ATTACHMENT B –
DESIGN DRAWINGS
GENERAL NOTES
1. THE CONTRACTOR SHALL HAVE SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE SECURITY. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE SECURITY AND CARE OF ALL PERSONS AND PROPERTY.


3. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT SHOWN.


5. PRIOR TO FINAL EXCAVATION AND INSTALLATION OF AUXILIARY SPILLWAY, RIVER SHALL BE OBSERVED FOR FISH HABITS AND THEREFORE REDUCE RISK OF EXCEEDANCE OF SIPHON CAPACITY.

6. THE DREDGED CHANNEL UPSTREAM OF THE CONCRETE COREWALL (STAGE 3, SHEET B-4.1).

7. THE ROADOWNER IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT AND MAINTAIN ANY EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT OF THE ROADOWNER.


9. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT SHOWN.

10. THE CONTRACTOR SHALL HAVE SOLE AND COMPLETE RESPONSIBILITY FOR JOB SITE SECURITY. THE CONTRACTOR WILL BE RESPONSIBLE FOR THE SECURITY AND CARE OF ALL PERSONS AND PROPERTY.


12. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE PROTECTION OF ALL EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT SHOWN.


14. THE ROADOWNER IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT AND MAINTAIN ANY EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT OF THE ROADOWNER.

15. THE CONTRACTOR SHALL TAKE THE NECESSARY STEPS TO PROTECT THE PROJECT AND THE ADJACENT PROPERTY, STRUCTURES, UTILITIES AND LANDSCAPING FROM ANY DAMAGE, DAMAGE TO EXISTING property, AND LOSS OF LIFE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE ENVIRONMENT AND THE WORK SITE FROM DAMAGE.

16. THE ROADOWNER IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT AND MAINTAIN ANY EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT OF THE ROADOWNER.

17. THE CONTRACTOR SHALL TAKE THE NECESSARY STEPS TO PROTECT THE PROJECT AND THE ADJACENT PROPERTY, STRUCTURES, UTILITIES AND LANDSCAPING FROM ANY DAMAGE, DAMAGE TO EXISTING property, AND LOSS OF LIFE. THE CONTRACTOR SHALL BE RESPONSIBLE FOR PROTECTING THE ENVIRONMENT AND THE WORK SITE FROM DAMAGE.

18. THE ROADOWNER IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT AND MAINTAIN ANY EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT OF THE ROADOWNER.

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21. THE ROADOWNER IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT AND MAINTAIN ANY EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT OF THE ROADOWNER.


23. THE ROADOWNER IS REQUIRED TO TAKE DUE PRECAUTIONARY MEASURES TO PROTECT AND MAINTAIN ANY EXISTING UTILITY SERVICES SHOWN ON THESE PLANS AND ANY OTHERS NOT OF THE ROADOWNER.
1. The contractor shall comply with Grand Traverse County rules & regulations for soil erosion control & submit a schedule of soil erosion & sedimentation control practices to the County's chief engineer for review prior to any work on the site. Said schedule of practices shall be submitted to the County 30 days prior to commencement of work.

2. Erosion and sediment control measures shall be categorized as initial, interim, and final measures. Initial measures shall be implemented prior to construction, interim measures subject to construction traffic, and final measures upon completion of construction.

3. The contractor shall report all temporary & permanent erosion control measures to the County's chief engineer for review prior to construction.

4. The contractor shall report all unforeseen erosion or sedimentation problems to the County's chief engineer for review.

5. All disturbed areas that will be left exposed for more than 30 days and not subject to erosion control must be stabilized with a suitable erosion control measure. The contractor is responsible for maintaining the disturbed areas during construction.

6. The contractor shall report the location and extent of any disturb to the County's chief engineer for review prior to construction. The area shall be stabilized by the contractor at no additional cost to the owner.

7. The contractor shall take all necessary actions to control the water discharge from disturbed areas. The contractor shall control the discharge from disturbed areas at no additional cost to the owner.

8. All temporary erosion control measures shall be designed to control soil erosion and sedimentation. The contractor shall take all necessary actions to control the discharge from disturbed areas.

9. All disturbed areas that will be left exposed more than 30 days and not subject to erosion control must be stabilized with a suitable erosion control measure.

10. All disturbed areas that will be left exposed for more than 30 days and not subject to erosion control must be stabilized with a suitable erosion control measure.

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25. All disturbed areas that will be left exposed for more than 30 days and not subject to erosion control must be stabilized with a suitable erosion control measure.
NOTE:
REFER TO RESTORATION SHEETS R-1.4 & R-2.4 FOR DETAILS PERTAINING TO THE TEMPORARY RIVER CHANNEL. PROPOSED PROFILE AND CROSS SECTIONS ARE DETAILED IN THOSE PLAN SHEETS.
NOTE: REFER TO RESTORATION SHEETS R-1.4 & R-2.4 FOR DETAILS PERTAINING TO THE TEMPORARY RIVER CHANNEL. PROPOSED PROFILE AND CROSS SECTIONS ARE DETAILED IN THOSE PLAN SHEETS.
REFER TO SHEETS B-8.1 - B-8.3 FOR AUXILIARY SPILLWAY AND STILLING BASIN DETAILS

LEGEND
EXISTING MAJOR RIP RAP
CONSTRUCTION ACCESS
ARTICULATED BLOCK
PROPOSED CONTOUR LINE
CONTOUR LINE
EXISTING MINOR CONTOUR LINE
ANTICIPATED WATER SURFACE
CULVERTS
WSE = WATER SURFACE ELEVATION

0 12.5' 25'
HORIZONTAL
0 25' 50'
VERTICAL

BOTTOM OF SHEETPILE VARIES BY LOCATION
BOTTOM OF CONCRETE COREWALL VARIES BY LOCATION

AUXILIARY SPILLWAY PROFILE
NOTE: EXCAVATION OF THE CONCRETE COREWALL (THE COREWALL WILL NOT HAVE MORE THAN 8 FEET OF UNSUPPORTED HEIGHT). THE SHEET PILE WALL LOCATED BENEATH THE CONCRETE COREWALL WILL NOT HAVE MORE THAN 3 FEET OF UNSUPPORTED HEIGHT DURING REMOVAL.

