1.0 GENERAL
A. THIS WORK SHALL CONSIST OF PROCURING AND DESIGNING THE COMPOSITE ARCH BRIDGE SYSTEM IN ACCORDANCE WITH THESE SPECIFICATIONS AND IN CONFORMITY WITH THE LINES, GRADES, AND DIMENSIONS SHOWN ON THE CONTRACT DRAWINGS.

B. ADVANCED INFRASTRUCTURE TECHNOLOGIES (AIT), LLC
20-GODFREY DRIVE, ORONO, MAINE 04473
PHONE: 207.866.6526 FAX: 207.866.6501
WWW.AITBRIDGES.COM

C. THE BRIDGE SYSTEM SHALL BE DESIGNED BY AIT IN ACCORDANCE WITH PENNDOT DESIGN MANUAL PART 4 - STRUCTURES [DM-4] AND ASHATO LRD BRIDGE DESIGN SPECIFICATIONS.

2.0 COMPOSITE ARCHES
A. THIS WORK SHALL CONSIST OF DESIGNING THE COMPOSITE ARCH TUBES TO THE DIMENSIONS, DETAILS, AND QUANTITIES SHOWN ON THE PLANS AND ACCORDING TO THE REQUIREMENTS OF THESE SPECIFICATIONS.

2.1 DESIGN
A. DESIGN LOADS ARE IN ACCORDANCE WITH PENNDOT DM-4 AND ASHATO LRD BRIDGE DESIGN SPECIFICATIONS, PHI-93 LIVE LOADING. ARCH DESIGN IS IN ACCORDANCE WITH THE ASHATO LRD GUIDE SPECIFICATIONS FOR DESIGN OF CONCRETE-FILLED FRP TUBES FOR FLEXURAL AND AXIAL MEMBERS, AND OTHER APPLICABLE SPECIFICATIONS. THE COMPOSITE ARCH DESIGN SHALL BE LICENSED BY A PROFESSIONAL ENGINEER. CALCULATIONS PACKAGES AND DRAWINGS SHALL BE PROVIDED TO THE CUSTOMER BY AIT FOR THE SYSTEM SUBMITTED. AS SUBMITTED, AIT WILL DELIVER TO THE JOBORD ALL PARTS OF THE BRIDGE SYSTEM AS SHOWN IN THE CONTRACT DRAWINGS. EACH COMPONENT IS CUSTOM DESIGNED, DETAILED, AND FABRICATED FOR THE SPECIFIC BRIDGE PROJECT.

B. ADVANCED INFRASTRUCTURE TECHNOLOGIES (AIT), LLC

C. PROVIDE MINIMUM COVER OF 1'-6" FROM TOP OF THE COMPOSITE ARCH UNIT CROWN TO TOP OF PAVEMENT.

D. MAXIMUM ALLOWABLE DIFFERENTIAL SETTLEMENT & LATERAL DEFLECTION OF THE FOUNDATION WILL BE CALCULATED ACCORDING TO AASHTO LRFD EQUATION 12.8.4.1-1 SO THAT THE ARCH CAPACITY IS NOT DETRIMENTALLY AFFECTED.

Δ 0.01 S²/R WHERE;

S = SPAN OF STRUCTURE BETWEEN SPRING LINES [FT]

R = RISE OF STRUCTURE (FT)

E. PROVIDE A SUITABLE DRAINAGE PIPE AT REGULAR INTERVALS (NOT TO EXCEED 10'-0") ALONG THE ARCH TO RELEASE HYDROSTATIC PRESSURE.

F. IN THE EVENT THAT CERTAIN DESIGN PARAMETERS, STRESSES OR SPECIFICATIONS ARE IN CONFLICT, THE FOLLOWING ORDER OF PREDOMINANCE GOVERNS:

1. DESIGN REQUIREMENTS LISTED IN "SPECIAL DRAWINGS AND SPECIAL DESIGN REQUIREMENTS" OF THE SPECIFICATION
2. DESIGN RELATED STRESSES OBTAINED IN THE DURATION OF PROJECT ADVERTISING
3. PENNDOT - DESIGN MANUAL PART 4 (STRUCTURES)
4. PENNDOT - DESIGN STANDARDS
5. ASHATO LRD BRIDGE DESIGN SPECIFICATIONS (7TH EDITION), ASHATO LRD GUIDE SPECIFICATIONS FOR DESIGN OF CONCRETE-FILLED FRP TUBES FOR FLEXURAL AND AXIAL MEMBERS
6. IN THE EVENT THAT A CLEAR ORDER OF PREDOMINANCE CANNOT BE ESTABLISHED OR DIFFERENCE IN THE INTERPRETATION OF THE DESIGN CANNOT BE SOLVED, THE CHIEF BRIDGE ENGINEER IS TO BE AMBITER AND HIS DECISION IS TO BE FINAL
7. DESIGN AND RATE THE ARCH SEGMENTS FOR PHI-93 AND LC LOADINGS, COMPARE WITH THE DESIGN CRITERIA IN DESIGN MANUAL PART 4 STRUCTURES, THE ASHATO LRD BRIDGE DESIGN SPECIFICATIONS, AND AS SPECIFIED, SUBJECT TO EXCEPTIONS AND/OR ADDITIONS UNDER "SPECIAL DRAWINGS AND SPECIAL DESIGN REQUIREMENTS" [PART 4]
8. PROVIDE DETAILS AND CALCULATIONS OF COMPOSITE ARCH END REACTIONS TO BE USED FOR FOUNDATION DESIGN TO BE DESIGNED BY OTHERS.
1. ALL SELECT GRANULAR BACKFILL MATERIAL USED IN THE STRUCTURE VOLUME SHALL BE FREE FROM ORGANIC OR MATERIAL NOTES:

