CS DRAWN BY	JZ APPROVED BY

SHEET TITLE

BORING LOGS

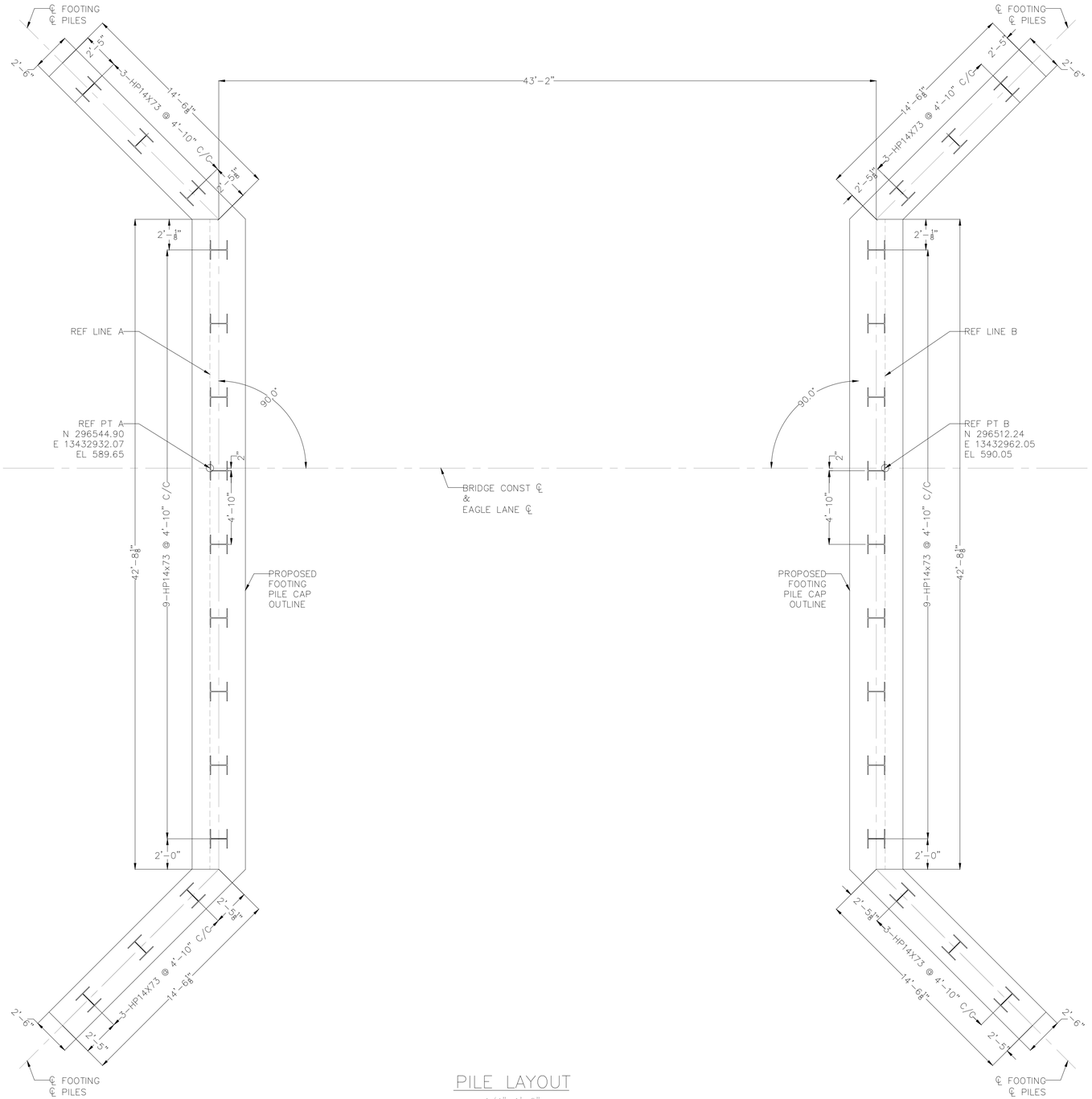
AS SHOWN

NORTH

SHEET NUMBER

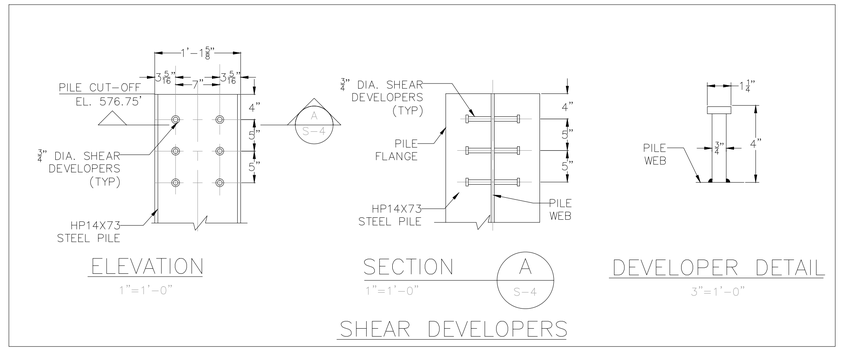
S-3

...ECT\CAD Details\2010 CAD Titleblock Templates\22534 ECT Template.dwg



PILE LAYOUT

1/4"=1'-0"



GENERAL NOTES:

1) THESE GENERAL NOTES ARE NOT INTENDED TO REPLACE SPECIFICATIONS. SEE SPECIFICATIONS FOR REQUIREMENTS IN ADDITION TO GENERAL NOTES.
2) THE CONTRACTOR SHALL SUPERVISE AND DIRECT WORK AND SHALL BE SOLELY RESPONSIBLE FOR ALL CONSTRUCTION MEANS, METHODS, PROCEDURES, TECHNIQUES, AND SEQUENCE. ALL APPLICABLE SAFETY REGULATIONS TO BE STRICTLY FOLLOWED.
3) ALL STRUCTURAL DRAWINGS SHALL BE USED IN CONJUNCTION WITH THE CIVIL DRAWINGS AND SPECIFICATIONS.
4) ALL EXISTING INFORMATION AND DIMENSIONS SHALL BE VERIFIED IN THE FIELD BY THE CONTRACTOR PRIOR TO FABRICATION AND CONSTRUCTION.

CONCRETE/REINFORCING STEEL:

1) CONCRETE COMPRESSIVE STRENGTH IN 28 DAYS:
   SUB STRUCTURE (PILE CAP) – 4000 PSI
   MUD MAT CONCRETE – 3000 PSI
2) REINFORCING:
   ASTM A615 – GRADE 60.
   ALL THE REINFORCEMENT SHALL BE EPOXY COATED AS PER ASTM A934.
   REFER TO THE DRAWINGS FOR REINFORCING LAP REQUIREMENTS, WHERE LAP SPLICES ARE NOT SHOWN, LAP PER ACI 318 OR CRSI STANDARDS.
3) CLEAR COVER FROM FACE OF CONCRETE:
   FOOTINGS (MINIMUM) – 3"

CONCRETE CONSTRUCTION JOINTS:

1) CONTRACTOR SHALL PROVIDE NECESSARY CONSTRUCTION JOINTS IN MONOLITHIC CONCRETE POURS SO THAT THE QUALITY OF PLACEMENT AND FINISH MEETS THE REQUIREMENTS OF PLANS AND SPECIFICATIONS. THE CONTRACTOR SHALL SUBMIT A PLAN SHOWING THE LOCATION OF ALL CONSTRUCTION JOINTS TO THE ENGINEER FOR APPROVAL.
2) THERE SHALL BE NO HORIZONTAL CONSTRUCTION JOINTS IN CONCRETE POURS. ALL VERTICAL CONSTRUCTION JOINTS IN SLABS AND BEAMS SHALL BE MADE WITH BULKHEADS. ADDITIONAL REINFORCING AT CONSTRUCTION JOINTS SHALL BE AS SPECIFIED BY THE ENGINEER.

STRUCTURAL STEEL:

1) STRUCTURAL STEEL:
   STEEL PILE (HP SECTIONS) – ASTM A992, GRADE 50, FY = 50 KSI
   PLATES, RODS, AND BARS – A36, FY = 36 KSI
2) DESIGN, FABRICATION, AND ERECTION: AISC MANUAL OF STEEL CONSTRUCTION, ASD/LRFD.
3) SPLICING OF STRUCTURAL STEEL MEMBERS IS PROHIBITED WITHOUT PRIOR APPROVAL OF THE ENGINEER AS TO LOCATION AND TYPE OF SPLICE TO BE MADE. ANY MEMBER HAVING A SPLICE NOT SHOWN AND DETAILED ON SHOP DRAWINGS WILL BE REJECTED.
4) ALL WELDING SHALL CONFIRM TO THE AMERICAN WELDING SOCIETY CODE. USE E70 SERIES ELECTRODES FOR ALL STRUCTURAL STEEL WELDS.

FOUNDATION:

1) DRIVE PILES TO A NOMINAL PILE DRIVING RESISTANCE NOT LESS THAN 60 TONS. DETERMINE NOMINAL PILE DRIVING RESISTANCE (Rndr) USING DYNAMIC TESTING WITH SIGNAL MATCHING.
2) THE ESTIMATED PILE LENGTH IS BASED ON STATIC ANALYSIS.
3) THE FACTORED PILE RESISTANCE AVAILABLE TO RESIST ALL FACTORED LOADS IS EQUAL TO 65% OF NOMINAL PILE DRIVING RESISTANCE THAT IS REDUCED BY THE LOSS DUE TO SCOUR. THIS IS FOR INFORMATION ONLY.
4) PILES SHALL BE DRIVEN TO SUCH ACCURACY THAT THE TOP OF PILE TO BE EMBEDDED IN THE CONCRETE SHALL BE WITHIN 2" OF THE ACTUAL LOCATION SHOWN IN THE DRAWING.
5) SHEAR DEVELOPERS SHALL BE WELDED TO THE TOP OF THE PILE AFTER THE INSTALLATION OF THE PILE IS COMPLETED, AS SHOWN IN THE DRAWING, S-4.

GRAPHIC SCALES
4 0 1 2 4 8
(IN FEET)
1/4 inch = 1 ft.

GRAPHIC SCALES
1 0 0.25 0.5 1 2
(IN FEET)
1 inch = 1 ft.

GRAPHIC SCALES
0.5 0 0.25 0.5 1
(IN FEET)
3 inch = 1 ft.

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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN, WAYNE COUNTY, MICHIGAN

the Henry Ford

FOR BIDDING	07-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
75% DESIGN	8-12-14

130825
ECT PROJECT NUMBER

AAB	AAB
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AAB/PFH	JOM
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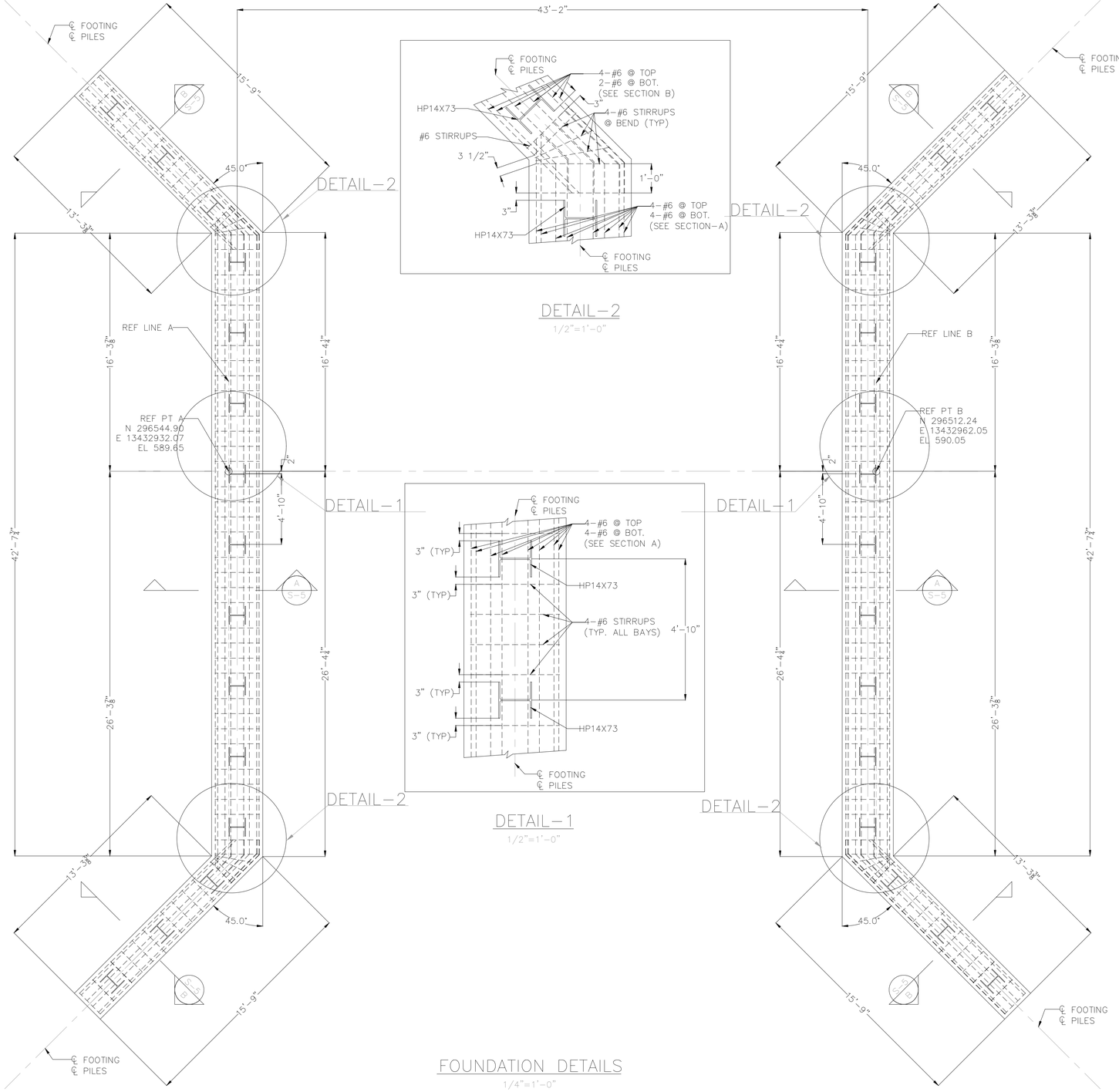
SHEET TITLE

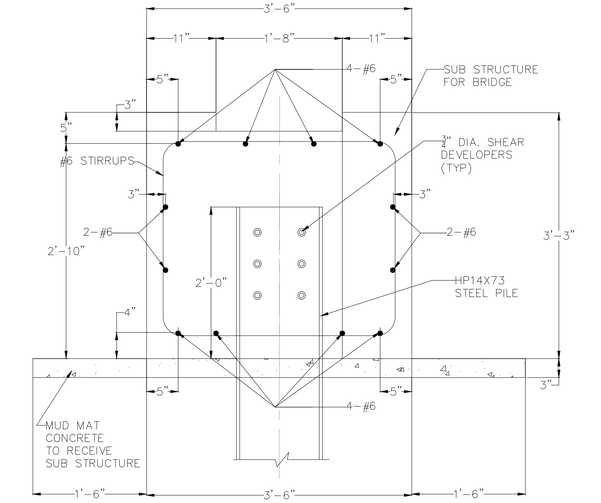
PILE LAYOUT

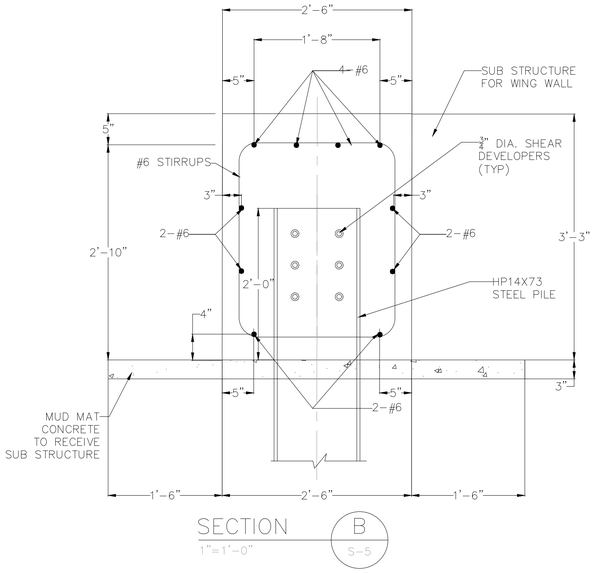
AS SHOWN

NORTH

SHEET NUMBER
S-4







GRAPHIC SCALE
(IN FEET)
1/4 inch = 1 ft.

GRAPHIC SCALE
(IN FEET)
1/2 inch = 1 ft.

GRAPHIC SCALE
(IN FEET)
1 inch = 1 ft.