NOTE: DURING REMOVAL OF THE CONCRETE COREWALL, THE COREWALL SHALL NOT HAVE MORE THAN 8 FEET OF UNSUPPORTED HEIGHT. THE SHEET PILE WALL LOCATED BENEATH THE CONCRETE COREWALL SHALL NOT HAVE MORE THAN 3 FEET OF UNSUPPORTED HEIGHT DURING REMOVAL.

NOTE: EXCAVATION OF PROPOSED RIVER CHANNEL THROUGH EARTHEN EMBANKMENT IS TO BE COMPLETED IN THE FOLLOWING STEPS.

1. SIMULTANEOUSLY EXCAVATE OR ALTERNATE THE EXCAVATION OF THE NORTH AND SOUTH SIDES OF THE DAM EMBANKMENT AND RIVER CHANNEL AND DEMOLISH THE CONCRETE COREWALL SUCH THAT THE MAXIMUM FREE STANDING HEIGHT OF THE COREWALL DURING EXCAVATION IS 8 FEET.

2. SLOWLY EXCAVATE THE MATERIAL ON THE SOUTH SIDE OF THE CONCRETE COREWALL AND ALLOW THE RIVER FLOW TO RELEASE THE SEDIMENT PLUG.

3. AFTER SEDIMENT PLUG IS REMOVED FINAL RIVER RESTORATION EFFORTS CAN OCCUR.

NOTE: DURING REMOVAL OF THE CONCRETE COREWALL, THE COREWALL SHALL NOT HAVE MORE THAN 8 FEET OF UNSUPPORTED HEIGHT. THE SHEET PILE WALL LOCATED BENEATH THE CONCRETE COREWALL SHALL NOT HAVE MORE THAN 3 FEET OF UNSUPPORTED HEIGHT DURING REMOVAL.

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LEGEND

EXISTING MAJOR FENCE LINE
PROPOSED CONTOUR LINE
PAVEMENT BOUNDARY
EXISTING MINOR CONTOUR LINE

REFER TO SHEET R-3.3 FOR CROSS SECTION DETAILS OF TYPICAL RESTORED RIVER CHANNEL AND SHEET R-1.4 FOR THE PROFILE OF THE RESTORED RIVER THROUGH THE DAM EMBANKMENT.

EAST SLOPE AT THE EARTHEN DAM EMBANKMENT MAXIMUM 3:1 SLOPE
WEST SLOPE AT THE EARTHEN DAM EMBANKMENT MAXIMUM 2:1 SLOPE

CONCRETE CORE WALL TO BE REMOVED TO 1’ BELOW FINISHED GRADE AT MINIMUM

FLOODPLAIN BENCH

FINAL RESTORED RIVER CHANNEL
EXISTING TOPOGRAPHY

AUXILIARY SPILLWAY

CONTRACTOR'S DRAWING
3/3/15 30% DESIGN REVIEW

6/3/15 60% DESIGN REVIEW

8/21/15 90% DESIGN REVIEW

10/21/15 100% DESIGN REVIEW
RESTORATION TYPICAL DETAILS

SAND AS AVAILABLE

SAND & STONES

ENTRANCE

CONCRETE BLOCK

CONCRETE SLABS

CONCRETE BLOCKS

GRAVEL

GROUND

FROST LINE (3 FEET) ABOVE WATER TABLE

SOIL AND SANDY MATERIAL

WOOD WEDGE (OR APPROVED EQUAL)

GRADE TO 1:2 MAX SLOPE

UNSTABLE SLOPE

SPACING DEPENDS ON SOIL TYPE AND SLOPE STEEPNESS.

A TRENCH APPROXIMATELY 3-5 INCHES DEEP SHOULD BE DUG AND THE COIR LOGS PLACED IN TRENCH AND BACKFILLED.

6" MIN. AGGREGATE TAPER EDGES AT 1:1

ORIGINAL GROUND 6"

12" TYP

CROSS SLOPE 3% OR FLATTER

TYPICAL SNAKE HIBERNACULUM

NOT TO SCALE

NOTE: ALTERNATE ITEM TO BE ADDED TO PROJECT BY OWNER AND ENGINEER. LOCATIONS TO BE DETERMINED IN THE FIELD DURING CONSTRUCTION.

NOTE: LOCATIONS TO BE DETERMINED IN THE FIELD DURING CONSTRUCTION.

NOTE: LOCATIONS TO BE DETERMINED IN THE FIELD DURING CONSTRUCTION.

TYPICAL SOIL EROSION CONTROL W/ COIR LOGS FOR STEEP SLOPES

NOT TO SCALE

NOTE: ALTERNATE ITEM TO BE ADDED TO PROJECT BY OWNER AND ENGINEER. LOCATIONS TO BE DETERMINED IN THE FIELD DURING CONSTRUCTION.

UNSTABLE SLOPE REMEDIATION (AS DIRECTED BY FIELD ENGINEER)

NOT TO SCALE

GRAVEL PARKING AREA

NOT TO SCALE
NOTES:
CASS ROAD BRIDGE TO BE CONSTRUCTED BY SEPARATE CONTRACTOR IN SUMMER 2016. AT THAT TIME RIPRAP WILL BE PLACED TO AN ELEVATION OF 618', THE LIMITS OF EXCAVATION UNDER THAT PROJECT. AFTER TEMPORARY RIVER CHANNEL HAS BEEN CONSTRUCTED AND EXCAVATION IS COMPLETE, THE REMAINING RIPRAP REQUIRED FOR ABUTMENT PROTECTION SHALL BE PLACED ACCORDING TO THESE DETAILS.
CONCRETE ARTICULATED BLOCK SPILLWAY WEIR APPROX. 70'

ROCK RIPRAP LETDOWN (D50=24-INCHES) ON AUXILIARY SPILLWAY WEIR

AUXILIARY SPILLWAY WEIR CONCRETE ARTICULATED BLOCK

MINIMUM OF 10-FEET DOWNSTREAM OF CORE WALL

2:1 SLOPE (TYP.)
**Auxiliary Spillway Stilling Basin Entrance Detail**

**Scale:** 1" = 2'

1. **Riprap at toe of grade break below articulated concrete blocks** to be covered entirely with grout and smooth finished.
2. **Riprap on sideslopes** to be grouted to full depth covered entirely with grout and smooth finished.
3. **Top of rock riprap downstream of baffles** to be grouted to full depth to EL. 615.0.
4. **Grout riprap on sideslopes** a minimum of 2.5-feet downstream of grouted basin jersey barrier baffles.

**Notes:**

- Use 1/1 scale for grouting.
- Use 1/5 scale for topographic details.
- Use 1/4 scale for structural details.
- Use 1/30 scale for construction and site plans.
- Use 1/100 scale for general arrangement and structural details.
- Use 1/200 scale for details of structural members.
- Use 1/2000 scale for site plans.

**Specifications:**

- **Riprap (D50=14 inches):**
  - Thickness = 2 x D50
- **Top of basin EL. 615±:**
- **End sill EL. 617:**
- **8 oz/sq yd filter geotextile:**
- **2.0' (4-foot wide type F jersey barrier baffle block):**
  - Embedded in riprap and grouted in place.
  - Back of barrier to have a grouted 1:1 slope.
  - Space blocks evenly.
  - Top EL. 616.0±.
- **3.0' (6.5': 10.0 min.) 3.0':**
- **30% Design Review:**
- **2:1 H:V:**
- **EL. 617:**
- **Impermeable clay berm 2.0':**
- **4-foot wide type F jersey barrier baffle block:**
  - Embedded in riprap and grouted in place.
  - Back of barrier to have a grouted 1:1 slope.
  - Space blocks evenly.
  - Top EL. 616.0±.
- **6.2' min. 3.0':**
- **30.0':**
- **Approach grouting riprap basin to full 6' depth - top of riprap not to protrude. Above grout - bottom of basin to be smooth.**
- **2.0':**
- **5.0' min.:**
- **Impermeable clay berm:**
- **2.0':**
- **5.0' min.:**
- **1.0':**
- **Anchor geotextiles:**
- **3.0':**
- **6.0' of bedding stone:**
  - ASHTO #1 and #2 1.5' min.
- **2.0':**
- **4.0':**
- **610 620 615 600 630:**
- **610 620 615 600 630:**
- **Notes:**
  1. **Riprap at toe of grade break below articulated concrete blocks** to be covered entirely with grout and smooth finished.
  2. **Riprap on sideslopes** to be grouted to full depth covered entirely with grout and smooth finished.
  3. **Top of rock riprap downstream of baffles** to be grouted to full depth to EL. 615.0.
  4. **Grout riprap on sideslopes** a minimum of 2.5-feet downstream of grouted basin jersey barrier baffles.

**Construction Details:**

- **Auxiliary Spillway Stilling Basin End Sill Detail (Looking Downstream):**
  - Scale 1" = 6'
  - 8 oz/sq yd filter geotextile
  - 10.0 min. 6.5'
  - 30.0'
  - 2.0' H:V
  - EL. 617
  - 4-foot wide type F jersey barrier baffle block
  - Embedded in riprap and grouted in place
  - Back of barrier to have a grouted 1:1 slope
  - Space blocks evenly
  - Top EL. 616.0±
  - 3.0' min.
  - 6.0' of bedding stone
  - ASHTO #1 and #2
  - 1.5' min.

- **Auxiliary Spillway Stilling Basin Jersey Barrier Baffle Block Detail:**
  - Scale 1" = 1'
  - 2.0' H:V
  - EL. 617
  - Impermeable clay berm 2.0'
  - 4-foot wide type F jersey barrier baffle block
  - Embedded in riprap and grouted in place
  - Back of barrier to have a grouted 1:1 slope
  - Space blocks evenly
  - Top EL. 616.0±
  - 3.0' min.
  - 6.0' of bedding stone
  - ASHTO #1 and #2
  - 1.5' min.
1. THE UPSTREAM FACE OF THE TAILWATER CONTROL COVERED WITH 1-FOOT OF RIPRAP ALONG THE ENTIRE OVERFLOW SECTION AND THE AREA OF THE CULVERT INLETS, AND DOES NOT NEED TO BE GROUTED.

2. THE DOWNSTREAM FACE OF THE TAILWATER CONTROL 3:1 SLOPE AND COVERED WITH 2.0-FEET OF RIPRAP, THE RIPRAP TO BE EXPOSED 6-INCHES ABOVE THE GROUT LINE.

3. TOP OF ROCK RIPRAP AT CREST OF THE RIPRAP TO BE EXPOSED 6-INCHES ABOVE THE GROUT LINE.

4. GROUT RIPRAP ON SIDESLOPES OF THE CONTROL BERM LETDOWN TO EXTEND A MINIMUM OF 13-FEET DOWNSTREAM OF GRADE BREAK ALONG THE ENTIRE OVERTOPPING SECTION.
WARNING!!!

EXISTING ROAD CONTRACTOR TO VERIFY OVERHEAD TRANSMISSION LINES AND TOWERS NEAR CONSTRUCTION AREA.

EXISTING GRADE 0.37% AVERAGE SLOPE

GRADE BREAK 0.32% AVERAGE SLOPE

ELEV:642.9 STA:256+40

ELEV:607.0 STA:200+00

ELEV:645 STA:150+00

Surrounding Features:
- Boardman Dam Spillway
- Keystone Road
- Existing Road
- Temporary Access
- Property Boundary, Typ.
- Multiple High Voltage Power Lines, Power Poles, and Lines, Typical of Surrounding Area

Channel & Floodplain Earthwork Quantities

<table>
<thead>
<tr>
<th>Station</th>
<th>ROAD, TYP.</th>
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<td>153+00</td>
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Sheet R-1.2

Sheet R-1.3

Approx. 2014 Delta
1. DESIGN TOPOGRAPHY, CHANNEL PROFILE AND CHANNEL GRADING SHOW GENERAL DESIGN INTENT, AND WILL BE ADAPTED DURING CONSTRUCTION WITH THE ASSISTANCE OF THE ENGINEER BASED ON PRE-DAM FEATURES AND OVERHEAD POWER LINES AND TOWERS (FROM AERIAL IMAGERY).