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SHEET TITLE

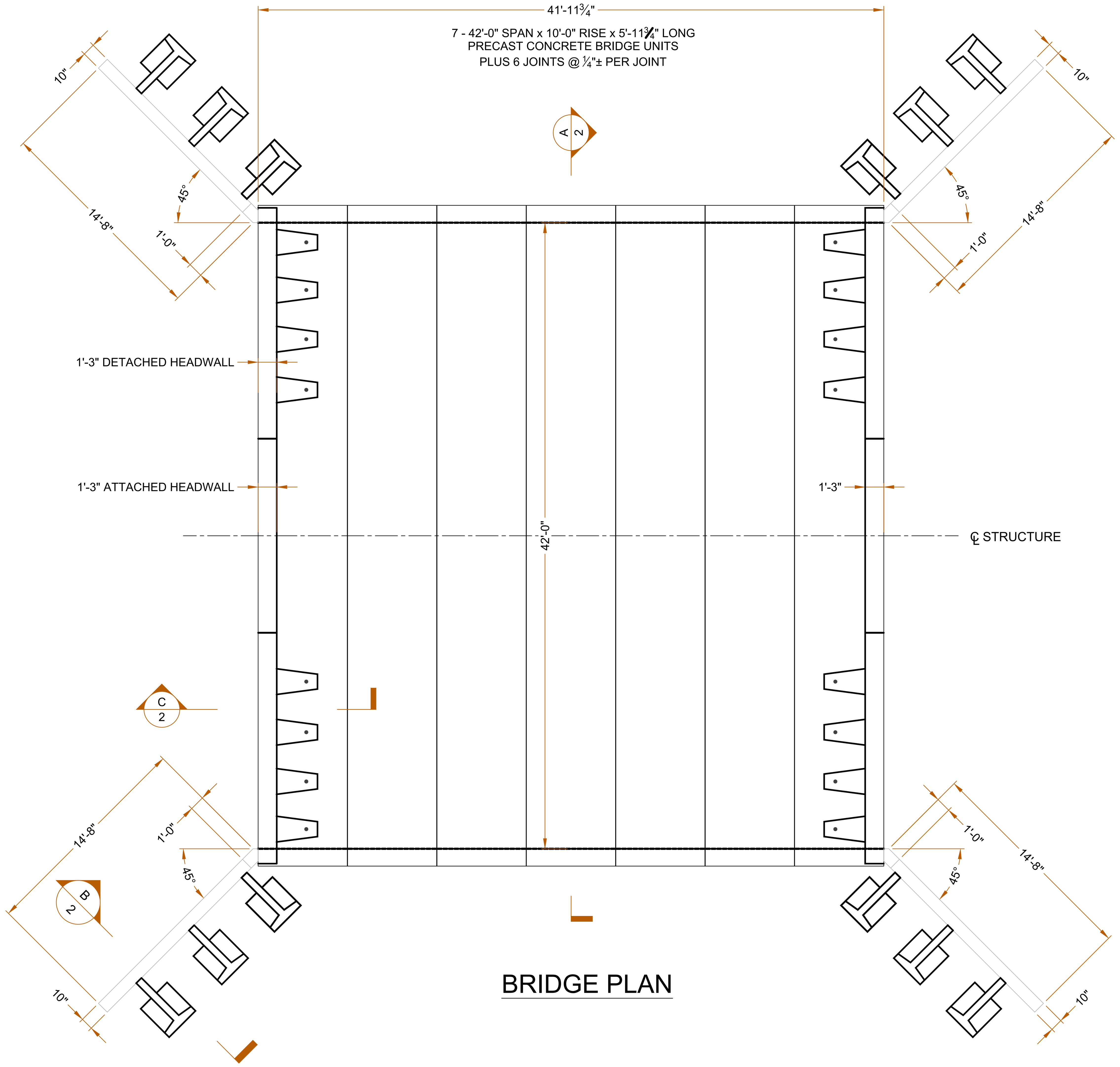
FOUNDATION DETAILS

AS SHOWN

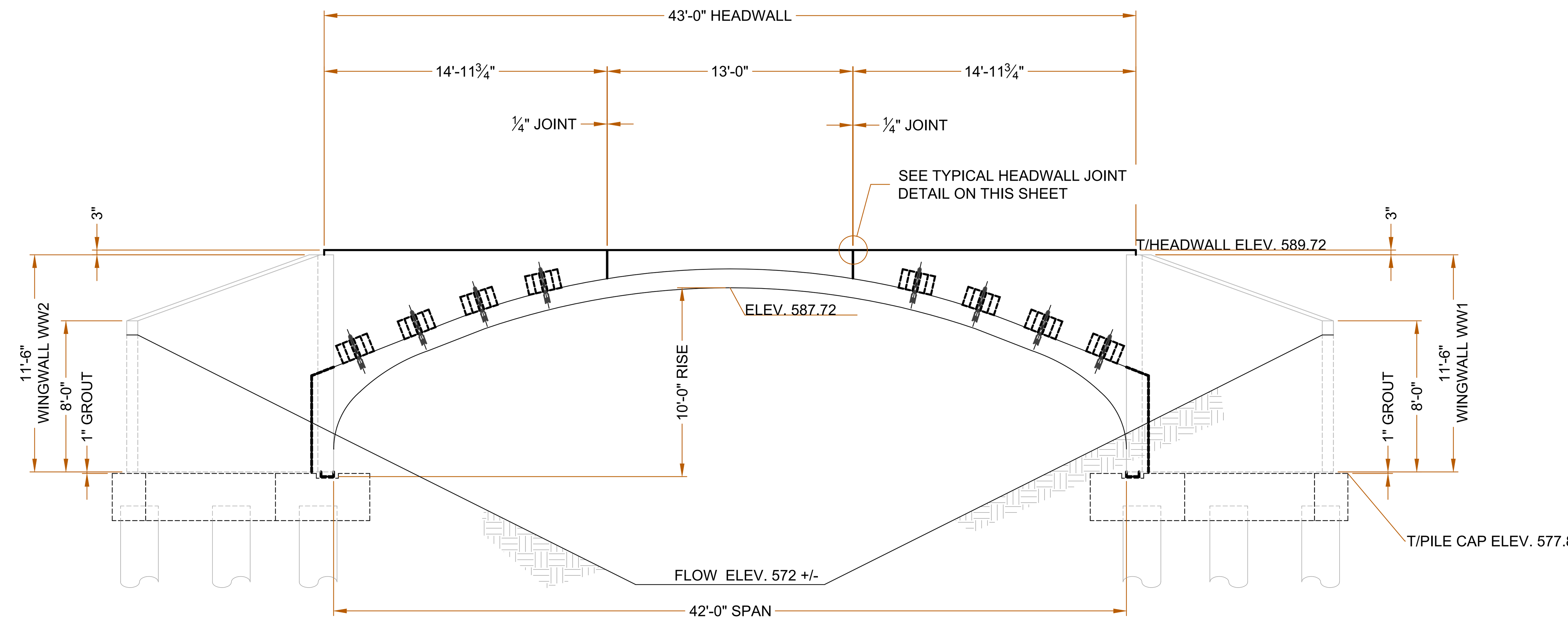
NORTH

SHEET NUMBER

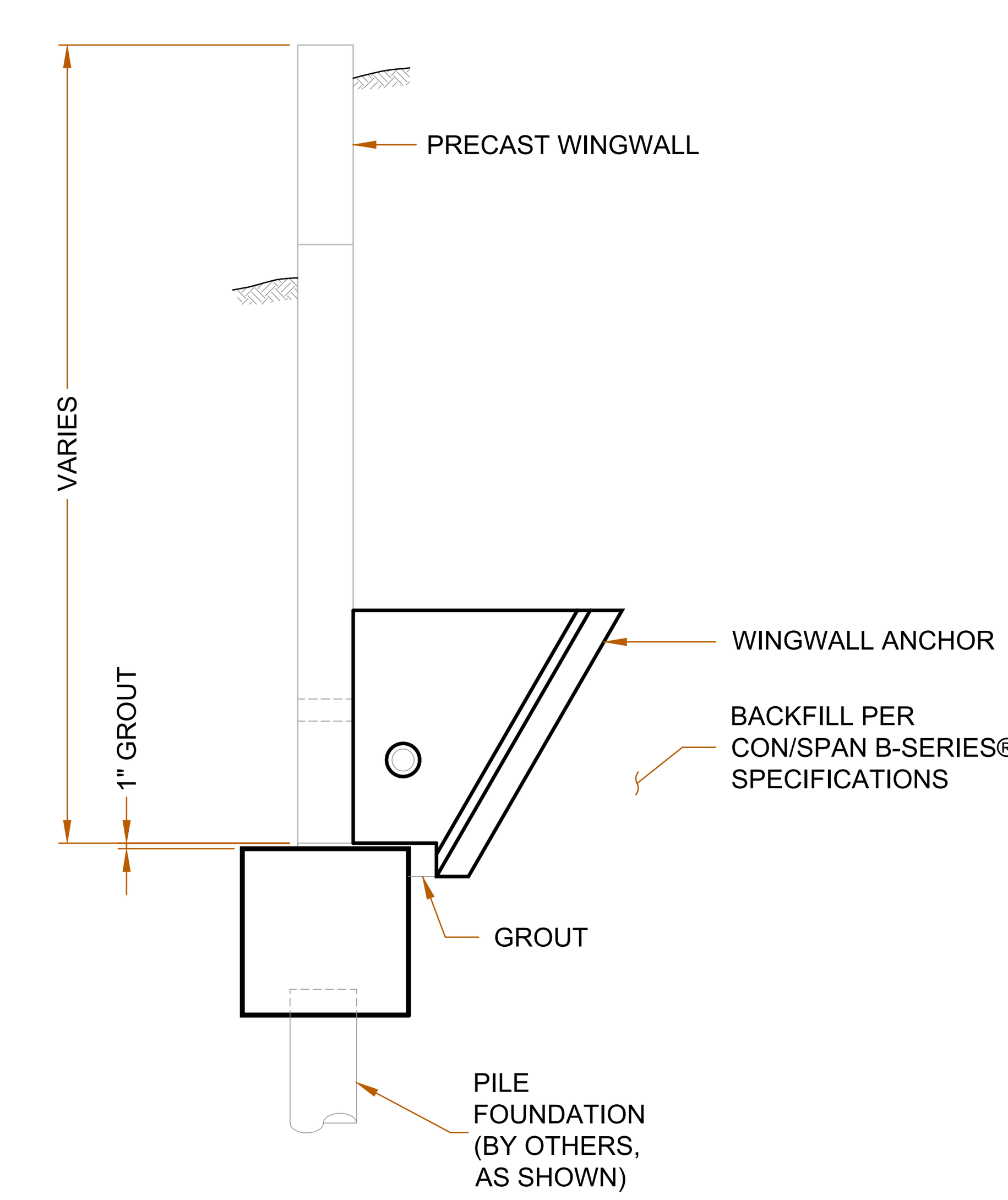
S-5



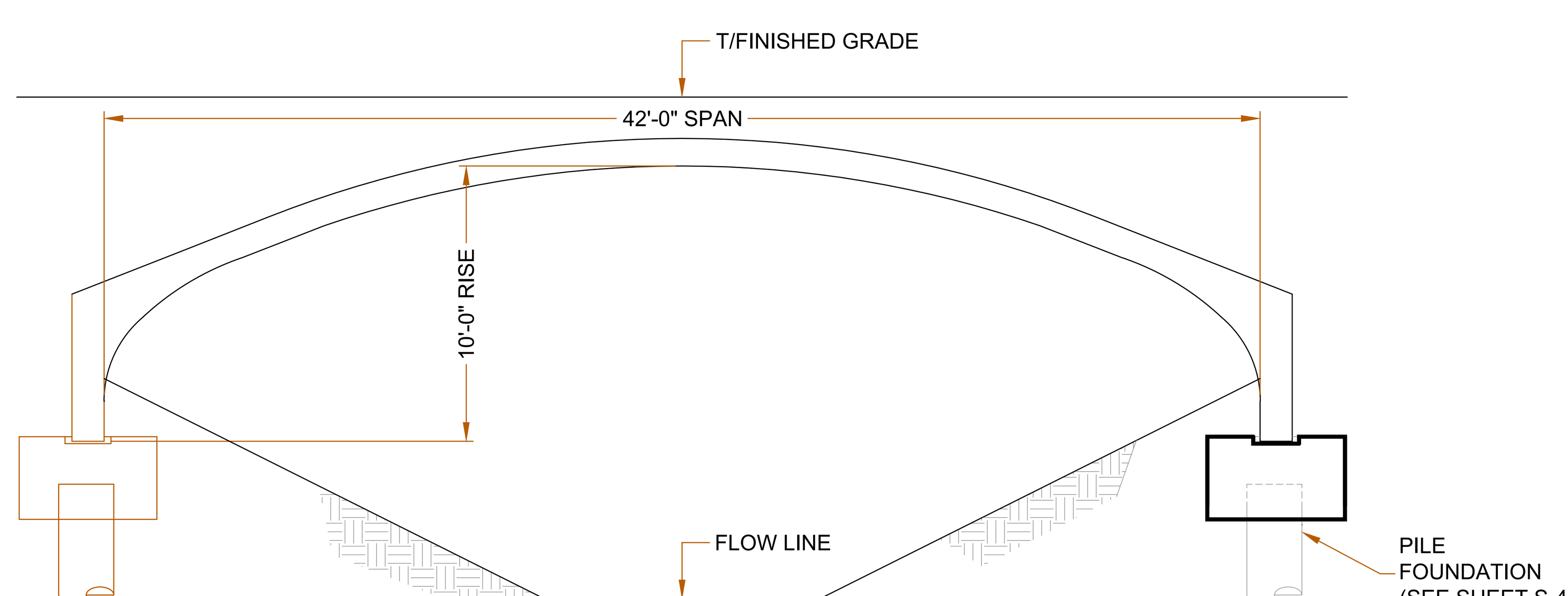
BRIDGE PLAN



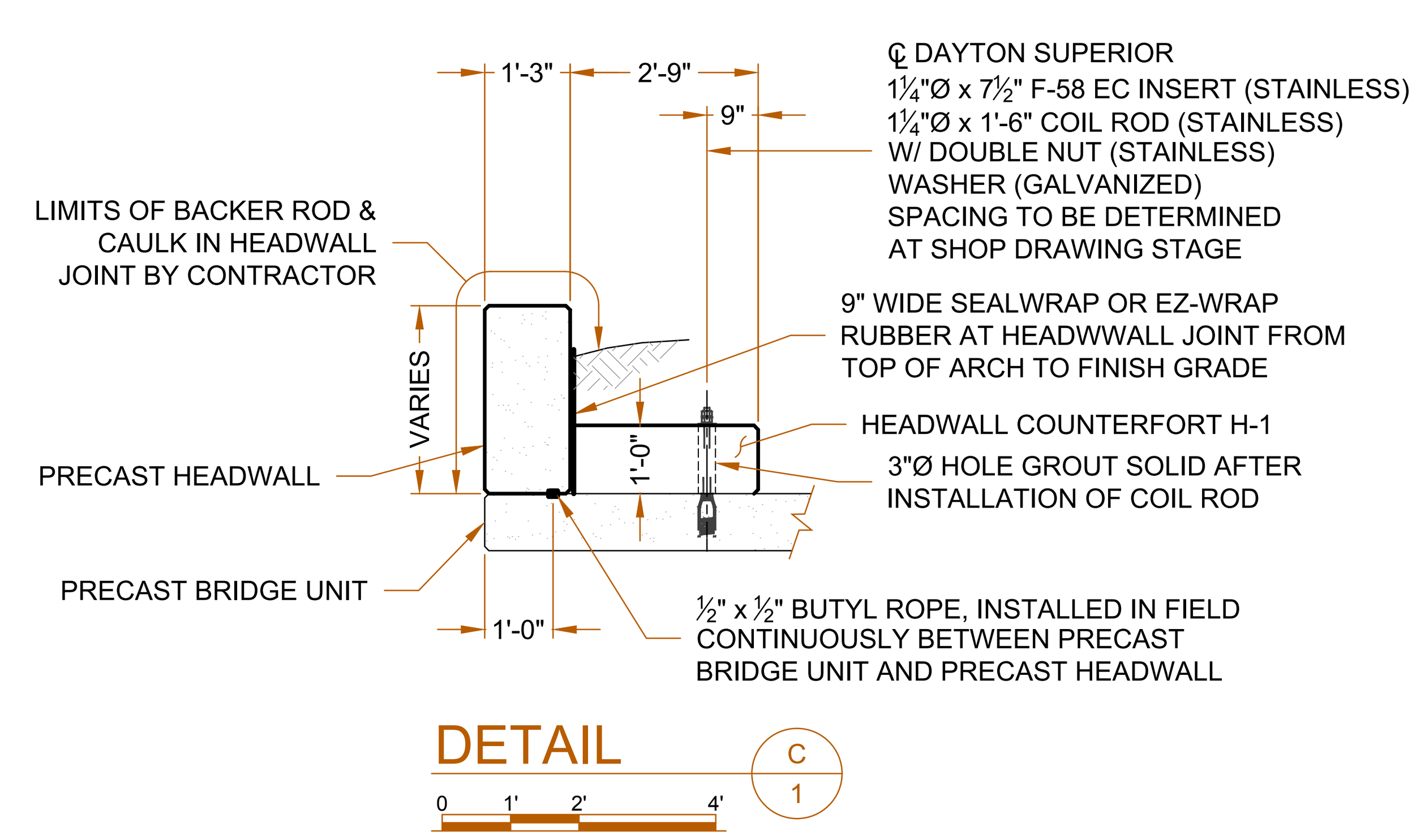
TYPICAL END ELEVATION



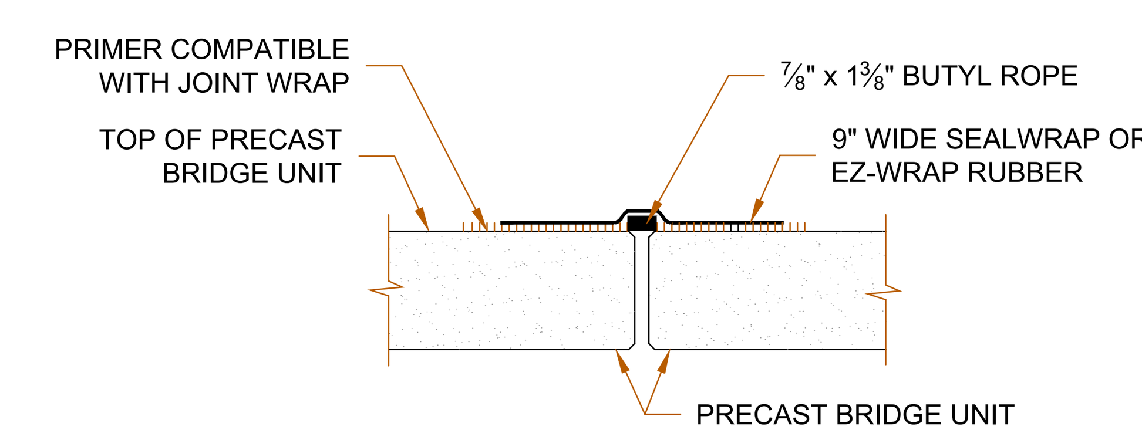
SECTION B/1



SECTION A/1



DETAIL C/1



TYPICAL JOINT SEAL DETAIL

NOT TO SCALE

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PRECAST CONCRETE STRUCTURE DETAILS