2. DETAILED GRADING OF THE LOW FLOW CHANNEL IS NOT REFLECTED IN THE DESIGN CONTOURS. THIS IS A FIELD SET ITEM, TO BE CONSTRUCTED WITH ASSISTANCE OF THE ENGINEER.

3. SPOIL AREAS LINES AND GRADES SHOW FINISH GRADING OF SPOIL AREAS TO ADD VARIABLE SIDE-SLOPES AND SURFACE AS NEEDED TO RESULT IN A NATURAL LANDFORM AND TRANSMISSION APPEARANCE AT THE END OF CONSTRUCTION.

EXISTING MAJOR (5 FT) CONTOUR
EXISTING MINOR (1 FT) CONTOUR FINISH 1 FT CONTOUR
EXISTING CHANNEL ALIGNMENT
SILT FENCE
SPOIL AREA
LONGITUDINAL PROFILE STA. 256+40 - 228+00

NOTES:
1. CENTERLINE兩個變形，繪製剖面和
2. 給定等高線。但本設計考慮
3. 與建築師的協調，並在
4. 建設過程中助
5. 助手D
6. TECHNICAL SERVICES
7. 100% DESIGN
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98. 100% DESIGN
99. 100% DESIGN
100. 100% DESIGN
EXISTING CHANNEL ALIGNMENT

UPSTREAM OF STA 214+00

CHANNEL WIDTH: 46.8 FT.

BANK HEIGHT: 2.8 FT.

TRANSITION FROM DOWNSTREAM 48 FT CHANNEL WIDTH

R-2.5

214+00

S6

TO UPSTREAM 46.8 FT WIDTH

SHEET KEY

TRANSITION FROM DOWNSTREAM 3 FT CHANNEL BANK HEIGHT

R-2.2

214+00

S6

TO UPSTREAM 2.8 FT BANK HEIGHT

SHEET KEY

GRADE TRANSITION UNIFORMLY

ALIGNMENT TO BE ALLOWED

FROM STA 210+00 TO STA 214+00.

EVOLVE FOR POST CONSTRUCTION

EXISTING MAJOR (5 FT) CONTOUR

CP,BL,SJ

CONDITIONS & SHALL BE

EXISTING MINOR (1 FT) CONTOUR

MONITORED FOR DEVELOPMENT OF

NUISANCE EROSION.

LIMITS OF DISTURBANCE

TEMPORARY ACCESS ROUTE

SILT FENCE

SPOIL AREA

OVERHEAD POWER LINES

AND POLES (SURVEYED)

DETAILED GRADING OF THE LOW FLOW

CHANNEL IS NOT REFLECTED IN THE

DESIGN CONTOURS & TO BE

CONSTRUCTED WITH ASSISTANCE OF

THE ENGINEER.

SEE DETAIL:

TEMPORARY

SEDIMENT TRAP,

GRADE FROM

FLOODPLAIN TO

MATCH EXISTING AT 3:1

GRADE BREAK

SHEET R-1.3 SHEET EXTENTS

R-3.2

MATCH EXISTING AT 3:1

VOLTAGE POWER LINES IN

CONTRACTOR TO VERIFY

LOCATION AND CLEARANCE

TO LINES, POWER POLES,

AND TRANSMISSION

TOWERS.

NOTES:

1. DESIGN TOPOGRAPHY, CHANNEL PROFILE AND

CHANNEL GRADING SHOW GENERAL DESIGN

INTENT, AND WILL BE ADAPTED DURING

CONSTRUCTION WITH THE ASSISTANCE OF THE

ENGINEER BASED ON PRE-DAM FEATURES AND

TOPOGRAPHY THAT ARE REVEALED DURING

DRAWDOWN OF THE IMPOUNDMENT ANDEXCAVATION OF ACCUMULATED SEDIMENT.

2. DETAILED GRADING OF THE LOW FLOW CHANNEL

IS NOT REFLECTED IN THE DESIGN CONTOURS.

THIS IS A FIELD SET ITEM, TO BE CONSTRUCTED

WITH THE ASSISTANCE OF THE ENGINEER.

3. SPOIL AREAS LINES AND GRADES SHOW

GENERAL EXTENTS AND SHAPE OF GRADING.

FINISH GRADING OF SPOIL AREAS TO ADD

VARIABLE SIDE-SLOPES AND SURFACE AS

NEEDED TO RESULT IN A NATURAL LANDFORM

CONSTRUCTION AREA.

WARNING!!!

MULTIPLE HIGH

VOLTAGE POWER LINES IN

CONTRACTOR TO VERIFY

LOCATION AND CLEARANCE

TO LINES, POWER POLES,

AND TRANSMISSION

TOWERS.

SEE DETAIL:
For Dam Embankment Excavation, Tributary 1, see Sheet B-6.1.

Pool and Bar Grading, see Typical Section R-3.3.

Northing 506163.0 Easting 19357893.5

Northing 505693.6 Easting 19357905.8

R-2.3 A

Constructed Channel, see NTS Typical Section.

8/4/15 90% Design 10/23/15 100% Design

Legend

MB Downstream of Cass Road, the existing major (5 ft) contour

Channel grading will be confirmed at the time of construction by the engineer to provide positive drainage to Sabin Impoundment.

Channel width: 48 ft.

Bank height: 3 ft.

Transition from downstream 47.4 ft channel width to upstream 48 ft. width

Temporary Access Route 1+00

NORTHING 506782.1 EASTING 19358140.3

TRANSITION FROM DOWNSTREAM 2.9 FT. CHANNEL BANK HEIGHT TO UPSTREAM 0.34% AVERAGE SLOPE

Silt fence, typ.

Cass Road Finish Grade

ELEV: 615.9 STA: 179+70

ELEV: 614.1 STA: 174+05

ELEV: 612.5 STA: 172+14

ELEV: 613.5 STA: 172+00

ELEV: 611.8 STA: 176+85

Scale in Feet

NOTES:

1. Design Topography, Channel Profile and General Extents are provided. Final channel alignment and profile are to be determined in consultation with this guidance. The engineer will determine final layout and grade and channel dimensions. All channel widths shown are minimum channel widths. Erosion controlRAYVACON will determine the minimum channel width required in accordance with Rayvac methods. See Sheet R-1.4 for details.