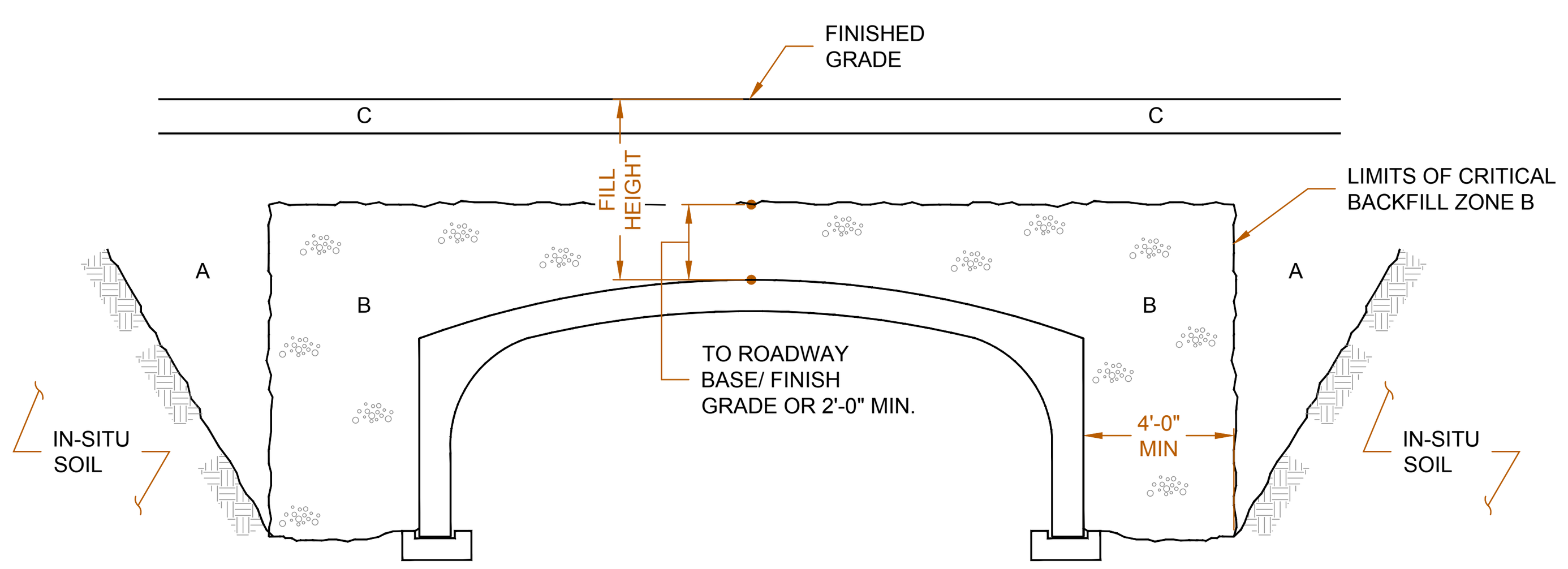
AS SHOWN

NORTH

SHEET NUMBER
S-6

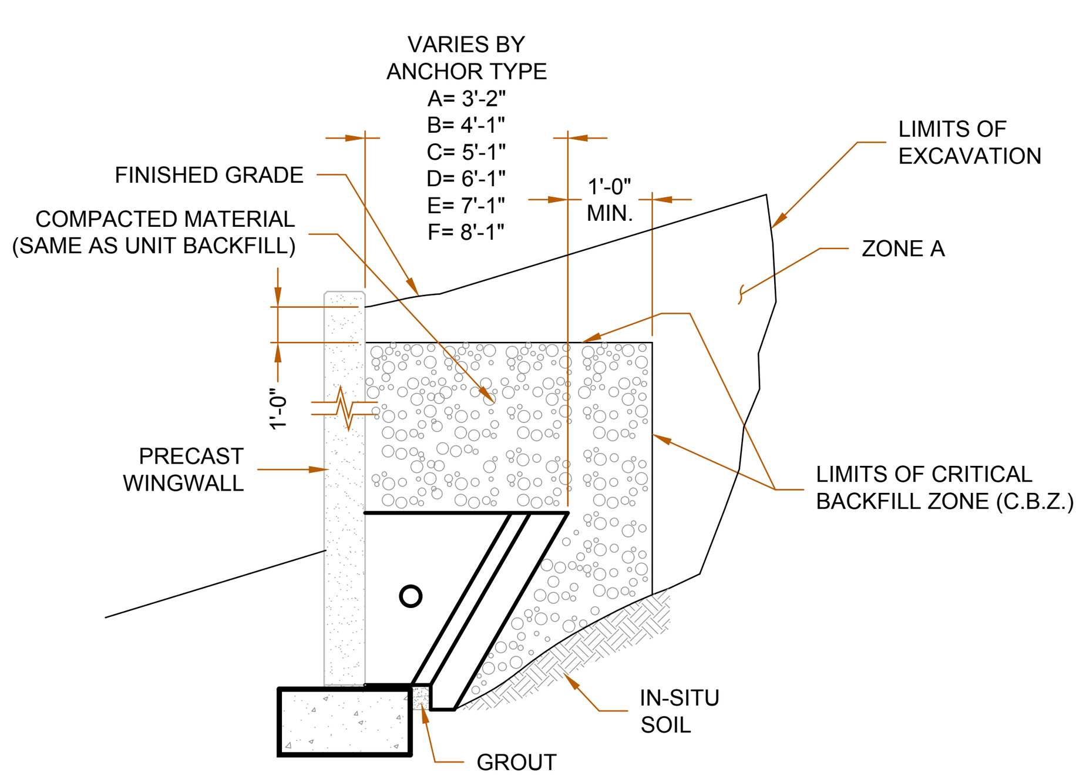
ACCEPTABLE SOILS FOR USE IN ZONE B BACKFILL

TYPICAL USCS MATERIALS	AASHTO GROUP	AASHTO SUBGROUP	PERCENT PASSING US SIEVE NO.			CHARACTER OF FRACTION PASSING NO. 40 SIEVE		SOIL DESRIPTION
			#10	#40	#200	LIQUID LIMIT	PLASTICITY INDEX	
GW, GP, SP	A1	A-1a	50 MAX	30 MAX	15 MAX		6 MAX	LARGELY GRAVEL BUT CAN INCLUDE SAND AND FINES
GM, SW, SP, SM		A-1b		50 MAX	25 MAX		6 MAX	GRAVELLY SAND OR GRADED SAND, MAY INCLUDE FINES
GM, SM, ML, SP, GP	A2	A-2-4			35 MAX	40 MAX	10 MAX	SANDS, GRAVELS WITH LOW-PLASTICITY SILT FINES
SC, GC, GM		A-2-5			35 MAX	41 MIN	10 MAX	SANDS, GRAVELS WITH PLASTIC SILT FINES
SP, SM, SW	A3			51 MIN	10 MAX		NON-PLASTIC	FINE SANDS
ML, SM, SC	A4				36 MIN	40 MAX	10 MAX	LOW-COMPRESSIBILTY SILTS

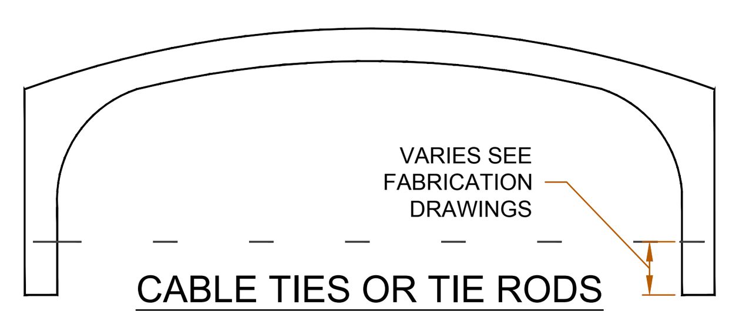


SPAN	FILL HEIGHT	ACCEPTABLE MATERIAL INSIDE ZONE B
≤ 24'-0"	≥ 12'-0"	A1, A3
≤ 24'-0"	< 12'-0"	A1, A2, A3, A4
> 24'-0"	ALL	A1, A3

BACKFILL REQUIREMENTS



WALL BACKFILL REQUIREMENTS



CABLE TIES OR TIE RODS

(> 24'-0" SPAN)

NOTES

PRECAST BRIDGE SYSTEM:

1. PRIOR TO CONSTRUCTION, CONTRACTOR MUST VERIFY ALL ELEVATIONS.
2. THIS ITEM SHALL BE A PRECAST BRIDGE SYSTEM, CON/SPAN® BRIDGE SYSTEM OR APPROVED EQUAL, THAT INCLUDES THE PRECAST REINFORCED CONCRETE ARCH CULVERT UNITS, PRECAST REINFORCED WINGWALLS, AND PRECAST REINFORCED HEADWALLS. PAYMENT SHALL INCLUDE FURNISHING AND INSTALLING A COMPLETE AND FUNCTIONAL STRUCTURE WHICH SHALL INCLUDE ALL LABOR, MATERIALS, EXCAVATION, BACKFILLING AND ALL INCIDENTALS REQUIRED TO COMPLETE THIS ITEM IN A SATISFACTORY AND WORKMANLIKE MANNER, UNLESS SEPARATELY ITEMIZED IN THE PLANS.
3. THE BRIDGE CULVERT STRUCTURES SHALL BE PRECAST CONCRETE ARCH STRUCTURES AS SHOWN IN THE DRAWINGS. THESE ARE BURIED, SOIL-INTERACTION STRUCTURES THAT RELY ON THE SOIL, INCLUDING A CRITICAL BACKFILL ZONE OF MATERIAL, FOR THEIR PERFORMANCE.
4. THE PRECAST CONCRETE ARCH SUPPLIER MUST ATTEND THE PRE-BID MEETING.
5. THE PRECAST CONCRETE ARCH SUPPLIER MUST PROVIDE A FIELD TECHNICAL REPRESENTATIVE THAT IS A REGISTERED PROFESSIONAL ENGINEER ONSITE DURING THE DELIVERY AND INSTALLATION OF THE PRECAST BRIDGE SYSTEM.
6. THE FORMWORK UTILIZED IN THE MANUFACTURE OF THE PRECAST CONCRETE ARCH UNITS MUST BE OWNED AND REGULARLY MAINTAINED BY THE PRECAST ARCH CONCRETE PROVIDER.
7. BECAUSE OF THE NATURE OF THESE SOIL-INTERACTION STRUCTURES, THE PRECAST CONCRETE ARCH PROVIDER MUST PROVIDE ONE OF THE FOLLOWING:
   (a) PROVIDE AT LEAST TWO (2) INDEPENDENTLY VERIFIED FULL SCALE LOAD TEST THAT CONFIRM THE PROPOSED DESIGN METHODOLOGY OF THE THREE SIDED ARCH TOPPED STRUCTURE, OR
   (b) PROVIDE THIRD PARTY DOCUMENTATION VERIFYING ANALYSIS AND DESIGN METHODOLOGY AGREES WITH THE RESULTS OF CURRENT FULL SCALE LOAD TESTS, UNLESS THE FINITE ELEMENT PROGRAM **CANDE** DEVELOPED BY FHWA IS USED.
8. USE OF ANY OTHER PRECAST STRUCTURE WITH THIS DESIGN AND THESE DRAWINGS VOIDS ANY CERTIFICATION OF THIS DESIGN AND WARRANTY. THE ENGINEER ASSUMES NO LIABILITY FOR DESIGN OF ANY ALTERNATE OR SIMILAR TYPE STRUCTURES ASSOCIATED WITH THIS DESIGN. THE CONTRACTOR MAY SUBMIT ALTERNATE DESIGNS FOR THE APPROVAL OF THE ENGINEER AND THE OWNER.
9. THE PRECAST CONCRETE ARCH BRIDGE CULVERTS MUST BE PROVIDED BY A SUPPLIER THAT HAS A MINIMUM TWO (2) REGISTERED PROFESSIONAL ENGINEERS ON STAFF THAT ARE DEDICATED TO THE DESIGN OF THESE TYPES OF STRUCTURES. SUPPLIER MUST PROVIDE THESE NAMES, P.E. LICENSE NUMBERS AND DATES OF HIRE.
10. THE PRECAST CONCRETE ARCH PROVIDER MUST PROVIDE EVIDENCE OF FIVE (5) PRECAST ARCH BRIDGES OF SIMILAR SPAN AND RISE INSTALLED IN THE STATE OF MICHIGAN IN THE LAST THREE YEARS. PROVIDED INFORMATION MUST INCLUDE SPAN, RISE, LENGTH OF STRUCTURE, DESIGN LOADING, AND DATE OF INSTALLATION.

DESIGN DATA

DESIGN LOADING:
BRIDGE UNITS: HS-20
HEADWALLS: EARTH PRESSURE + LIVE LOAD IMPACT
WINGWALLS: EARTH PRESSURE + LIVE LOAD SURCHARGE
DESIGN FILL HEIGHT: 1'-0" MIN TO 1'-6" MAX
FROM TOP OF CROWN TO TOP OF PAVEMENT.

MATERIALS

PRECAST UNITS SHALL BE CONSTRUCTED AND INSTALLED IN ACCORDANCE WITH CON/SPAN® SPECIFICATIONS.

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AAB — CHECKED BY
AAB/PFH — DRAWN BY
JOM — APPROVED BY

SHEET TITLE

PRECAST CONCRETE STRUCTURE DETAILS

AS SHOWN

NORTH

SHEET NUMBER

S-7

GENERAL SPECIFICATIONS FOR MANUFACTURE AND INSTALLATION OF CON/SPAN® BRIDGE SYSTEMS

. DESCRIPTION

1.1. TYPE - THIS WORK SHALL CONSIST OF FURNISHING AND CONSTRUCTING A CON/SPAN® BRIDGE SYSTEM IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN REASONABLY CLOSE CONFORMITY WITH THE LINES, GRADES, DESIGN AND DIMENSIONS SHOWN ON THE PLANS OR AS ESTABLISHED BY THE ENGINEER. IN SITUATIONS WHERE TWO OR MORE SPECIFICATIONS APPLY TO THIS WORK, THE MOST STRINGENT REQUIREMENTS SHALL GOVERN.

1.2. DESIGNATION - PRECAST REINFORCED CONCRETE CON/SPAN® BRIDGE UNITS MANUFACTURED IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE DESIGNATED BY SPAN AND RISE. PRECAST REINFORCED CONCRETE WINGWALLS AND HEADWALLS MANUFACTURED IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE DESIGNATED BY LENGTH, HEIGHT, AND DEFLECTION ANGLE. PRECAST REINFORCED CONCRETE EXPRESS™ FOUNDATION UNITS MANUFACTURED IN ACCORDANCE WITH THIS SPECIFICATION SHALL BE DESIGNATED BY LENGTH, HEIGHT AND WIDTH.

. DESIGN

2.1. SPECIFICATIONS - THE PRECAST ELEMENTS ARE DESIGNED IN ACCORDANCE WITH THE "STANDARD SPECIFICATIONS FOR HIGHWAY BRIDGES" 17TH EDITION, ADOPTED BY THE AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS, 2002. A MINIMUM OF ONE FOOT OF COVER ABOVE THE CROWN OF THE BRIDGE UNITS IS REQUIRED IN THE INSTALLED CONDITION. (UNLESS NOTED OTHERWISE ON THE SHOP DRAWINGS AND DESIGNED ACCORDINGLY.)

. MATERIALS

3.1. CONCRETE - THE CONCRETE FOR THE PRECAST ELEMENTS SHALL BE AIR-ENTRAINED WHEN INSTALLED IN AREAS SUBJECT TO FREEZE-THAW CONDITIONS, COMPOSED OF PORTLAND CEMENT, FINE AND COARSE AGGREGATES, ADMIXTURES AND WATER. AIR-ENTRAINED CONCRETE SHALL CONTAIN 6 ± 2 PERCENT AIR. THE AIR- ENTRAINING ADMIXTURE SHALL CONFORM TO AASHT0 M154. THE MINIMUM CONCRETE COMPRESSIVE STRENGTH SHALL BE AS SHOWN ON THE SHOP DRAWINGS.

3.1.1. PORTLAND CEMENT - SHALL CONFORM TO THE REQUIREMENTS OF ASTM SPECIFICATIONS C150-TYPE I, TYPE II, OR TYPE III CEMENT.

3.1.2. COARSE AGGREGATE - SHALL CONSIST OF STONE HAVING A MAXIMUM SIZE OF 1 INCH. AGGREGATE SHALL MEET REQUIREMENTS FOR ASTM C33.

3.1.3. WATER REDUCING ADMIXTURE - THE MANUFACTURER MAY SUBMIT, FOR APPROVAL BY THE ENGINEER, A WATER-REDUCING ADMIXTURE FOR THE PURPOSE OF INCREASING WORKABILITY AND REDUCING THE WATER REQUIREMENT FOR THE CONCRETE.

3.1.4. CALCIUM CHLORIDE - THE ADDITION TO THE MIX OF CALCIUM CHLORIDE OR ADMIXTURES CONTAINING CALCIUM CHLORIDE WILL NOT BE PERMITTED.

3.1.5. MIXTURE - THE AGGREGATES, CEMENT AND WATER SHALL BE PROPORTIONED AND MIXED IN A BATCH MIXER TO PRODUCE A HOMOGENEOUS CONCRETE MEETING THE STRENGTH REQUIREMENTS OF THIS SPECIFICATION. THE PROPORTION OF PORTLAND CEMENT IN THE MIXTURE SHALL NOT BE LESS THAN 564 POUNDS (6 SACKS) PER CUBIC YARD OF CONCRETE.

3.2. STEEL REINFORCEMENT

3.2.1. THE MINIMUM STEEL YIELD STRENGTH SHALL BE 60,000 PSI, UNLESS OTHERWISE NOTED ON THE SHOP DRAWINGS.

3.2.2. ALL REINFORCING STEEL FOR THE PRECAST ELEMENTS SHALL BE FABRICATED AND PLACED IN ACCORDANCE WITH THE DETAILED SHOP DRAWINGS SUBMITTED BY THE MANUFACTURER.

3.2.3. REINFORCEMENT SHALL CONSIST OF WELDED WIRE FABRIC CONFORMING TO ASTM SPECIFICATION A 185 OR A 497, OR DEFORMED BILLET STEEL BARS CONFORMING TO ASTM SPECIFICATION A 615, GRADE 60. LONGITUDINAL DISTRIBUTION REINFORCEMENT MAY CONSIST OF WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS.

3.3. STEEL HARDWARE

3.3.1. BOLTS AND THREADED RODS FOR WINGWALL CONNECTIONS SHALL CONFORM TO ASTM A 307. NUTS SHALL CONFORM TO AASHTO M292 (ASTM A194) GRADE 2H. ALL BOLTS, THREADED RODS AND NUTS USED IN WINGWALL CONNECTIONS SHALL BE MECHANICALLY ZINC COATED IN ACCORDANCE WITH ASTM B695 CLASS 50.

3.3.2. STRUCTURAL STEEL FOR WINGWALL CONNECTION PLATES AND PLATE WASHERS SHALL CONFORM TO AASHTO M 270 (ASTM A 709) GRADE 36 AND SHALL BE HOT DIP GALVANIZED AS PER AASHTO M111 (ASTM A123).

3.3.3. INSERTS FOR WINGWALLS SHALL BE 1" DIAMETER TWO-BOLT PRESET WINGWALL ANCHORS AS MANUFACTURED BY DAYTON SUPERIOR CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700 AND SHALL BE MECHANICALLY ZINC COATED IN ACCORDANCE WITH ASTM B695 CLASS 50.

3.3.4. FERRULE LOOP INSERTS SHALL BE F-64 FERRULE LOOP INSERTS AS MANUFACTURED BY DAYTON SUPERIOR CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700.

3.3.5. HOOK BOLTS USED IN ATTACHED HEADWALL CONNECTIONS SHALL BE ASTM A307.

3.3.6. INSERTS FOR DETACHED HEADWALL CONNECTIONS SHALL BE AISI TYPE 304 STAINLESS STEEL, EXPANDED COIL INSERTS AS MANUFACTURED BY DAYTON SUPERIOR CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700. COIL RODS AND NUTS USED IN HEADWALL CONNECTIONS SHALL BE AISI TYPE 304 STAINLESS STEEL. WASHERS USED IN HEADWALL CONNECTIONS SHALL BE EITHER AISI TYPE 304 STAINLESS STEEL PLATE WASHERS OR AASHTO M270 (ASTM A709) GRADE 36 PLATE WASHERS HOT DIP GALVANIZED AS PER AASHTO M111 (ASTM A123).

3.3.7. MECHANICAL SPLICES OF REINFORCING BARS SHALL BE MADE USING THE DOWEL BAR SPLICER SYSTEM AS MANUFACTURED BY DAYTON SUPERIOR CONCRETE ACCESSORIES, MIAMISBURG, OHIO, (800) 745-3700, AND SHALL CONSIST OF THE DOWEL BAR SPLICER (DB-SAE) AND DOWEL-IN (DI).

MANUFACTURE OF PRECAST ELEMENTS - SUBJECT TO THE PROVISIONS OF SECTION 5, BELOW, THE PRECAST ELEMENT DIMENSION AND REINFORCEMENT DETAILS SHALL BE AS PRESCRIBED IN THE PLAN AND SHOP DRAWINGS PROVIDED BY THE MANUFACTURER.

4.1. FORMS - THE FORMS USED IN MANUFACTURE SHALL BE SUFFICIENTLY RIGID AND ACCURATE TO MAINTAIN THE REQUIRED PRECAST ELEMENT DIMENSIONS WITHIN THE PERMISSIBLE VARIATIONS GIVEN IN SECTION 5 OF THESE SPECIFICATIONS. ALL CASTING SURFACES SHALL BE OF A SMOOTH MATERIAL.

4.2. PLACEMENT OF REINFORCEMENT

4.2.1. PLACEMENT OF REINFORCEMENT IN PRECAST BRIDGE UNITS - THE COVER OF CONCRETE OVER THE OUTSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 2" MINIMUM. THE COVER OF CONCRETE OVER THE INSIDE CIRCUMFERENTIAL REINFORCEMENT SHALL BE 1½" MINIMUM, UNLESS OTHERWISE NOTED ON THE SHOP DRAWINGS. THE CLEAR DISTANCE OF THE END CIRCUMFERENTIAL WIRES SHALL NOT BE LESS THAN 1" NOR MORE THAN 2" FROM THE ENDS OF EACH SECTION. REINFORCEMENT SHALL BE ASSEMBLED UTILIZING SINGLE OR MULTIPLE LAYERS OF WELDED WIRE FABRIC (NOT TO EXCEED 3 LAYERS), SUPPLEMENTED WITH A SINGLE LAYER OF DEFORMED BILLET-STEEL BARS, WHEN NECESSARY. WELDED WIRE FABRIC SHALL BE COMPOSED OF CIRCUMFERENTIAL AND LONGITUDINAL WIRES MEETING THE SPACING REQUIREMENTS OF 4.3, BELOW, AND SHALL CONTAIN SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE BRIDGE UNIT TO MAINTAIN THE SHAPE AND POSITION OF THE REINFORCEMENT. LONGITUDINAL DISTRIBUTION REINFORCEMENT MAY BE WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS AND SHALL MEET THE SPACING REQUIREMENTS OF 4.3, BELOW. THE ENDS OF THE LONGITUDINAL DISTRIBUTION REINFORCEMENT SHALL BE NOT MORE THAN 3" AND NOT LESS THAN 1½" FROM THE ENDS OF THE BRIDGE UNIT.

4.2.2. BENDING OF REINFORCEMENT FOR PRECAST BRIDGE UNITS - THE OUTSIDE AND INSIDE CIRCUMFERENTIAL REINFORCING STEEL FOR THE CORNERS OF THE BRIDGE SHALL BE BENT TO SUCH AN ANGLE THAT IS APPROXIMATELY EQUAL TO THE CONFIGURATION OF THE BRIDGE'S OUTSIDE CORNER.

4.2.3. PLACEMENT OF REINFORCEMENT FOR PRECAST WINGWALLS AND HEADWALLS - THE COVER OF CONCRETE OVER THE LONGITUDINAL AND TRANSVERSE REINFORCEMENT SHALL BE 2" MINIMUM. THE CLEAR DISTANCE FROM THE END OF EACH PRECAST ELEMENT TO THE END OF REINFORCING STEEL SHALL NOT BE LESS THAN 1½" NOR MORE THAN 3". REINFORCEMENT SHALL BE ASSEMBLED UTILIZING A SINGLE LAYER OF WELDED WIRE FABRIC, OR A SINGLE LAYER OF DEFORMED BILLET-STEEL BARS. WELDED WIRE FABRIC SHALL BE COMPOSED OF TRANSVERSE AND LONGITUDINAL WIRES MEETING THE SPACING REQUIREMENTS OF 4.3, BELOW, AND SHALL CONTAIN SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE ELEMENT TO MAINTAIN THE SHAPE AND POSITION OF THE REINFORCEMENT. LONGITUDINAL REINFORCEMENT MAY BE WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS AND SHALL MEET THE SPACING REQUIREMENTS OF 4.3, BELOW.

4.2.4. PLACEMENT OF REINFORCMENT FOR PRECAST FOUNDATION UNITS - THE COVER OF CONCRETE OVER THE BOTTOM REINFORCEMENT SHALL BE 3 INCHES MINIMUM. THE COVER OF CONCRETE FOR ALL OTHER REINFORCEMENT SHALL BE 2 INCHES MINIMUM. THE CLEAR DISTANCE FROM THE END OF EACH PRECAST ELEMENT TO THE END OF REINFORCING STEEL SHALL NOT BE LESS THAN 2 INCHES NOR MORE THAN 3 INCHES. REINFORCEMENT SHALL BE ASSEMBLED UTILIZING A SINGLE LAYER OF WELDED WIRE FABRIC OR A SINGLE LAYER OF DEFOREMED BILLET-STEEL BARS. WELDED WIRE FABRIC SHALL BE COMPOSED OF TRANSVERSE AND LONGITUDINAL WIRES MEETING THE SPACING REQUIREMENTS OF 4.3, BELOW, AND SHALL CONTAIN SUFFICIENT LONGITUDINAL WIRES EXTENDING THROUGH THE ELEMENT TO MAINTAIN THE SHAPE AND POSITION OF THE REINFORCEMENT. LONGITUDINAL REINFORCEMENT MAY BE WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS AND SHALL MEET THE SPACING REQUIREMENTS OF 4.3, BELOW.

4.3. LAPS, WELDS, SPACING

4.3.1. LAPS, WELDS, AND SPACING FOR PRECAST BRIDGE UNITS - TENSION SPLICES IN THE CIRCUMFERENTIAL REINFORCEMENT SHALL BE MADE BY LAPPING. LAPS MAY BE TACK WELDED TOGETHER FOR ASSEMBLY PURPOSES. FOR SMOOTH WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 5.11.2.5.2 AND 5.11.6.2. FOR DEFORMED WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 5.11.2.5.1 AND 5.11.6.1. THE OVERLAP OF WELDED WIRE FABRIC SHALL BE MEASURED BETWEEN THE OUTER-MOST LONGITUDINAL WIRES OF EACH FABRIC SHEET. FOR DEFORMED BILLET-STEEL BARS, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 5.11.2.1 FOR SPLICES OTHER THAN TENSION SPLICES, THE OVERLAP SHALL BE A MINIMUM OF 1'-0" FOR WELDED WIRE FABRIC OR DEFORMED BILLET-STEEL BARS. THE SPACING CENTER TO CENTER OF THE CIRCUMFERENTIAL WIRES IN A WIRE FABRIC SHEET SHALL BE NOT LESS THAN 2" NOR MORE THAN 4". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL WIRES SHALL NOT BE MORE THAN 8". THE SPACING CENTER TO CENTER OF THE LONGITUDINAL DISTRIBUTION STEEL FOR EITHER LINE OF REINFORCING IN THE TOP SLAB SHALL BE NOT MORE THAN 1'-4".

4.3.2. LAPS, WELDS, AND SPACING FOR PRECAST WINGWALLS, HEADWALLS AND FOUNDATIONS - SPLICES IN THE REINFORCEMENT SHALL BE MADE BY LAPPING. LAPS MAY BE TACK WELDED TOGETHER FOR ASSEMBLY PURPOSES. FOR SMOOTH WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 5.11.2.5.2 AND 5.11.6.2. FOR DEFORMED WELDED WIRE FABRIC, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 5.11.2.5.1 AND 5.11.6.1. FOR DEFORMED BILLET-STEEL BARS, THE OVERLAP SHALL MEET THE REQUIREMENTS OF AASHTO 5.11.2.1. THE SPACING CENTER-TO-CENTER OF THE WIRES IN A WIRE FABRIC SHEET SHALL BE NOT LESS THAN 2" NOR MORE THAN 8".

4.4. CURING - THE PRECAST CONCRETE ELEMENTS SHALL BE CURED FOR A SUFFICIENT LENGTH OF TIME SO THAT THE CONCRETE WILL DEVELOP THE SPECIFIED COMPRESSIVE STRENGTH IN 28 DAYS OR LESS. ANY ONE OF THE FOLLOWING METHODS OF CURING OR COMBINATIONS THERE OF SHALL BE USED:

4.4.1. STEAM CURING - THE PRECAST ELEMENTS MAY BE LOW-PRESSURE STEAM CURED BY A SYSTEM THAT WILL MAINTAIN A MOIST ATMOSPHERE.

4.4.2. WATER CURING - THE PRECAST ELEMENTS MAY BE WATER CURED BY ANY METHOD THAT WILL KEEP THE SECTIONS MOIST.

4.4.3. MEMBRANE CURING - A SEALING MEMBRANE CONFORMING TO THE REQUIREMENTS OF ASTM SPECIFICATION C309 MAY BE APPLIED AND SHALL BE LEFT INTACT UNTIL THE REQUIRED CONCRETE COMPRESSIVE STRENGTH IS ATTAINED. THE CONCRETE TEMPERATURE AT THE TIME OF APPLICATION SHALL BE WITHIN +/- 10 DEGREES F OF THE ATMOSPHERIC TEMPERATURE. ALL SURFACES SHALL BE KEPT MOIST PRIOR TO THE APPLICATION OF THE COMPOUNDS AND SHALL BE DAMP WHEN THE COMPOUND IS APPLIED.

4.5. STORAGE, HANDLING & DELIVERY

4.5.1. STORAGE - PRECAST CONCRETE BRIDGE ELEMENTS SHALL BE LIFTED AND STORED IN “AS-CAST” POSITION. PRECAST CONCRETE HEADWALL AND WINGWALL UNITS ARE CAST, STORED AND SHIPPED IN A FLAT POSITION. THE PRECAST ELEMENTS SHALL BE STORED IN SUCH A MANNER TO PREVENT CRACKING OR DAMAGE. STORE ELEMENTS USING TIMBER SUPPORTS AS APPROPRIATE. THE UNITS SHALL NOT BE MOVED UNTIL THE CONCRETE COMPRESSIVE STRENGTH HAS REACHED A MINIMUM OF 2500 PSI, AND THEY SHALL NOT BE STORED IN AN UPRIGHT POSITION.

4.5.2. HANDLING - HANDLING DEVICES SHALL BE PERMITTED IN EACH PRECAST ELEMENT FOR THE PURPOSE OF HANDLING AND SETTING. SPREADER BEAMS MAY BE REQUIRED FOR THE LIFTING OF PRECAST CONCRETE BRIDGE ELEMENTS TO PRECLUDE DAMAGE FROM BENDING OR TORSION FORCES.

4.5.3. DELIVERY - PRECAST CONCRETE ELEMENTS MUST NOT BE SHIPPED UNTIL THE CONCRETE HAS ATTAINED THE SPECIFIED DESIGN COMPRESSIVE STRENGTH, OR AS DIRECTED BY THE DESIGN ENGINEER. PRECAST CONCRETE ELEMENTS MAY BE UNLOADED AND PLACED ON THE GROUND AT THE SITE UNTIL INSTALLED. STORE ELEMENTS USING TIMBER SUPPORTS AS APPROPRIATE.

4.6. QUALITY ASSURANCE - THE PRECASTER SHALL DEMONSTRATE ADHERENCE TO THE STANDARDS SET FORTH IN THE NPCA QUALITY CONTROL MANUAL. THE PRECASTER SHALL MEET EITHER SECTION 4.6.1 OR 4.6.2

4.6.1. CERTIFICATION - THE PRECASTER SHALL BE CERTIFIED BY THE PRECAST/PRESTRESSED CONCRETE INSTITUTE PLANT CERTIFICATION PROGRAM OR THE NATIONAL PRECAST CONCRETE ASSOCIATION'S PLANT CERTIFICATION PROGRAM PRIOR TO AND DURING PRODUCTION OF THE PRODUCTS COVERED BY THIS SPECIFICATION.