2. Detailed grading of the low flow channel is not reflected in the design contours. This is a field set item, to be constructed with assistance of the engineer. See detail:

3. Spoil areas lines and grades show general extents and shape of grading. Existing grades to be finish grading of spoil areas to add variable side slopes and surface as appearance at the end of construction.

4. Auxillary spillway & foundation will be confirmed at the time of construction by the engineer.

5. Power poles (surveyed) and overhead transmission lines and power lines in construction area. Contractor to verify location and clearance to lines, power poles, and transmission.

6. Multiple high voltage power lines in construction area. Contractor to verify location and clearance to lines, power poles, and transmission.

7. Remove Beaver dam and salvage footbridge for use by others.

8. Existing channel alignment plan & profile STA. 180+00 - 156+83

9. Existing grade auxilliary spillway & foundation.

10. 0.34% average slope
WARNING!!! MULTIPLE HIGH VOLTAGE POWER LINES IN AND NEAR CONSTRUCTION AREA. CONTRACTOR TO VERIFY LOCATION AND CLEARANCE TO LINES, POWER POLES, AND TRANSMISSION TOWERS.
BASELINE ALIGNMENT AT CENTER OF CHANNEL, TYP.

NOTES:
1. DESIGN TOPOGRAPHY, CHANNEL PROFILE AND CHANNEL GRADING SHOW GENERAL DESIGN INTENT, AND WILL BE ADAPTED DURING CONSTRUCTION WITH THE ASSISTANCE OF THE ENGINEER BASED ON PRE-DAM FEATURES AND TOPOGRAPHY THAT ARE REVEALED DURING DRAWDOWN OF THE IMPOUNDMENT AND EXCAVATION OF ACCUMULATED SEDIMENT.
2. DETAILED GRADING OF THE LOW FLOW CHANNEL IS NOT REFLECTED IN THE DESIGN CONTOURS. THIS IS A FIELD SETITEM, TO BE CONSTRUCTED WITH THE ASSISTANCE OF THE ENGINEER.
NOTE: Design topography, channel profile and channel grading show general design intent, and will be adapted during construction with the assistance of the Engineer based on pre-dam features and topography that are revealed during drawdown of the impoundment and excavation of accumulated sediment.

2. Detailed grading of the low flow channel is not reflected in the design contours. This is a field set item, to be constructed with the assistance of the Engineer.
NOTES:
1. DESIGN TOPOGRAPHY, CHANNEL PROFILE AND CHANNEL GRADING SHOW GENERAL DESIGN INTENT, AND WILL BE ADAPTED DURING CONSTRUCTION WITH THE ASSISTANCE OF THE ENGINEER BASED ON PRE-DAM FEATURES AND TOPOGRAPHY THAT ARE REVEALED DURING DRAWDOWN OF THE IMPOUNDMENT AND EXCAVATION OF ACCUMULATED SEDIMENT.
2. DETAILED GRADING OF THE LOW FLOW CHANNEL IS NOT REFLECTED IN THE DESIGN CONTOURS. THIS IS A FIELD SET ITEM, TO BE CONSTRUCTED WITH THE ASSISTANCE OF THE ENGINEER.
NOTES:

1. DESIGN TOPOGRAPHY, CHANNEL PROFILE AND CHANNEL GRADING SHOW GENERAL DESIGN INTENT, AND WILL BE ADAPTED DURING CONSTRUCTION WITH THE ASSISTANCE OF THE ENGINEER BASED ON PRE-DAM FEATURES AND TOPOGRAPHY THAT ARE REVEALED DURING DRAWDOWN OF THE IMPOUNDMENT AND EXCAVATION OF ACCUMULATED SEDIMENT.

2. DETAILED GRADING OF THE LOW FLOW CHANNEL IS NOT REFLECTED IN THE DESIGN CONTOURS. THIS IS A FIELD SET ITEM, TO BE CONSTRUCTED WITH THE ASSISTANCE OF THE ENGINEER.

3. SPOIL AREAS LINES AND GRADES SHOW GENERAL EXTENTS AND SHAPE OF GRADING. FINISH GRADING OF SPOIL AREAS TO ADD VARIABLE SIDE-SLOPES AND SURFACE AS NEEDED TO RESULT IN A NATURAL LANDFORM APPEARANCE AT THE END OF CONSTRUCTION.

4. SCALE IN FEET
ALL LOG PILES SHALL BE INSTALLED USING VIBRASONIC PILE DRIVING EQUIPMENT. INSTALLATION BY EXCAVATION OR HAMMERING WILL NOT BE ALLOWED.

LOG PILES SHALL BE INSTALLED USING VIBRISONIC PILE DRIVING EQUIPMENT. INSTALLATION BY EXCAVATION OR HAMMERING WILL NOT BE ALLOWED.

EXCAVATOR BUCKET GRIP POINT SHALL BE WITHIN THE RANGE OF 12-14 IN.

SLASH FOR WORKING LOAD RIGGING EXCEEDING 12 TONS

TENSION METER RIGGING FOR PILE TESTING SHALL CONFORM TO THE TENSION SCALE MANUFACTURER'S RECOMMENDATIONS.

CONSTRICTOR HITCH FASTENING LOCATION

USE 3 CLAMPS AT EACH FASTENING LOCATION

EQUAL TO 2-YR FLOOD WATER SURFACE

EMBEDMENT DEPTHS MAY INCLUDE 6 FT, 8 FT, 10 FT, AND 12 FT.

PILE. DEPTHS SHALL BE DETERMINED IN THE FIELD. AS A GUIDELINE, TEST EMBEDMENT DEPTHS MAY INCLUDE 6 FT, 8 FT, 10 FT, AND 12 FT.

UP TO 10% OF PRODUCTION PILINGS SHALL BE PROOF TESTED. IF RESULTS VARY MORE THAN 50% THEN IT SHOULD BE ANTICIPATED THAT UP TO 25% OF THE PRODUCTION PILINGS SHALL BE PROOF TESTED.

PROOF TESTS SHALL BE MADE AT UP TO FOUR EMBEDMENT DEPTHS FOR EACH PILE. DEPTHS SHALL BE DETERMINED IN THE FIELD. AS A GUIDELINE, TEST EMBEDMENT DEPTHS MAY INCLUDE 6 FT, 8 FT, 10 FT, AND 12 FT.