4.6.2. QUALIFICATIONS, TESTING AND INSPECTION

4.6.2.1. THE PRECASTER SHALL HAVE BEEN IN THE BUSINESS OF PRODUCING PRECAST CONCRETE PRODUCTS SIMILAR TO THOSE SPECIFIED FOR A MINIMUM OF THREE YEARS. HE SHALL MAINTAIN A PERMANENT QUALITY CONTROL DEPARTMENT OR RETAIN AN INDEPENDENT TESTING AGENCY ON A CONTINUING BASIS. THE AGENCY SHALL ISSUE A REPORT, CERTIFIED BY A LICENSED ENGINEER, DETAILING THE ABILITY OF THE PRECASTER TO PRODUCE QUALITY PRODUCTS CONSISTENT WITH INDUSTRY STANDARDS.

4.6.2.2. THE PRECASTER SHALL SHOW THAT THE FOLLOWING TESTS ARE PERFORMED IN ACCORDANCE WITH THE ASTM STANDARDS INDICATED. TESTS SHALL BE PERFORMED AS SPECIFICATIONS.

4.6.2.2.1. AIR CONTENT: C231 OR C173

4.6.2.2.2. COMPRESSIVE STRENGTH: C31,C39,C497

4.6.2.3. THE PRECASTER SHALL PROVIDE DOCUMENTATION DEMONSTRATING COMPLIANCE WITH THIS SECTION TO CONTECH® ENGINEERED SOLUTIONS AT REGULAR INTERVALS OR UPON REQUEST.

4.6.2.4. THE OWNER MAY PLACE AN INSPECTOR IN THE PLANT WHEN THE PRODUCTS COVERED BY THIS SPECIFICATION ARE BEING MANUFACTURED.

4.6.3. DOCUMENTATION - THE PRECASTER SHALL SUBMIT PRECAST PRODUCTION REPORTS TO CONTECH® ENGINEERED SOLUTIONS AS REQUIRED.

5. PERMISSIBLE VARIATIONS

5.1. BRIDGE UNITS

5.1.1. INTERNAL DIMENSIONS - THE INTERNAL DIMENSION SHALL VARY NOT MORE THAN 1% FROM THE DESIGN DIMENSIONS NOR MORE THAN 1½" WHICHEVER IS LESS.

5.1.2. SLAB AND WALL THICKNESS - THE SLAB AND WALL THICKNESS SHALL NOT BE LESS THAN THAT SHOWN IN THE DESIGN BY MORE THAN ¼". A THICKNESS MORE THAN THAT REQUIRED IN THE DESIGN SHALL NOT BE CAUSE FOR REJECTION.

5.1.3. LENGTH OF OPPOSITE SURFACES - VARIATIONS IN LAYING LENGTHS OF TWO OPPOSITE SURFACES OF THE BRIDGE UNIT SHALL NOT BE MORE THAN ½" IN ANY SECTION, EXCEPT WHERE BEVELED ENDS FOR LAYING OF CURVES ARE SPECIFIED BY THE PURCHASER.

5.1.4. LENGTH OF SECTION - THE UNDERRUN IN LENGTH OF A SECTION SHALL NOT BE MORE THAN ½" IN ANY BRIDGE UNIT.

5.1.5. POSITION OF REINFORCEMENT - THE MAXIMUM VARIATION IN POSITION OF THE REINFORCEMENT SHALL BE ±½". IN NO CASE SHALL THE COVER OVER THE REINFORCEMENT BE LESS THAN 1½" FOR THE OUTSIDE CIRCUMFERENTIAL STEEL OR BE LESS THAN 1" FOR THE INSIDE CIRCUMFERENTIAL STEEL AS MEASURED TO THE EXTERNAL OR INTERNAL SURFACE OF THE BRIDGE. THESE TOLERANCES OR COVER REQUIREMENTS DO NOT APPLY TO MATING SURFACES OF THE JOINTS.

5.1.6. AREA OF REINFORCEMENT - THE AREAS OF STEEL REINFORCEMENT SHALL BE THE DESIGN STEEL AREAS AS SHOWN IN THE MANUFACTURER'S SHOP DRAWINGS. STEEL AREAS GREATER THAN THOSE REQUIRED SHALL NOT BE CAUSE FOR REJECTION. THE PERMISSIBLE VARIATION IN DIAMETER OF ANY REINFORCEMENT SHALL CONFORM TO THE TOLERANCES PRESCRIBED IN THE ASTM SPECIFICATION FOR THAT TYPE OF REINFORCEMENT.

5.2. WINGWALLS & HEADWALLS

5.2.1. WALL THICKNESS - THE WALL THICKNESS SHALL NOT VARY FROM THAT SHOWN IN THE DESIGN BY MORE THAN ½".

5.2.2. LENGTH/HEIGHT OF WALL SECTIONS - THE LENGTH AND HEIGHT OF THE WALL SHALL NOT VARY FROM THAT SHOWN IN THE DESIGN BY MORE THAN ½".

5.2.3. POSITION OF REINFORCEMENT - THE MAXIMUM VARIATION IN THE POSITION OF THE REINFORCEMENT SHALL BE ±½". IN NO CASE SHALL THE COVER OVER THE REINFORCEMENT BE LESS THAN 1½".

5.2.4. SIZE OF REINFORCEMENT - THE PERMISSIBLE VARIATION IN DIAMETER OF ANY REINFORCING SHALL CONFORM TO THE TOLERANCES PRESCRIBED IN THE ASTM SPECIFICATION FOR THAT TYPE OF REINFORCING. STEEL AREA GREATER THAN THAT REQUIRED SHALL NOT BE CAUSE FOR REJECTION.

5.3. FOUNDATION UNITS

5.3.1. WALL THICKNESS - THE WALL THICKNESS SHALL NOT VARY FROM THAT SHOWN IN THE DESIGN BY MORE THAN ½".

5.3.2. LENGTH/ HEIGHT/WIDTH OF FOUNDATION SECTIONS - THE LENGTH, HEIGHT AND WIDTH OF THE FOUNDATION UNITS SHALL NOT VARY FROM THAT SHOWN IN THE DESIGN BY MORE THAN ½".

5.3.3. POSITION OF REINFORCEMENT - THE MAXIMUM VARIATION IN THE POSITION OF THE REINFORCEMENT SHALL BE ±½". IN NO CASE SHALL THE COVER OVER THE REINFORCEMENT BE LESS THAN 1½".

5.3.4. SIZE OF REINFORCEMENT - THE PERMISSIBLE VARIATION IN DIAMETER OF ANY REINFORCING SHALL CONFORM TO THE TOLERANCES PRESCRIBED IN THE ASTM SPECIFICATION FOR THAT TYPE OF REINFORCING. STEEL AREA GREATER THAN THAT REQUIRED SHALL NOT BE CAUSE FOR REJECTION.

6. TESTING/ INSPECTION

6.1. TESTING

6.1.1. TYPE OF TEST SPECIMEN - CONCRETE COMPRESSIVE STRENGTH SHALL BE DETERMINED FROM COMPRESSION TESTS MADE ON CYLINDERS OR CORES. FOR CYLINDER TESTING, A MINIMUM OF 4 CYLINDERS SHALL BE TAKEN FOR EACH BRIDGE ELEMENT. EACH ELEMENT SHALL BE CONSIDERED SEPARATELY FOR THE PURPOSE OF TESTING AND ACCEPTANCE.

6.1.2. COMPRESSION TESTING - CYLINDERS SHALL BE MADE AND TESTED AS PRESCRIBED BY THE ASTM C39 SPECIFICATION. CYLINDERS SHALL BE CURED IN THE SAME ENVIRONMENT AS THE BRIDGE ELEMENTS. CORES SHALL BE OBTAINED AND TESTED FOR COMPRESSIVE STRENGTH IN ACCORDANCE WITH THE PROVISIONS OF THE ASTM C42 SPECIFICATION.

6.1.3. ACCEPTABILITY OF CYLINDER TESTS - WHEN THE AVERAGE COMPRESSIVE STRENGTH OF ALL CYLINDERS TESTED IS EQUAL TO OR GREATER THAN THE DESIGN COMPRESSIVE STRENGTH, AND NOT MORE THAN 10% OF THE CYLINDERS TESTED HAVE A COMPRESSIVE STRENGTH LESS THAN THE DESIGN CONCRETE STRENGTH, AND NO CYLINDER TESTED HAS A COMPRESSIVE STRENGTH LESS THAN 80% OF THE DESIGN COMPRESSIVE STRENGTH, THEN THE ELEMENT SHALL BE ACCEPTED. WHEN THE COMPRESSIVE STRENGTH OF THE CYLINDERS TESTED DOES NOT CONFORM TO THESE ACCEPTANCE CRITERIA, THE ACCEPTABILITY OF THE ELEMENT MAY BE DETERMINED AS DESCRIBED IN SECTION 6.1.4, BELOW.

6.1.4. ACCEPTABILITY OF CORE TESTS - THE COMPRESSIVE STRENGTH OF THE CONCRETE IN A BRIDGE ELEMENT IS ACCEPTABLE WHEN THE AVERAGE CORE TEST STRENGTH IS EQUAL TO OR GREATER THAN THE DESIGN CONCRETE STRENGTH. WHEN THE COMPRESSIVE STRENGTH OF A CORE TESTED IS LESS THAN THE DESIGN CONCRETE STRENGTH, THE PRECAST ELEMENT FROM WHICH THAT CORE WAS TAKEN MAY BE RE-CORED. WHEN THE COMPRESSIVE STRENGTH OF THE RE-CORE IS EQUAL TO OR GREATER THAN THE DESIGN CONCRETE STRENGTH, THE COMPRESSIVE STRENGTH OF THE CONCRETE IN THAT BRIDGE ELEMENT IS ACCEPTABLE.

6.1.4.1. WHEN THE COMPRESSIVE STRENGTH OF ANY RECORE IS LESS THAN THE DESIGN CONCRETE STRENGTH, THE PRECAST ELEMENT FROM WHICH THAT CORE WAS TAKEN SHALL BE REJECTED.

6.1.4.2. PLUGGING CORE HOLES - THE CORE HOLES SHALL BE PLUGGED AND SEALED BY THE MANUFACTURER IN A MANNER SUCH THAT THE ELEMENTS WILL MEET ALL OF THE TEST REQUIREMENTS OF THIS SPECIFICATION. PRECAST ELEMENTS SO SEALED SHALL BE CONSIDERED SATISFACTORY FOR USE.

6.1.4.3. TEST EQUIPMENT - EVERY MANUFACTURER FURNISHING PRECAST ELEMENTS UNDER THIS SPECIFICATION SHALL FURNISH ALL FACILITIES AND PERSONNEL NECESSARY TO CARRY OUT THE TEST REQUIRED.

6.2. INSPECTION - THE QUALITY OF MATERIALS, THE PROCESS OF MANUFACTURE, AND THE FINISHED PRECAST ELEMENTS SHALL BE SUBJECT TO INSPECTION BY THE PURCHASER.

7. JOINTS

THE BRIDGE UNITS SHALL BE PRODUCED WITH FLAT BUTT ENDS. THE ENDS OF THE BRIDGE UNITS SHALL BE SUCH THAT WHEN THE SECTIONS ARE LAID TOGETHER THEY WILL MAKE A CONTINUOUS LINE WITH A SMOOTH INTERIOR FREE OF APPRECIABLE IRREGULARITIES, ALL COMPATIBLE WITH THE PERMISSIBLE VARIATIONS IN SECTION 5, ABOVE. THE JOINT WIDTH BETWEEN ADJACENT PRECAST UNITS SHALL NOT EXCEED ¾".

8. WORKMANSHIP/ FINISH

THE BRIDGE UNITS, WINGWALLS, HEADWALLS AND FOUNDATION UNITS SHALL BE SUBSTANTIALLY FREE OF FRACTURES. THE ENDS OF THE BRIDGE UNITS SHALL BE NORMAL TO THE WALLS AND CENTERLINE OF THE BRIDGE SECTION, WITHIN THE LIMITS OF THE VARIATIONS GIVEN IN SECTION 5, ABOVE, EXCEPT WHERE BEVELED ENDS ARE SPECIFIED. THE FACES OF THE WINGWALLS AND HEADWALLS SHALL BE PARALLEL TO EACH OTHER, WITHIN THE LIMITS OF VARIATIONS GIVEN IN SECTION 5, ABOVE. THE SURFACE OF THE PRECAST ELEMENTS SHALL BE A SMOOTH STEEL FORM OR TROWELED SURFACE. TRAPPED AIR POCKETS CAUSING SURFACE DEFECTS SHALL BE CONSIDERED AS PART OF A SMOOTH, STEEL FORM FINISH.

9. REPAIRS

PRECAST ELEMENTS MAY BE REPAIRED, IF NECESSARY, BECAUSE OF IMPERFECTIONS IN MANUFACTURE OR HANDLING DAMAGE AND WILL BE ACCEPTABLE IF, IN THE OPINION OF THE PURCHASER, THE REPAIRS ARE SOUND, PROPERLY FINISHED AND CURED, AND THE REPAIRED SECTION CONFORMS TO THE REQUIREMENTS OF THIS SPECIFICATION.

10. REJECTION

THE PRECAST ELEMENTS SHALL BE SUBJECT TO REJECTION ON ACCOUNT OF ANY OF THE SPECIFICATION REQUIREMENTS. INDIVIDUAL PRECAST ELEMENTS MAY BE REJECTED BECAUSE OF ANY OF THE FOLLOWING:

10.1. FRACTURES OR CRACKS PASSING THROUGH THE WALL, EXCEPT FOR A SINGLE END CRACK THAT DOES NOT EXCEED ONE HALF THE THICKNESS OF THE WALL.

10.2. DEFECTS THAT INDICATE PROPORTIONING, MIXING, AND MOLDING NOT IN COMPLIANCE WITH SECTION 4 OF THESE SPECIFICATIONS.

10.3. HONEYCOMBED OR OPEN TEXTURE.

10.4. DAMAGED ENDS, WHERE SUCH DAMAGE WOULD PREVENT MAKING A SATISFACTORY JOINT.

11. MARKING

EACH BRIDGE UNIT SHALL BE CLEARLY MARKED BY WATERPROOF PAINT. THE FOLLOWING SHALL BE SHOWN ON THE INSIDE OF THE VERTICAL LEG OF THE BRIDGE SECTION:

BRIDGE SPAN x BRIDGE RISE
DATE OF MANUFACTURE
NAME OR TRADEMARK OF THE MANUFACTURER

12. INSTALLATION PREPARATION

TO ENSURE CORRECT INSTALLATION OF THE PRECAST CONCRETE BRIDGE SYSTEM, CARE AND CAUTION MUST BE EXERCISED IN FORMING THE SUPPORT AREAS FOR BRIDGE UNITS, HEADWALL, AND WINGWALL ELEMENTS. EXERCISING SPECIAL CARE WILL FACILITATE THE RAPID INSTALLATION OF THE PRECAST COMPONENTS.

12.1. FOOTINGS

DO NOT OVER EXCAVATE FOUNDATIONS UNLESS DIRECTED BY SITE SOIL ENGINEER TO REMOVE UNSUITABLE SOIL.

THE SITE SOILS ENGINEER SHALL CERTIFY THAT THE BEARING CAPACITY MEETS OR EXCEEDS THE FOOTING DESIGN REQUIREMENTS, PRIOR TO THE CONTRACTOR POURING OF THE FOOTINGS.

THE BRIDGE UNITS AND WINGWALLS SHALL BE INSTALLED ON EITHER PRECAST OR CAST-IN-PLACE CONCRETE FOOTINGS. THE SIZE AND ELEVATION OF THE FOOTINGS SHALL BE AS DESIGNED BY THE ENGINEER. A KEYWAY SHALL BE FORMED IN THE TOP SURFACE OF THE BRIDGE FOOTING AS SPECIFIED ON THE PLANS. NO KEYWAY IS REQUIRED IN THE WINGWALL FOOTINGS, UNLESS OTHERWISE SPECIFIED ON THE PLANS.

THE FOOTINGS SHALL BE GIVEN A SMOOTH FLOAT FINISH AND SHALL REACH A COMPRESSIVE STRENGTH OF 2,000 PSI BEFORE PLACEMENT OF THE BRIDGE AND WINGWALL ELEMENTS. BACKFILLING SHALL NOT BEGIN UNTIL THE FOOTING HAS REACHED THE FULL DESIGN COMPRESSIVE STRENGTH.

THE FOOTING SURFACE SHALL BE CONSTRUCTED IN ACCORDANCE WITH GRADES SHOWN ON THE PLANS. WHEN TESTED WITH A 10'-0" STRAIGHT EDGE, THE SURFACE SHALL NOT VARY MORE THAN ¼" IN 10'-0".

IF A PRECAST CONCRETE FOOTING IS USED, THE CONTRACTOR SHALL PREPARE A 4" THICK BASE LAYER OF COMPACTED GRANULAR MATERIAL THE FULL WIDTH OF THE FOOTING PRIOR TO PLACING THE PRECAST FOOTING.

THE FOUNDATIONS FOR PRECAST CONCRETE BRIDGE ELEMENTS AND WINGWALLS MUST BE CONNECTED BY REINFORCEMENT TO FORM ONE MONOLITHIC BODY. EXPANSION JOINTS SHALL NOT BE USED.

THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CONSTRUCTION OF THE FOUNDATIONS PER THE PLANS AND SPECIFICATIONS.

13. INSTALLATION

13.1. GENERAL - THE INSTALLATION OF THE PRECAST CONCRETE ELEMENTS SHALL BE AS EXPLAINED IN THE PUBLICATION CON/SPAN BRIDGE SYSTEMS INSTALLATION HANDBOOK.

13.1.1. LIFTING - IT IS THE RESPONSIBILITY OF THE CONTRACTOR TO ENSURE THAT A CRANE OF THE CORRECT LIFTING CAPACITY IS AVAILABLE TO HANDLE THE PRECAST CONCRETE UNITS. THIS CAN BE ACCOMPLISHED BY USING THE WEIGHTS GIVEN FOR THE PRECAST CONCRETE COMPONENTS AND BY DETERMINING THE LIFTING REACH FOR EACH CRANE UNIT. SITE CONDITIONS MUST BE CHECKED WELL IN ADVANCE OF SHIPPING TO ENSURE PROPER CRANE LOCATION AND TO AVOID ANY LIFTING RESTRICTIONS. THE LIFT ANCHORS OR HOLES PROVIDED IN EACH UNIT ARE THE ONLY MEANS TO BE USED TO LIFT THE ELEMENTS. THE PRECAST CONCRETE ELEMENTS MUST NOT BE SUPPORTED OR RAISED BY OTHER MEANS THAN THOSE GIVEN IN THE MANUALS AND DRAWINGS WITHOUT WRITTEN APPROVAL FROM CONTECH® ENGINEERED SOLUTIONS.

13.1.2. CONSTRUCTION EQUIPMENT WEIGHT RESTRICTIONS - IN NO CASE SHALL EQUIPMENT OPERATING IN EXCESS OF THE DESIGN LOAD (HS20 OR HS25) BE PERMITTED OVER THE BRIDGE UNITS UNLESS APPROVED BY CONTECH® ENGINEERED SOLUTIONS.

13.1.2.1. IN THE IMMEDIATE AREA OF THE BRIDGE UNITS, THE FOLLOWING RESTRICTIONS FOR THE USE OF HEAVY CONSTRUCTION MACHINERY DURING BACKFILLING OPERATIONS APPLY:

- NO CONSTRUCTION EQUIPMENT SHALL CROSS THE BARE PRECAST CONCRETE BRIDGE UNIT.
- AFTER THE COMPACTED FILL LEVEL HAS REACHED A MINIMUM OF 4" OVER THE CROWN OF THE BRIDGE, CONSTRUCTION EQUIPMENT WITH A WEIGHT OF LESS THAN 10 TONS MAY CROSS THE BRIDGE.
- AFTER THE COMPACTED FILL LEVEL HAS REACHED A MINIMUM OF 1'-0" OVER THE CROWN OF THE BRIDGE, CONSTRUCTION EQUIPMENT WITH A WEIGHT OF LESS THAN 30 TONS MAY CROSS THE BRIDGE.
- AFTER THE COMPACTED FILL LEVEL HAS REACHED THE DESIGN COVER, OR 2'-0" MINIMUM, OVER THE CROWN OF THE PRECAST CONCRETE BRIDGE, CONSTRUCTION EQUIPMENT WITHIN THE DESIGN LOAD LIMITS FOR THE ROAD MAY CROSS THE PRECAST CONCRETE BRIDGE.

13.2. LEVELING PAD/SHIMS - THE BRIDGE UNITS AND WINGWALLS SHALL BE SET ON HARDBOARD SHIMS CONFORMING TO ASTM D1037 OR PLASTIC SHIMS (DAYTON SUPERIOR P-80, P-81 OR APPROVED EQUAL) MEASURING 5" x 5", MINIMUM, UNLESS SHOWN OTHERWISE ON THE PLANS. A MINIMUM GAP OF ½" SHALL BE PROVIDED BETWEEN THE FOOTING AND THE BOTTOM OF THE BRIDGE'S VERTICAL LEGS OR THE BOTTOM OF THE WINGWALL. ALSO, A SUPPLY OF ¼", ½" AND ⅛" THICK HARDBOARD OR PLASTIC SHIMS FOR VARIOUS SHIMMING PURPOSES SHALL BE ON SITE.

13.3. PLACEMENT OF BRIDGE UNITS - THE BRIDGE UNITS SHALL BE PLACED AS SHOWN ON THE ENGINEER'S PLAN DRAWINGS. SPECIAL CARE SHALL BE TAKEN IN SETTING THE ELEMENTS TO THE TRUE LINE AND GRADE. THE JOINT WIDTH BETWEEN ADJACENT PRECAST UNITS SHALL NOT EXCEED ¾".

13.4. IT IS THE CONTRACTOR'S RESPONSIBILITY TO MAINTAIN THE STRUCTURE SPAN DURING ALL PHASES OF INSTALLATION. DUE TO THE ARCH SHAPE, BRIDGE ELEMENTS WILL TEND TO SPREAD UNDER SELF-WEIGHT. IT IS IMPERATIVE THAT ANY LATERAL SPREADING OF THE BRIDGE ELEMENTS BE AVOIDED DURING AND AFTER THEIR PLACEMENT. GENERALLY, HORIZONTAL CABLE TIES OR TIE RODS ARE SHIPPED IN THE LARGER BRIDGE ELEMENTS TO ASSIST IN PREVENTING THIS SPREADING. CABLE TIES/TIE RODS SHALL NOT BE REMOVED UNTILL BRIDGE UNITS ARE GROUTED AND GROUT HAS CURED. IT IS RECOMMENDED THAT TEMPORARY HARDWOOD BLOCKS BE USED IN CONJUNCTION WITH THE CABLE TIES/TIE RODS TO MAINTAIN SPAN. IF, HOWEVER, DUE TO SITE RESTRICTIONS, THESE CABLE TIES/TIE RODS MUST BE REMOVED PRIOR TO PLACEMENT OF THE BRIDGE ELEMANTS, THE CONTRACTOR MUST NOTIFY CONTECH (MANUFACTURER) AND REQUEST A SUGGESTED INSTALLATION PROCEDURE.

IN ADDITION, IF THE CABLE TIES/TIE RODS MUST BE REMOVED PRIOR TO SETTING ARCH UNITS, THE FOLLOWING QUALITY CONTROL PROCEDURE MUST BE FOLLOWED:

1) FIND "MEASURED SPAN" UPON ARCH UNIT'S DELIVERY TO SITE, PRIOR TO LIFTING FROM TRUCK AND REMOVING CABLE TIES/TIE RODS. "MEASURED SPAN" SHALL BE THE AVERAGE OF (3) SPAN MEASUREMENTS ALONG THE LAY LENGTH OF THE ARCH UNIT.

2) AFTER SETTING OF BRIDGE UNIT ON THE FOUNDATION, VERIFY THE SPAN. THIS "INSTALLED SPAN MEASUREMENT" SHALL NOT EXCEED THE MAXIMUM OF:

A) THE NOMINAL SPAN +½" OR
B) THE "MEASURED SPAN"

IF THE "INSTALLED SPAN MEASUREMENT" EXCEEDS THIS AMOUNT, THE ARCH UNIT SHALL BE LIFTED AND RE-SET UNTIL THE "INSTALLED SPAN MEASUREMENT" MEETS THE LIMITS.

13.5. PLACEMENT OF WINGWALLS, HEADWALLS AND FOUNDATION UNITS - THE WINGWALLS, HEADWALLS AND FOUNDATIONS SHALL BE PLACED AS SHOWN ON THE PLAN DRAWINGS. SPECIAL CARE SHALL BE TAKEN IN SETTING THE ELEMENTS TO THE TRUE LINE AND GRADE.

13.6. WATERPROOFING/JOINT PROTECTION AND SUBSURFACE DRAINAGE

13.6.1. EXTERNAL PROTECTION OF JOINTS - THE BUTT JOINT MADE BY TWO ADJOINING BRIDGE UNITS SHALL BE COVERED WITH A ⅞" x 1⅜" PREFORMED BITUMINOUS JOINT SEALANT AND A MINIMUM OF A 9" WIDE JOINT WRAP. THE SURFACE SHALL BE FREE OF DIRT BEFORE APPLYING THE JOINT MATERIAL. A PRIMER COMPATIBLE WITH THE JOINT WRAP TO BE USED SHALL BE APPLIED FOR A MINIMUM WIDTH OF 9" ON EACH SIDE OF THE JOINT. THE EXTERNAL WRAP SHALL BE CS212 BY CONCRETE SEALANTS INC., EZ-WRAP RUBBER BY PRESS-SEAL GASKET CORPORATION, SEAL WRAP BY MAR MAC MANUFACTURING CO. INC. OR APPROVED EQUAL. THE JOINT SHALL BE COVERED CONTINUOUSLY FROM THE BOTTOM OF ONE BRIDGE SECTION LEG, ACROSS THE TOP OF THE BRIDGE AND TO THE OPPOSITE BRIDGE SECTION LEG. ANY LAPS THAT RESULT IN THE JOINT WRAP SHALL BE A MINIMUM OF 6" LONG WITH THE OVERLAP RUNNING DOWNHILL.

13.6.2. IN ADDITION TO THE JOINTS BETWEEN BRIDGE UNITS, THE JOINT BETWEEN THE END BRIDGE UNIT AND THE HEADWALL SHALL ALSO BE SEALED AS DESCRIBED ABOVE. IF PRECAST WINGWALLS ARE USED, THE JOINT BETWEEN THE END BRIDGE UNIT AND THE WINGWALL SHALL BE SEALED WITH A 2'-0" STRIP OF FILTER FABRIC. ALSO, IF LIFT HOLES ARE FORMED IN THE BRIDGE UNITS, THEY SHALL BE PRIMED AND COVERED WITH A 9" x 9" SQUARE OF JOINT WRAP.

13.6.3. DURING THE BACKFILLING OPERATION, CARE SHALL BE TAKEN TO KEEP THE JOINT WRAP IN ITS PROPER LOCATION OVER THE JOINT.

13.6.4. SUBSOIL DRAINAGE SHALL BE AS DIRECTED BY THE ENGINEER.

13.7. GROUTING

13.7.1. GROUTING SHALL NOT BE PERFORMED WHEN TEMPERATURES ARE EXPECTED TO GO BELOW 35° FOR A PERIOD OF 72 HOURS. FILL THE BRIDGE-FOUNDATION KEYWAY WITH CEMENT GROUT (PORTLAND CEMENT AND WATER OR CEMENT MORTAR COMPOSED OF PORTLAND CEMENT, SAND AND WATER) WITH A MINIMUM 28-DAY COMPRESSIVE STRENGTH OF 3000 PSI. VIBRATE AS REQUIRED TO ENSURE THAT THE ENTIRE KEY AROUND THE BRIDGE ELEMENT IS COMPLETELY FILLED. IF BRIDGE ELEMENTS HAVE BEEN SET WITH TEMPORARY TIES (CABLES, BARS, ETC.) GROUT MUST ATTAIN A MINIMUM COMPRESSIVE STRENGTH OF 1500 PSI BEFORE TIES MAY BE REMOVED.

13.7.2. ALL GROUT SHALL HAVE A MAXIMUM AGGREGATE SIZE OF ¼".

13.7.3. LIFTING AND ERECTION ANCHOR RECESSES SHALL BE FILLED WITH GROUT.

13.7.4. AFTER GROUT HAS REACHED ITS DESIGN STRENGTH THE TEMPORARY HARDWOOD WEDGES SHALL BE REMOVED AND THEIR HOLES FILLED WITH GROUT.

13.8. BACKFILL

13.8.1. DO NOT PERFORM BACKFILLING DURING WET OR FREEZING WEATHER.

13.8.2. NO BACKFILL SHALL BE PLACED AGAINST ANY STRUCTURAL ELEMENTS UNTIL THEY HAVE BEEN APPROVED BY THE ENGINEER.

13.8.3. BACKFILL SHALL BE CONSIDERED AS ALL REPLACED EXCAVATION AND NEW EMBANKMENT ADJACENT TO THE PRECAST CONCRETE ELEMENTS. THE PROJECT CONSTRUCTION AND MATERIAL SPECIFICATIONS, WHICH INCLUDE THE SPECIFICATIONS FOR EXCAVATION FOR STRUCTURES AND ROADWAY EXCAVATION AND EMBANKMENT CONSTRUCTION, SHALL APPLY EXCEPT AS MODIFIED IN THIS SECTION.

13.8.4. BACKFILL ZONES:

- IN-SITU SOIL
- ZONE A: CONSTRUCTED EMBANKMENT OR OVERFILL.
- ZONE B: FILL THAT IS DIRECTLY ASSOCIATED WITH PRECAST CONCRETE BRIDGE INSTALLATION.
- ZONE C: ROAD STRUCTURE.

13.8.5. REQUIRED BACKFILL PROPERTIES

13.8.5.1. IN-SITU SOIL - NATURAL GROUND IS TO BE SUFFICIENTLY STABLE TO ALLOW EFFECTIVE SUPPORT TO THE PRECAST CONCRETE BRIDGE UNITS. AS A GUIDE, THE EXISTING NATURAL GROUND SHOULD BE OF SIMILAR QUALITY AND DENSITY TO ZONE B MATERIAL FOR MINIMUM LATERAL DIMENSION OF ONE BRIDGE SPAN OUTSIDE OF THE BRIDGE FOOTING.

13.8.5.2. ZONE A - ZONE A REQUIRES FILL MATERIAL WITH SPECIFICATIONS AND COMPACTING PROCEDURES EQUAL TO THAT FOR NORMAL ROAD EMBANKMENTS.

13.8.5.3. ZONE B - GENERALLY, SOILS SHALL BE REASONABLY FREE OF ORGANIC MATTER, AND, NEAR CONCRETE SURFACES, FREE OF STONES LARGER THAN 3" IN DIAMETER SEE CHARTS FOR DETAILED DESCRIPTIONS OF ACCEPTABLE SOILS.

13.8.5.4. ZONE C - ZONE C IS THE ROAD SECTION OF GRAVEL, ASPHALT OR CONCRETE BUILT IN COMPLIANCE WITH LOCAL ENGINEERING PRACTICES.

13.8.5.5. GEOTECHNICAL ENGINEER SHALL REVIEW GRADATIONS OF ALL INTERFACING MATERIALS AND, IF NECESSARY, RECOMMEND GEOTEXTILE FILTER FABRIC (PROVIDED BY CONTRACTOR)

13.8.6. PLACING AND COMPACTING BACKFILL

DUMPING FOR BACKFILLING IS NOT ALLOWED ANY NEARER THAN 3'-0" FROM THE BRIDGE LEG.

THE FILL MUST BE PLACED AND COMPACTED IN LAYERS NOT EXCEEDING 8". THE MAXIMUM DIFFERENCE IN THE SURFACE LEVELS OF THE FILL ON OPPOSITE SIDES OF THE BRIDGE MUST NOT EXCEED 2'-0".

THE FILL BEHIND WINGWALLS MUST BE PLACED AT THE SAME TIME AS THAT OF THE BRIDGE FILL. IT MUST BE PLACED IN PROGRESSIVELY PLACED HORIZONTAL LAYERS NOT EXCEEDING 8" PER LAYER.

THE BACKFILL OF ZONE B SHALL BE COMPACTED TO A MINIMUM DENSITY OF 95% OF THE STANDARD PROCTOR, AS REQUIRED BY AASHTO T-99.

SOIL WITHIN 1'-0" OF CONCRETE SURFACES SHALL BE HAND-COMPACTED. ELSEWHERE, USE OF ROLLERS IS ACCEPTABLE. IF VIBRATING ROLLER-COMPACTORS ARE USED, THEY SHALL NOT BE STARTED OR STOPPED WITHIN ZONE B AND THE VIBRATION FREQUENCY SHOULD BE AT LEAST 30 REVOLUTIONS PER SECOND.

THE BACKFILL MATERIAL AND COMPACTING BEHIND WINGWALLS SHALL SATISFY THE CRITERIA FOR THE BRIDGE BACKFILL, ZONE B.

BACKFILL AGAINST A WATERPROOFED SURFACE SHALL BE PLACED CAREFULLY TO AVOID DAMAGE TO THE WATERPROOFING MATERIAL.

13.8.7. BRIDGE UNITS

FOR FILL HEIGHTS OVER 12 FEET (AS MEASURED FROM TOP CROWN OF BRIDGE TO FINISHED GRADE), NO BACKFILLING MAY BEGIN UNTIL A BACKFILL COMPACTION TESTING PLAN HAS BEEN COORDINATED WITH AND APPROVED BY CONTECH® ENGINEERED SOLUTIONS.

13.8.8. WINGWALLS

BACKFILL IN FRONT OF WINGWALLS SHALL BE CARRIED TO GROUND LINES SHOWN IN THE PLANS.

13.8.9. MONITORING

THE CONTRACTOR SHALL CHECK SETTLEMENTS AND HORIZONTAL DISPLACEMENT OF FOUNDATION TO ENSURE THAT THEY ARE WITHIN THE ALLOWABLE LIMIT PROVIDED BY THE ENGINEER. THESE MEASUREMENTS SHOULD GIVE AN INDICATION OF THE SETTLEMENTS AND DEFORMATIONS ALONG THE LENGTH OF THE FOUNDATIONS.

THE FIRST MEASUREMENT SHOULD TAKE PLACE AFTER THE ERECTION OF ALL PRECAST BRIDGE SYSTEM ELEMENTS, A SECOND AFTER COMPLETION OF BACKFILLING, AND A THIRD BEFORE OPENING OF THE BRIDGE TO TRAFFIC. FURTHER MEASUREMENTS MAY BE MADE ACCORDING TO LOCAL CONDITIONS.