THE FOUR LOAD TESTS SHALL BE APPLIED TO THE PILE WITH A DIFFERENT INSTALLED DEPTH.

EACH PILE TEST SHALL HAVE UPWARD LOAD GRADUALLY INCREASED AND AS CLOSELY ALIGNED TO AXIS OF PILE AS POSSIBLE. RECORD THE PILE DIAMETER, EMBEDMENT DEPTH AND MAXIMUM FORCE REQUIRED TO MOVE THE PILE ON SIDE OF LIVE LOAD.

THAT CAUSES THE PILE TO MOVE VERTICALLY 1 INCH. REPEAT FOR THIRD AND FOURTH TEST.

EXCAVATOR CONDUCTING PULL OUT LOADING SHALL BE POSITIONED NO CLOSER THAN EMBEDMENT DEPTH OF PILE, IF POSSIBLE. IF A CLOSER POSITIONING IS REQUIRED, EXCAVATOR SHALL BE NO CLOSER THAN THAT REQUIRED TO GENERATE DESIRED LOADING WITH DISTANCE FROM PILE NOTED IN THE TEST RECORD. LIMIT COMPRESSIVE LOADING OF THE TRACKS ON THE GROUND BY DRIVING THE EXCAVATOR ONTO LOGS LAID ON THE GROUND TO DISTRIBUTE THE WEIGHT OVER A LARGER AREA.

CABLE DETAIL 3/8 IN. DIAM. (MIN.) 10/23/15 100% DESIGN

46.8 TO 48 FT 2.8 TO 3.0 FT

CHANNEL GRADING DETAIL EXCAVATED SCOUR POOL

END OF RADIUS ALONG CHANNEL CENTERLINE, AS

FRONT 10 FEET OF BACKFILL SHALL BE SALVAGED GRAVEL AND PACK SLASH BETWEEN LOG LAYERS AT OR BEHIND BANK TOP.

CHANNEL BANK TOP, TYP.

CHANNEL RESTORATION TYPICALS

USED TO COVER A MAIN BRANCH TO THE POOL.

LOG PILE - EMBED 15 FT MIN.

BENEATH SUBGRADE.

MATERIAL EXCAVATED FROM POOLS, IF COARSE (GRAVEL, COBBLES, AND BOULDERS), WILL BE PLACED ACROSS THE CHANNEL TO FORM BARS OR DOWNSTREAM TO AUGMENT RIFFLES. IF POOL MATERIAL IS COMPOSED OF SAND OR FINER IT WILL BE SPOILED OUTSIDE OF THE CHANNEL AND FLOODPLAIN CORRIDOR.

DETAILED GRADING OF THE CHANNEL IS NOT REFLECTED IN THE DESIGN CONTOURS. THIS IS A FIELD SET ITEM, TO BE CONSTRUCTED WITH ASSISTANCE OF THE ENGINEER.

MATERIAL EXCAVATED FROM POOLS WILL BE USED TO BUILD A CONTROL WAR MATERIAL ACROSS THE POOL.

CHANNEL RESTORATION TYPICALS

EXPANDED DRAWINGS OF THE CHANNEL IS NOT REFLECTED IN THE DESIGN CONTOURS. THIS IS A FIELD SET ITEM, TO BE CONSTRUCTED WITH ASSISTANCE OF THE ENGINEER.
**NOTES:**

1. D = 5' STD. (SINGLE PANEL FOR WATER DEPTHS 5' OR LESS).
2. D = 5' STD. (ADDITIONAL PANEL FOR WATER DEPTHS > 5').
3. CURTAIN TO REACH BOTTOM UP TO DEPTHS OF 10 FEET. TWO (2) PANELS TO BE USED FOR DEPTHS GREATER THAN 10 FEET UNLESS OTHERWISE SPECIFIED IN THE CONSTRUCTION PLANS OR AS DIRECTED BY THE ENGINEER.

**PROPOSED CHANNEL**

- **TOE OF BANK**
- **TOP OF BANK**

- PLACE SAND-FILLED BULK BAGS, AS NECESSARY, TO BACKWATER EXISTING POOL.

**BARIER OPTIONS:**

- JERSEY, SUPERSACK, TURBIDITY CURTAIN

**BARRIER - JERSEY, SUPERSACK, TURBIDITY CURTAIN, SEE NOTES**

- AMOCO 4552 NONWOVEN GEOTEXTILE AND VISQUEEN OR APPROVED EQUAL WRAPPED AROUND BARRIER

**SAND BAGS PLACED TO MEET BANK GRADE**

**BARRIER - JERSEY, SUPERSACK, TURBIDITY CURTAIN, SEE NOTES**

**CHANNEL RESTORATION - SEDIMENT CONTROL TYPICAL DETAILS**
INSTALLATION SEQUENCE AND INSTRUCTIONS FOR FABRIC ENCAPSULATED SOIL LIFTS (FES)

1. REMOVE THE EXISTING SOIL, ROCK OR MATERIAL FROM THE TRENCH. APPLY 1 FT MINIMUM OF SOIL OR NATIVE MATERIAL TO THE TRENCH BOTTOM. APPLY SOIL SIXTY PERCENT (60%) DESIGN

2. OUTER FABRIC ENDS SHALL BE JOINED BY LAPPING THE UPSTREAM PIECE OF FABRIC OVER THE DOWNSTREAM PIECE AS SHOWN IN SECTION B-B. OVERLAPS SHALL BE A MINIMUM OF 3 FT, INNER FABRIC ENDS SHALL BE BUTTED TOGETHER, NOT OVERLAPPED. OVERLAPS SHALL BE STAGGERED FROM LIFT TO LIFT BY A MINIMUM OF 15 FT.

3. STAKING SPACING IS DEFINED IN SPECIFICATIONS FOR FES LIFT AND SURFACE FABRIC. STAKES 1 PER 3 L.FT. ALONG THE STREAMBANK OR CHANNEL SIDE STREAM SIDE.