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Fax: 734.769.31664

CONTECH ENGINEERED SOLUTIONS LLC
www.ContechES.com
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800-338-1122 513-645-7000 513-645-7993 FAX

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Working together, restoring the river

OXBOW RESTORATION PROJECT- PHASE III

**DEARBORN,
WAYNE COUNTY,
MICHIGAN**

the Henry Ford

FOR BIDDING	07-17
100% DESIGN	11-07-14
PERMIT APPLICATION	9-12-14
75% DESIGN	8-12-14

130825
ECT PROJECT NUMBER

DESIGNED BY: AAB
CHECKED BY: AAB
DRAWN BY: AAB/PFH
APPROVED BY: JOM

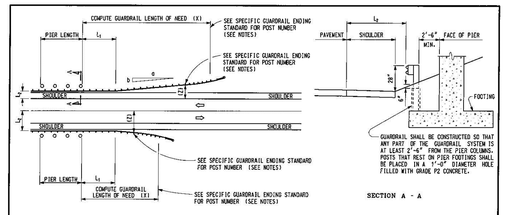
SHEET TITLE

PRECAST CONCRETE SPECIFICATION

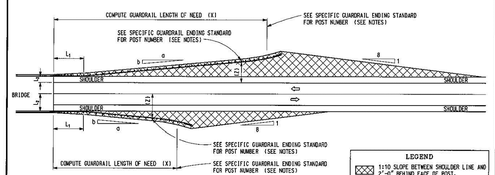
AS SHOWN

NORTH

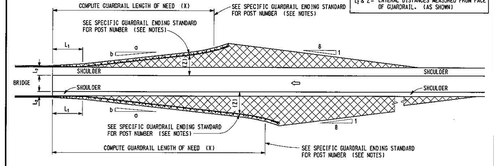
SHEET NUMBER
S-8



BEAM GUARDRAIL AT PIERS - LOCAL ROADWAYS - UNDER



BEAM GUARDRAIL AT BRIDGES - LOCAL ROADWAYS - OVER

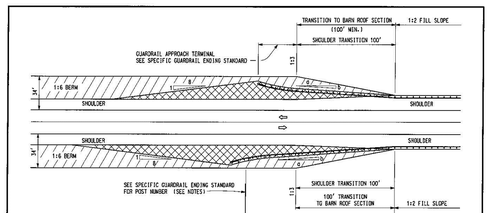


BEAM GUARDRAIL AT BRIDGES - SINGLE RAMPS

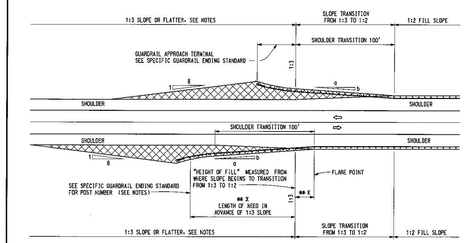
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL AT BRIDGES AND EMBANKMENTS

11-14-2003 T.R.N.A. APPROVAL	5-17-2002 PLAN DATE	R-59-E	SHEET 2 OF 6



BEAM GUARDRAIL AT EMBANKMENTS - TWO-WAY ROADWAYS
(BARN ROOF SLOPE)



** SEE CHART FOR THE "X" AND THE "X" DISTANCE. (SHEET 6 OF 6)

BEAM GUARDRAIL AT EMBANKMENTS - TWO-WAY ROADWAYS

LEGEND
1:10 SLOPE BETWEEN SHOULDER LINE AND 2'-0" BEHIND FACE OF POST.
1:6 BERM

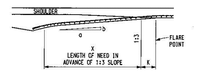
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL AT BRIDGES AND EMBANKMENTS

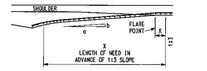
11-14-2003 T.R.N.A. APPROVAL	5-17-2002 PLAN DATE	R-59-E	SHEET 3 OF 6

**

GUARDRAIL AT EMBANKMENTS (FLARED INSTALLATIONS, b/a)							
HEIGHT OF FILL AT 1:3 SLOPE (FEET)		TO MPH FLARE 1 : 15		60 MPH FLARE 1 : 14		50 MPH FLARE 1 : 11	
OVER	TO	X	K	X	K	X	K
5	10	100	37.5	100	12.5	100	0
10	12	100	37.5	100	12.5	100	0
12	14	100	37.5	100	12.5	100	0
14	16	113	24.5	110	2.5	100	0
16	18	155	-17.5	149	-36.5	101	-1
18	20	153	-55.5	182	-69.5	127	-27
20	22	223	-85.5	207	-94.5	148	-48
22	24	246	-106.5	227	-113.5	164	-64
24	25	256	-116.5	235	-122.5	171	-71



FOR POSITIVE "X" DISTANCES, BEGIN FLARE POINT BEYOND THE 1:3 SLOPE.



FOR NEGATIVE "X" DISTANCES, BEGIN FLARE POINT IN ADVANCE OF THE 1:3 SLOPE.

NOTES:

THE CONSTRUCTION OF GUARDRAIL SHALL BE ACCORDING TO THE CURRENT STANDARD PLANS. APPROPRIATE APPROACH CURB AND GUTTER DETAILS AND DOWNSPOUT HEADER DETAILS, WHEN USED, ARE SPECIFIED ON THE CURRENT STANDARD PLAN R-32-SERIES.

ALL POST NUMBERS ARE REFERENCED ACCORDING TO THOSE SPECIFIED ON THE SPECIFIC GUARDRAIL ENDING STANDARD.

A 1:10 SLOPE SHALL BE MAINTAINED IN FRONT OF AND 2'-0" BEHIND THE GUARDRAIL BEAM OUTSIDE THE DESIGNATED SHOULDER AREA. SLOPE BEYOND THE 2'-0" HINGE LINE BEHIND THE GUARDRAIL BEAM AREA MAY BE 1:2 OR FLATTER AND SHALL BE TRANSITIONED TO NORMAL GRADED SLOPES IN SUCH A WAY AS TO GIVE A PLEASING APPEARANCE.

GUARDRAIL WILL NOT BE REQUIRED ON DEPARTING END OF STRUCTURES ON DUAL ROADWAYS WHICH HAVE CONTINUOUS ABUTMENTS OR WHEN FILL SLOPES ARE 1:4 OR FLATTER. IF A DOWNSPOUT HEADER IS REQUIRED ON THE DEPARTING ENDS OF STRUCTURES, IT WILL BE NECESSARY TO SHIELD IT WITH GUARDRAIL.

THIS STANDARD PLAN APPLIES ONLY TO NEW CONSTRUCTION UNLESS SPECIFICALLY CALLED FOR ON UPGRADING PROJECTS.

AREA BEHIND THE GUARDRAIL DEPARTING END TERMINAL SHALL HAVE A 1:3 SLOPE OR FLATTER.

AREA BEHIND THE GUARDRAIL APPROACH TERMINAL SHALL HAVE A 1:4 SLOPE OR FLATTER UNLESS THE ENDING CANNOT BE PLACED IN A 1:4 BECAUSE THE PREDOMINATE SLOPE PRESSING THE APPROACH TERMINAL IS A 1:3. IN THIS CASE, THE ENDING MAY BE PLACED IN THE 1:3 SLOPE.

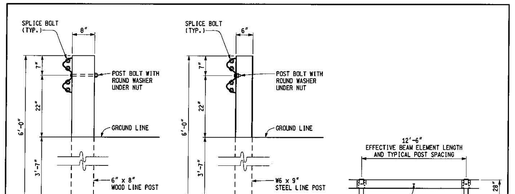
GUARDRAIL ANCHORAGE, BRIDGE IS INCLUDED IN THE GUARDRAIL LENGTHS SPECIFIED. (SEE CURRENT STANDARD PLAN R-67-SERIES).

ALL 1:10 SLOPES SHALL BE GRADED TO "CLASS A" SLOPE TOLERANCES.

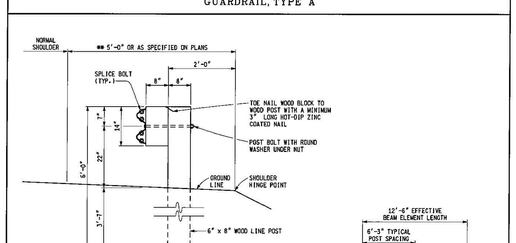
MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR

GUARDRAIL AT BRIDGES AND EMBANKMENTS

11-14-2003 T.R.N.A. APPROVAL	5-17-2002 PLAN DATE	R-59-E	SHEET 6 OF 6

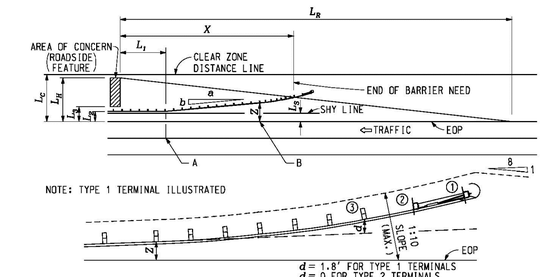


GUARDRAIL, TYPE A



GUARDRAIL, TYPE B
(WOOD POST)

MDOT	DEPARTMENT DIRECTOR Kirk T. Steudle	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT STANDARD PLAN FOR			
PREPARED BY DESIGN DIVISION	APPROVED BY: John C. Friend ENGINEER OF DELIVERY	GUARDRAIL, TYPES A, B, BD, T, & TD			
DRAWN BY: R.L.T.	APPROVED BY: Mark A. VanPortfliet ENGINEER OF DEVELOPMENT	9-16-2009 T.R.N.A. APPROVAL	6-9-2009 PLAN DATE	R-60-H	SHEET 1 OF 10
CHECKED BY: K.E.P.					



$$X = \frac{L_H - \left(\frac{b}{a}\right)(L_1) - (L_2 + d)}{\frac{b}{a} + \frac{L_H}{L_R}}$$

$$X = \frac{L_H - (L_2 + d)}{\left(\begin{smallmatrix}\text{No Flare}\\ \text{or Type 2}\\ \text{Terminals}\end{smallmatrix}\right)\frac{L_H}{L_R}}$$

$$Z = (X - L_1 - 25)\left(\frac{b}{a}\right) + L_2$$

$$Z = L_2 \quad \text{(For Type 2 Terminals)}$$

LENGTH OF NEED FOR GUARDRAIL FOR TYPE B				NORTH SIDE	SOUTH SIDE
RUNOUT LENGTH FOR 30 mph (7.01.19)		L_R	=	70 ft	70 ft
E.O.P TO FACE OF BARRIER (SHEET C-7)		L_2	=	4.75 ft	7.83 ft
EFFECTIVE TURNED OUT DISTANCE OF ANCHORAGE		d	=	0 ft	0 ft
LATERAL EXTENT OF ROADSIDE FEATURE (MEASURED)		L_H	=	15.12 ft	18.2 ft
LENGTH OF NEED	$X = L_H(L_2+d)/(L_H/L_R)$	X	=	**48 ft**	**40 ft**

THEREFORE, USE MINIMUM 48 FEET LENGTH OF GUARDRAIL FOR ALL THE SIDES.

TYPICAL BRIDGE APPROACH GUARDRAIL DETAIL
N.T.S

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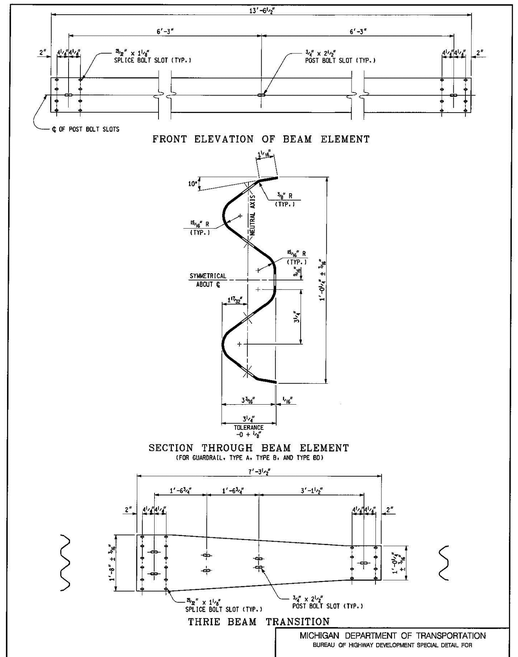

MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR			
GUARDRAIL, TYPES A, B, BD, T, & TD			
9-16-2009 T.R.N.A. APPROVAL	6-9-2009 PLAN DATE	R-60-H	SHEET 3 OF 10

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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN,
WAYNE COUNTY,
MICHIGAN

the Henry Ford

FOR BIDDING	10-17
100%-Rev 1	06-13-17
100%	11-07-14
PERMIT APPLICATION	09-16-14
75% DESIGN	08-06-14

130825
ECT PROJECT NUMBER

MDOT STANDARDS	MMICS
DESIGNED BY	CHECKED BY
LA	JZ
DRAWN BY	APPROVED BY

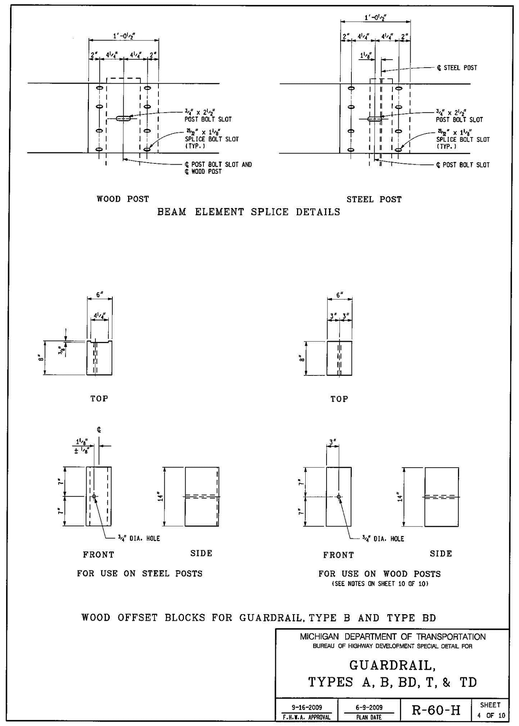
SHEET TITLE

GUARDRAIL DETAIL SHEET 1 OF 2

AS SHOWN

NORTH

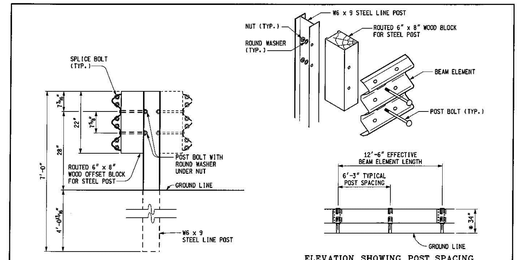
SHEET NUMBER
S-9

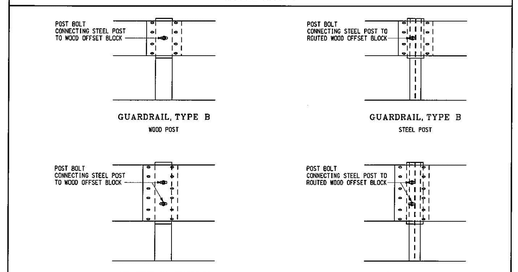


MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

GUARDRAIL,
TYPES A, B, BD, T, & TD

9-16-2009	6-9-2009	R-60-H	SHEET
F.H.W.A. APPROVAL	PLAN DATE		4 OF 10

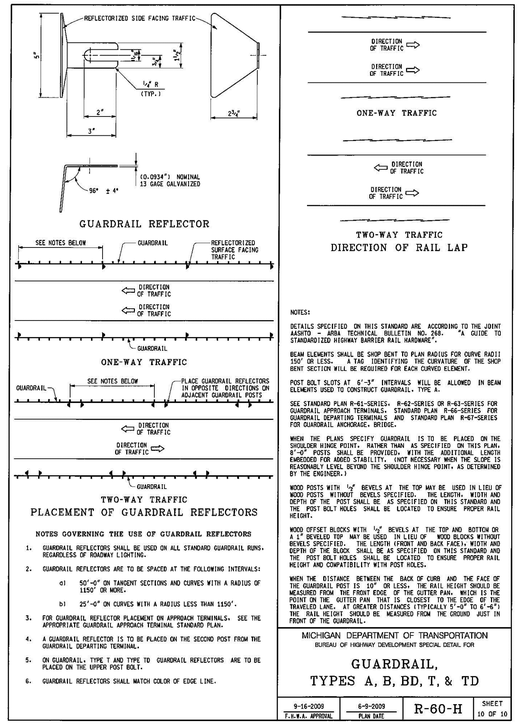




MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

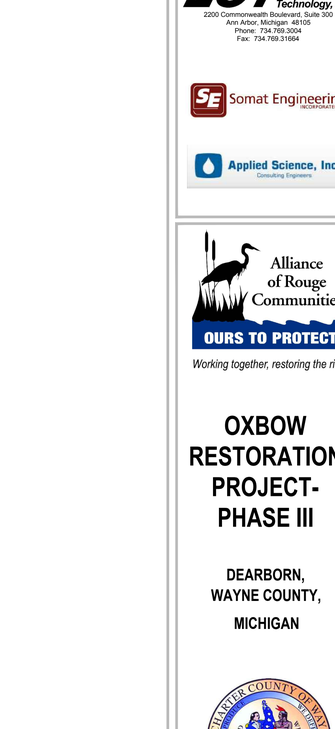
GUARDRAIL,
TYPES A, B, BD, T, & TD

9-16-2009	6-9-2009	R-60-H	SHEET
F.H.W.A. APPROVAL	PLAN DATE		6 OF 10



NOTES GOVERNING THE USE OF GUARDRAIL REFLECTORS

1. GUARDRAIL REFLECTORS SHALL BE USED ON ALL STANDARD GUARDRAIL RUNS, REGARDLESS OF ROADWAY LIGHTING.
2. GUARDRAIL REFLECTORS ARE TO BE SPACED AT THE FOLLOWING INTERVALS:
   a) 50'-0" ON TANGENT SECTIONS AND CURVES WITH A RADIUS OF 1150' OR MORE.
   b) 25'-0" ON CURVES WITH A RADIUS LESS THAN 1150'.
3. FOR GUARDRAIL REFLECTOR PLACEMENT ON APPROACH TERMINALS, SEE THE APPROPRIATE GUARDRAIL APPROACH TERMINAL STANDARD PLAN.
4. A GUARDRAIL REFLECTOR IS TO BE PLACED ON THE SECOND POST FROM THE GUARDRAIL DEPARTING TERMINAL.
5. ON GUARDRAIL, TYPE T AND TYPE TD GUARDRAIL REFLECTORS ARE TO BE PLACED ON THE UPPER POST BOLT.
6. GUARDRAIL REFLECTORS SHALL MATCH COLOR OF EDGE LINE.