5. APPLY NATIVE SEED MIX TO TOP OF FILL FROM THE FRONT OF THE LIFT (FIG C).

6. FOLD THE LOOSE ENDS OF THE TWO COIR FABRIC LAYERS BACK OVER THE TOPOF COMPLETED LIFT SO THAT BASAL END IS DIRECTED INTO THE EXISTING STREAMBANK OR CHANNEL SIDE STREAM SIDE. FOLD BOTH INNER AND OUTER FABRIC OVER SOIL LIFT TO 45°

7. FOLD BOTH INNER AND OUTER FABRIC OVER BOTTOM OF KEY TRENCH (FIG D). INSTALLATION SEQUENCE AND INSTRUCTIONS FOR FABRIC ENCAPSULATED SOIL LIFTS (FES)


9. FOLD BOTH INNER AND OUTER FABRIC OVER KEY TRENCH DETAIL (FIG G). INSTALLATION SEQUENCE AND INSTRUCTIONS FOR FABRIC ENCAPSULATED SOIL LIFTS (FES)

10. SUPPLEMENT LIFT STAKING WITH ADDITIONAL WOODEN STAPLES ON FORMING SIDE STREAM SIDE.

11. PLACE LIVE CUTTINGS UNDER 1 FT. ON CENTER STAKES 3 FT OC IN KEY TRENCH.

12. USE NATIVE SEED MIX ON THE BANK SIDE OF THE FORMS (FIG C).

GENERAL NOTES ON SECURING COIR FABRIC

1. INSTALL KEY TRENCH NEAR OR AT THE PARALLEL TO THE LONG AXIS OF THE CHANNEL AND POSITION IT SO THAT 3 FEET EXTENDS FOR EMBEDMENT ON THE BANK SIDE OF THE FORMS (FIG B). DRAPE THE REMAINDER OF THE FABRIC NOT TO SCALE

2. OUTER FABRIC ENDS SHALL BE JOINED BY LAPPING THE UPSTREAM PIECE OF FABRIC OVER THE DOWNSTREAM PIECE AS SHOWN IN SECTION B-B. OVERLAPS SHALL BE A MINIMUM OF 3 FT, INNER FABRIC ENDS SHALL BE BUTTED TOGETHER, NOT OVERLAPPED. OVERLAPS SHALL BE STAGGERED FROM LIFT TO LIFT BY A MINIMUM OF 15 FT.

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11. PLACE LIVE CUTTINGS UNDER 1 FT. ON CENTER STAKES 3 FT OC IN KEY TRENCH.

12. USE NATIVE SEED MIX ON THE BANK SIDE OF THE FORMS (FIG C).
Typical Private Access Cross Section

Station

<table>
<thead>
<tr>
<th>Station</th>
<th>Elevation</th>
</tr>
</thead>
<tbody>
<tr>
<td>0+00</td>
<td>640</td>
</tr>
<tr>
<td>1+00</td>
<td>650</td>
</tr>
<tr>
<td>1+07</td>
<td>660</td>
</tr>
</tbody>
</table>

Legend:
- Existing Major Contour Line
- Proposed Contour Line
- Existing Minor Contour Line
- Wetlands
- Existing Access Pad
- Existing Bank

Upon completion of the project, restore wetlands impacted by construction access road.

Construction Access Road.

Private Property Owners (the Alpers) River Access.

South Construction Access Road.

River Launch Area.

River Floodplain.

Alpers River Access with maximum 10% longitudinal grade and 10 feet wide.

Alpers River Access widens to 20 feet as it approaches the river.

Construction Entrance.

Silt Fencing.

Gravel Access Pad.

Silt Fence.

Project Boundary.

Construction Access.

Property Boundary.

Wetland.

Typical Private Access Cross Section.
GENERAL NOTES

UTILITIES

MISS DIG/UNDERGROUND UTILITY NOTIFICATION

All signs on the plans or in the log that do not have a recommendation are to be retained.

EXISTING SIGN RELOCATION

If plan information indicates an existing underground utility is or will be out of service within the limits of this contract, the Contractor shall contact the owner to determine the need for relocation.  The Contractor shall be responsible for obtaining and executing the necessary underground utility relocation permit and for the cost of this work.  Signs and posts damaged during the removal and storage operations shall be replaced with new signs and posts.

MARKETABLE TIMBER

All affected trees, stumps, and root masses are to be removed to a maximum depth of 18 inches, removed using mechanical equipment, and disposed of in accordance with the current edition of Michigan Department Of Transportation (MDOT) "Standard Specifications For Construction.

AGGREGATE BASE

Aggregate bases shall use aggregate 22A, unless otherwise specified.

PLANE LAYING

Signs that have wrinkled or twisted sheeting may be rejected.

EARTHWORK

Appropriate soil erosion and sedimentation control measures shall be in place prior to earth-disturbing activities.  Place turf, sod, or seed/mulch on exposed soil or pavement areas prior to earth-disturbing activities.  Protect all exposed sod with either sod or seed/mulch or mulch blanket as directed by the Engineer.

INFRASTRUCTURE

All infrastructure items are to be constructed according to the current English edition of "Standard Highway Signs" manual or as detailed in plans.

Continued...
1. THE CONTRACTOR SHALL COMPLY WITH GRAND TRAVERSE COUNTY RULES & REGULATIONS FOR SOIL EROSION CONTROL & SUBMIT A SCHEDULE OF SOIL EROSION ACTIVITIES TO THE LOCAL ENFORCING AGENCY PRIOR TO ANY EARTH CHANGE.

2. THE CONTRACTOR SHALL INSPECT ALL TEMPORARY & PERMANENT EROSION CONTROL MEASURES WEEKLY & IMMEDIATELY (WITHIN 24 HOURS) AFTER A SIGNIFICANT RAINFALL EVENT. ALL MEASURES REQUIRING MAINTENANCE REPAIR, OR REPLACEMENT SHALL BE CORRECTED IMMEDIATELY AT NO ADDITIONAL COST TO THE OWNER.

3. PERMANENT SOIL EROSION CONTROL MEASURES, PLANTINGS & MULCHING FOR ALL SLOPES, CHANNELS, DITCHES OR DISTRIBUTED LAND AREA SHALL BE COMPLETED WITHIN FIVE (5) CALENDAR DAYS AFTER FINAL GRADING OR FINAL EARTH CHANGE HAS BEEN COMPLETED.