NOTES:

DETAILS SPECIFIED ON THIS STANDARD ARE ACCORDING TO THE JOINT AASHTO – ARBA TECHNICAL BULLETIN NO. 248, "A GUIDE TO STANDARDIZED HIGHWAY BARRIER RAIL HARDWARE".

BEAM ELEMENTS SHALL BE SHOP BENT TO PLAN RADIUS FOR CURVE RADII 150' OR LESS. A TAG IDENTIFYING THE CURVATURE OF THE SHOP BENT SECTION WILL BE REQUIRED FOR EACH CURVED ELEMENT.

POST BOLT SLOTS AT 6'-3" INTERVALS WILL BE ALLOWED IN BEAM ELEMENTS USED TO CONSTRUCT GUARDRAIL, TYPE A.

SEE STANDARD PLAN R-61-SERIES, R-62-SERIES OR R-63-SERIES FOR GUARDRAIL APPROACH TERMINALS. STANDARD PLAN R-66-SERIES FOR GUARDRAIL DEPARTING TERMINALS AND STANDARD PLAN R-67-SERIES FOR GUARDRAIL ANCHORAGE, BRIDGE.

WHEN THE PLANS SPECIFY GUARDRAIL IS TO BE PLACED ON THE SHOULDER HINGE POINT, RATHER THAN AS SPECIFIED ON THIS PLAN, 8'-0" POSTS SHALL BE PROVIDED, WITH THE ADDITIONAL LENGTH EMBEDDED FOR ADDED STABILITY. (NOT NECESSARY WHEN THE SLOPE IS REASONABLY LEVEL BEYOND THE SHOULDER HINGE POINT, AS DETERMINED BY THE ENGINEER.)

WOOD POSTS WITH ½" BEVELS AT THE TOP MAY BE USED IN LIEU OF WOOD POSTS WITHOUT BEVELS SPECIFIED. THE LENGTH, WIDTH AND DEPTH OF THE POST SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT.

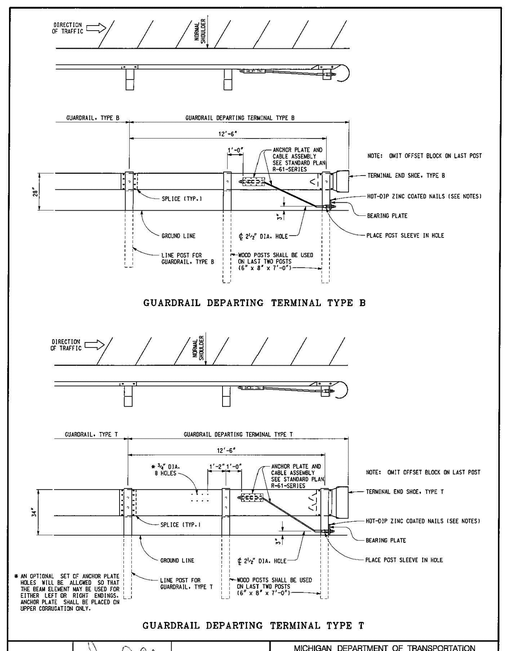
WOOD OFFSET BLOCKS WITH ½" BEVELS AT THE TOP AND BOTTOM OR A 1" BEVELED TOP MAY BE USED IN LIEU OF WOOD BLOCKS WITHOUT BEVELS SPECIFIED. THE LENGTH (FRONT AND BACK FACE), WIDTH AND DEPTH OF THE BLOCK SHALL BE AS SPECIFIED ON THIS STANDARD AND THE POST BOLT HOLES SHALL BE LOCATED TO ENSURE PROPER RAIL HEIGHT AND COMPATIBILITY WITH POST HOLES.

WHEN THE DISTANCE BETWEEN THE BACK OF CURB AND THE FACE OF THE GUARDRAIL POST IS 19" OR LESS, THE RAIL HEIGHT SHOULD BE MEASURED FROM THE FRONT EDGE OF THE GUTTER PAN, WHICH IS THE POINT ON THE GUTTER PAN THAT IS CLOSEST TO THE EDGE OF THE TRAVELED LANE. AT GREATER DISTANCES (TYPICALLY 5'-0" TO 6'-6") THE RAIL HEIGHT SHOULD BE MEASURED FROM THE GROUND JUST IN FRONT OF THE GUARDRAIL.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY DEVELOPMENT SPECIAL DETAIL FOR

GUARDRAIL,
TYPES A, B, BD, T, & TD

9-16-2009	6-9-2009	R-60-H	SHEET
F.H.W.A. APPROVAL	PLAN DATE		10 OF 10

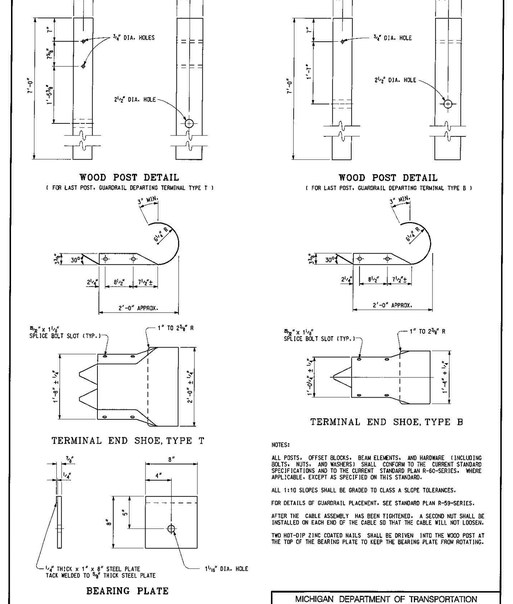


MDOT	ENGINEER OF CONSTRUCTION & TECHNOLOGY	ENGINEER - ROAD DESIGN	MICHIGAN DEPARTMENT OF TRANSPORTATION BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR GUARDRAIL DEPARTING TERMINAL TYPES B & T
PREPARED BY DESIGN DIVISION	ENGINEER OF MAINTENANCE	ENGINEER OF DESIGN	
DRAWN BY: B.L.T.		DEPARTMENT DIRECTOR Gregory J. Rosine	
CHECKED BY: R.K.P.	ENGINEER OF TRAFFIC AND SAFETY	CHIEF ENGINEER/DEPUTY DIRECTOR BUREAU OF HIGHWAY TECHNICAL SERVICES	12-21-2001 F.H.W.A. APPROVAL / 5-25-2001 PLAN DATE / R-66-D / SHEET 1 OF 2

TYPICAL BRIDGE APPROACH GUARDRAIL DETAIL

N.T.S

3 WORKING DAYS
BEFORE YOU DIG
CALL MISS DIG
1-800-482-7171



NOTES:

ALL POSTS, OFFSET BLOCKS, BEAM ELEMENTS, AND HARDWARE (INCLUDING BOLTS, NUTS, AND WASHERS) SHALL CONFORM TO THE CURRENT STANDARD SPECIFICATIONS AND TO THE CURRENT STANDARD PLAN R-60-SERIES, WHERE APPLICABLE, EXCEPT AS SPECIFIED ON THIS STANDARD.

ALL 1:10 SLOPES SHALL BE GRADED TO CLASS A SLOPE TOLERANCES.

FOR DETAILS OF GUARDRAIL PLACEMENT, SEE STANDARD PLAN R-60-SERIES.

AFTER THE CABLE ASSEMBLY HAS BEEN TIGHTENED, A SECOND NUT SHALL BE INSTALLED ON EACH END OF THE CABLE SO THAT THE CABLE WILL NOT LOOSEN.

TWO HOT-DIP ZINC COATED NAILS SHALL BE DRIVEN INTO THE WOOD POST AT THE TOP OF THE BEARING PLATE TO KEEP THE BEARING PLATE FROM ROTATING.

MICHIGAN DEPARTMENT OF TRANSPORTATION
BUREAU OF HIGHWAY TECHNICAL SERVICES STANDARD PLAN FOR

GUARDRAIL DEPARTING
TERMINAL TYPES B & T

12-21-2001	5-25-2001	R-66-D	SHEET
F.H.W.A. APPROVAL	PLAN DATE		2 OF 2

ECT Environmental Consulting & Technology, Inc.
2200 Commonwealth Boulevard, Suite 300
Ann Arbor, Michigan 48105
Phone: 734.769.3004
Fax: 734.769.3164

Somat Engineering

Applied Science, Inc.
Consulting Engineers

Alliance of Rouge Communities
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OXBOW RESTORATION PROJECT- PHASE III

DEARBORN,
WAYNE COUNTY,
MICHIGAN

the Henry Ford

100%	07-17
PERMIT APPLICATION	09-16-14
75% DESIGN	08-06-14

130825
ECT PROJECT NUMBER

LA/CONTECH	MM/CS
DESIGNED BY	CHECKED BY
LA	JZ
DRAWN BY	APPROVED BY

SHEET TITLE

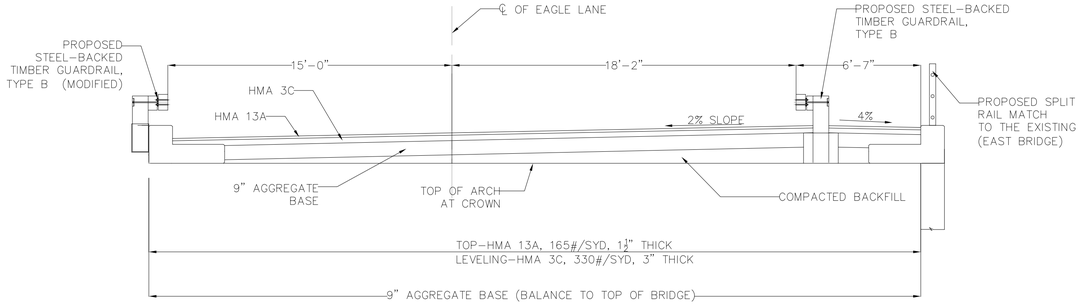
GUARDRAIL DETAIL SHEET 2 OF 2

AS SHOWN

NORTH

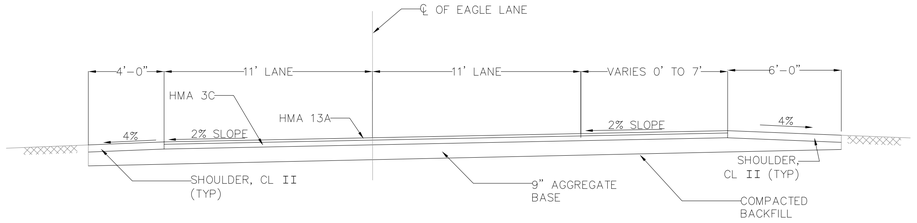
SHEET NUMBER

S-10



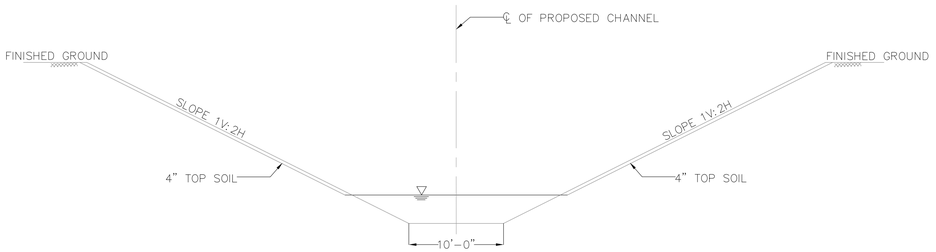
TYPICAL SECTION AT BRIDGE

1/8"=1'-0"



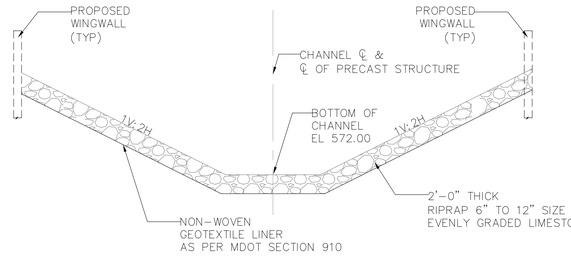
TYPICAL SECTION AT BRIDGE APPROACH (BOTH SIDES OF BRIDGE)

1/8"=1'-0"



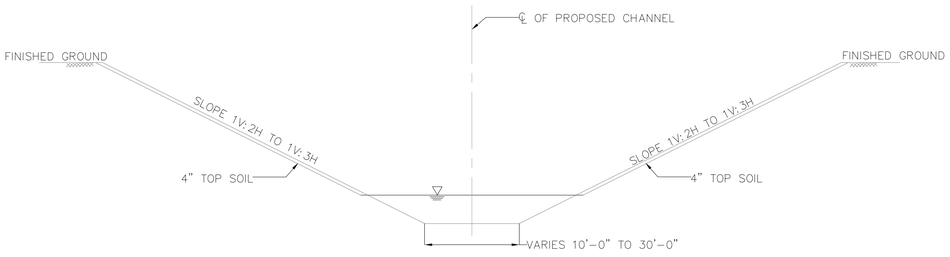
PROPOSED CHANNEL TYPICAL SECTION (STA 0+88 TO STA 1+17.8)

N.T.S



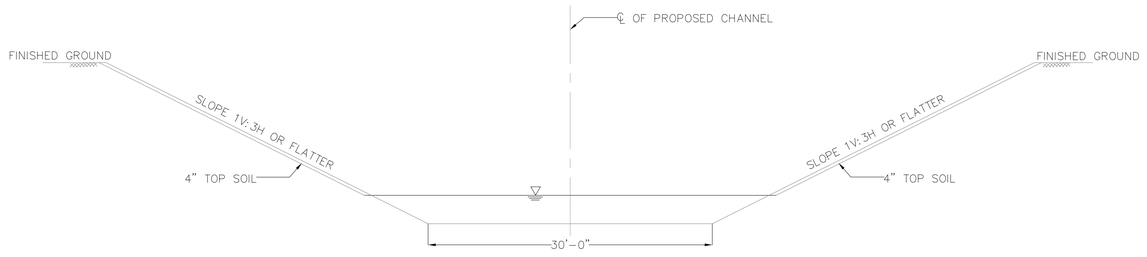
PROPOSED CHANNEL TYPICAL SECTION (STA 1+17.8 TO STA 1+28.2 & STA 1+70.2 TO STA 1+80.6)

N.T.S



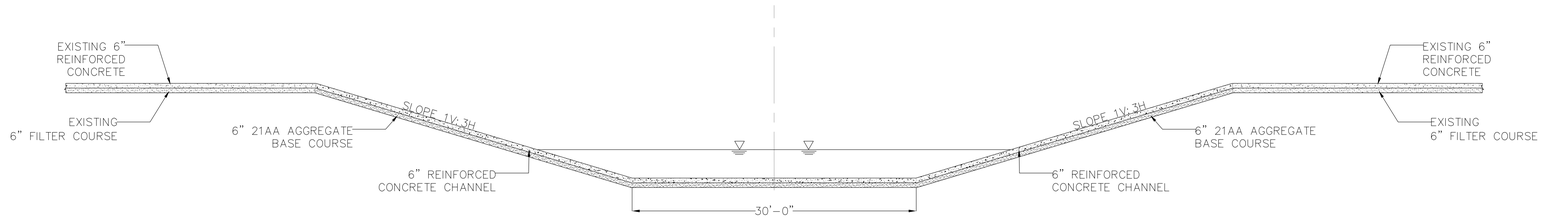
PROPOSED CHANNEL TYPICAL SECTION (STA 1+80.6 TO STA 2+10)

N.T.S



PROPOSED CHANNEL TYPICAL SECTION (STA 2+10 TO STA 3+04.7)

N.T.S



PROPOSED CHANNEL TYPICAL SECTION (STA 3+04.7 TO STA 3+71)

N.T.S

NOTES

A. FOR THE SECTION THROUGH THE BRIDGE (STA 1+28.2 TO STA 1+70.2), SEE SECTION-A, SHEET S-2.

GRAPHIC SCALE

8 0 2 4 8 16

(IN FEET)

1/8 inch = 1 ft.

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130825
ECT PROJECT NUMBER

AAB	AAB
DESIGNED BY	CHECKED BY
AAB/PFH	JOM
DRAWN BY	APPROVED BY

SHEET TITLE

TYPICAL SECTIONS

AS SHOWN

NORTH

SHEET NUMBER

S-11