4. ALL SUBGRADE SLOPES SHALL BE TRACKED PERPENDICULAR TO THE SLOPE TO AID IN EROSION CONTROL OF SLOPED AREAS.

5. WHERE SEASONAL LIMITATIONS OR CONSTRUCTION DELAYS PREVENT SCHEDULED INSTALLATION OF PERMANENT CONTROL FACILITIES, APPROVED TEMPORARY MEASURES SHALL BE INSTALLED WITHIN FIVE (5) CALENDAR DAYS & MAINTAINED UNTIL REPLACED BY PERMANENT FACILITY.

6. THE LOCATION OF ANY STOCKPILES SHALL BE DESIGNATED BY THE OWNER PRIOR TO CONSTRUCTION. THIS AREA SHALL BE ENCLOSED BY SILT FENCE A REASONABLE DISTANCE FROM THE TOE OF SLOPE UNTIL SUCH TIME IT IS USED.

7. AT COMPLETION OF CONSTRUCTION ACTIVITIES OR UPON REQUEST FOR REVIEW, SUBMIT INSPECTION LOG BOOK TO THE COUNTY, THE OWNER & THE PROFESSIONAL.

8. STREET SWEEPING AND DUST CONTROL SHALL BE THE CONTRACTOR’S RESPONSIBILITY.

9. ALL DRAINAGE DITCHES ARE TO BE STABILIZED WITH EROSION CONTROL BLANKET, DRAINAGE DITCHES STEEPER THAN 3% ARE TO BE SODDED.

10. SLOPES STEEPER THAN 1V:6H (16%) ARE TO BE STABILIZED WITH EROSION CONTROL BLANKETS.

11. CONCRETE RUBBLE MAY BE SALVAGED AND USED FOR TEMPORARY EROSION CONTROL, BUT ALL METAL SHALL BE CUT FLUSH AND DISPOSED OF OFF-SITE.

12. SILT FENCE SHALL BE INSPECTED AND REPAIRED IMMEDIATELY FOLLOWING ANY SIGNIFICANT RAINFALL (EQUAL TO OR GREATER THAN 0.5 INCHES/24HR) AND DAILY DURING PROLONGED RAINFALL. OTHERWISE, INSPECTION SHALL BE WEEKLY, AT A MINIMUM.

13. SEDIMENT SHALL BE REMOVED FROM THE UPSTREAM FACE OF THE SEDIMENT BARRIER WHEN IT HAS REACHED A 1/2 DEPTH OF THE BARRIER HEIGHT.

14. REPAIR OR REPLACE BARRIER (FABRIC, POSTS, BALES, ETC.) WHEN DAMAGED.

15. BARRIERS SHALL BE INSPECTED DAILY FOR SIGNS OF DETERIORATION AND SEDIMENT REMOVAL.

LEGEND

EXISTING CENTER LINE
PROP BED
PAVEMENT BUILDING
WATERWAY
EDGE OF TOWNSHIP
ADJACENT TOWNSHIP
PROPOSED ROADWAY
CONSTRUCTION ACCESS

LIMITS OF ROAD CONSTRUCTION GRADING

EXISTING TREE LINES
PROPOSED TREE CLEARING LIMITS
SILT FENCE

PROPOSED HMA CURB

EXISTING CONTOUR LINE
FENCE LINE
WETLAND AREA
PROPERTY BOUNDARY
PAVEMENT BOUNDARY
OR SHRUB LINE
EDGE OF TREE AND/AGGREGATE SHOULDER
HMA SHOULDER
ROADWAY

66' ROW
RIGHT OF WAY ACCESS

6/3/15 60% DESIGN REVIEW
8/21/15 90% DESIGN REVIEW
10/21/15 100% DESIGN REVIEW
NOTE:

S - 1.2 INTAKE RETAINING WALL REMOVALS (2 OF 3)

TS TRN DB DD D. DEVAUN 3/3/15
6/3/15 60% DESIGN REVIEW
8/21/15 90% DESIGN REVIEW
10/10/15
100% DESIGN REVIEW
NOTE:
S - 1.3 INTAKE RETAINING WALL REMOVAL (3 OF 3)

3/3/15 30% DESIGN REVIEW
6/3/15 60% DESIGN REVIEW
8/21/15 90% DESIGN REVIEW
10/10/15 100% DESIGN REVIEW
1. CONTRACTOR TO COORDINATE WITH OWNER AND THIRD PARTY OWNER OF POWERHOUSE EQUIPMENT FOR THE REMOVAL OF THE EQUIPMENT LOCATED WITHIN THE BUILDING. SEE SPECIFICATION 02 41 16 FOR ADDITIONAL DETAILS AND REQUIREMENTS.

2. THE CONTRACTOR SHALL USE EVERY PRECAUTION TO PROTECT THE REMAINING THIRD PARTY DAM EQUIPMENT FROM DAMAGE DURING DEMOLITION OF THE DAM STRUCTURE. ANY DAMAGE CAUSED BY THE CONTRACTOR SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR, REPAIRED OR REPLACED IN A PROMPT MANNER AS DIRECTED BY THE ENGINEER.
1. CONTRACTOR TO COORDINATE WITH OWNER AND THIRD PARTY OWNER OF POWERHOUSE EQUIPMENT FOR THE REMOVAL OF THE EQUIPMENT LOCATED WITHIN THE BUILDING. SEE SPECIFICATION 02 41 16 FOR ADDITIONAL DETAILS AND REQUIREMENTS.

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NOTE:
10/15 100% DESIGN REVIEW
NOTES:

S - 6.1

SUBSTATION REMOVALS (1 OF 4)

TS TRN DB DD D. DEVAUN
3/3/15 30% DESIGN REVIEW
6/3/15 60% DESIGN REVIEW
8/21/15 90% DESIGN REVIEW
10/15 100% DESIGN REVIEW
NOTE:

S - 6.4 SUBSTATION REMOVALS (4 OF 4)

11/1/15 30% DESIGN REVIEW
6/3/15 60% DESIGN REVIEW
8/21/15 90% DESIGN REVIEW
10/10/15 100% DESIGN REVIEW