1. FORM FOUNDATIONS AND PLACE REBAR

SUGGESTED CONSTRUCTION SEQUENCE:

1. FORM FOUNDATIONS AND PLACE REBAR
2. INSERT END REINFORCEMENT CAGES INTO ARCH ENDS AND INSTALL ARCHES IN FOOTINGS
3. ATTACH DECKING TO ARCHES
4. POUR FOUNDATIONS
5. DRILL 3" HOLE AT APEX OF ARCH AND FILL ARCHES WITH SELF-CONSOLIDATING CONCRETE. CONSTRUCT"
6. ERECT HEADWALLS
7. BACKFILL STRUCTURE AND PLACE SOIL REINFORCEMENT LAYERS PER RC-12M. BACKFILL ARCH IN LARGER THAN THE 2.0 MM (No. 10) SIEVE, IF THE SHEAR DEVICE CONFORMS WITH AASHTO T236, SECTIONS 5.4 AND 5.5 REQUIREMENTS OF SECTION 703.2 DIRECT SHEAR TESTING MAY BE PERFORMED ON SAMPLES CONTAINING MATERIAL FURNISH MATERIALS WITH A MAXIMUM PLASTICITY INDEX (PI) OF 3 AS DETERMINED IN ACCORDANCE WITH AASHTO T89

DO NOT USE METALLURGICAL SLAG OR CINDERS. FURNISH MATERIALS MEETING THE QUALITY REQUIREMENTS OF TYPE C COARSE AGGREGATE OR BETTER AS SPECIFIED IN NO. 200 0-10% NO. 40 0-60% NO. 200 0-10% FURNISH MATERIALS MEETING THE QUALITY REQUIREMENTS OF TYPE C COARSE AGGREGATE OR BETTER AS SPECIFIED IN SECTION 703.2(A), TABLE B, EXCEPT FURNISH MATERIALS FREE OF CLAY LUMPS, FRAGILE PARTICLES, COAL AND C ORE. DO NOT USE METALLURGICAL SLAG OR CINDERS.

FURNISH MATERIALS WITH A MAXIMUM PLASTICITY INDEX (PI) OF 3 AS DETERMINED IN ACCORDANCE WITH AASHTO T89 AND T90. FURNISH MATERIAL EXHIBITING AN ANGLE OF INTERNAL FRICTION OF NOT LESS THAN 34 DEGREES AS DETERMINED IN ACCORDANCE WITH AASHTO T236, ON THE PORTION FNER THAN THE 2.0 MM (No. 10) SIEVE COMPACTED TO 95% OF PFM No. 716. METHOD B, AT OPTIMUM MOISTURE CONTENT, EXCEPT FOR COARSE AGGREGATE MEETING THE REQUIREMENTS OF SECTION 703.2 DIRECT SHEAR TESTING MAY BE PERFORMED ON SAMPLES CONTAINING MATERIAL LARGER THAN THE 2.0 MM (No. 10) SIEVE, IF THE SHEAR DEVICE CONFORMS WITH AASHTO T236, SECTIONS 5.4 AND 5.5. ADDITIONALLY, ALL SELECT GRANULAR BACKFILL MATERIAL SHALL EXHIBIT THE FOLLOWING PROPERTIES:

PH RANGE BETWEEN 6.0 AND 10.0

ARCH FILLING NOTES:

1. SELF-CONSOLIDATING CONCRETE MAY BE PLACED BY PUMP OR WITH A CONCRETE BUCKET AND FUNNEL.
2. EACH ARCH WILL TAKE AN ESTIMATED 0.00 CUBIC YARDS OF CONCRETE
3. NO CONCRETE SHOULD BE PLACED IN THE ARCH IF IT DOES NOT MEET THE SLUMP FLOW REQUIREMENTS OF 24"- 30" SPREAD.
4. DRILL THE 2" FILL HOLE THROUGH THE ARCH AT THE APEX. DRILL A 2" HOLE IN THE ADJACENT CORRUGATION FOR AIR VENTING.
5. ARCHES CAN BE INSPECTED FOR VOIDS AFTER FILLING BY TAPPING THE ARCH AND LISTENING FOR A HOLLOW SOUND. REPAIR IN ACCORDANCE WITH THE SPECIFICATIONS.

MANUFACTURING AND CONSTRUCTION TOLERANCES AND INSPECTION DETAILS:

1. EACH ARCH WILL BE MEASURED TO CONFORM TO THE DIMENSIONAL TOLERANCES SPECIFIED. DIMENSIONS OUTSIDE THE FOLLOWING LIMITS WILL BE SUBJECT TO REJECTION OR REPAIR.
1.1. THE SHAPE OF THE ARCH SHALL NOT VARY FROM THE SHOP DRAWINGS BY MORE THAN 1.5" AT ANY LOCATION
1.2. THE SPAN AND RISE OF THE ARCH SHALL CONFORM TO THE DESIGN AND SHOP DRAWINGS WITHIN ±0.5% OF THE GIVEN DIMENSION
1.3. DIAMETER OF ALL SECTIONS OF THE ARCH SHALL CONFORM TO THE DESIGN AND SHOP DRAWINGS WITHIN ±12% AS MEASURED WITH A PI TAPE
2. PRIOR TO ACCEPTANCE EACH ARCH WILL BE VISUALLY INSPECTED FOR DEFECTS. THE PRESENCE OF ONE OR MORE OF THE FOLLOWING DEFECTS WILL BE CAUSE FOR REJECTION:
2.1. VOIDS RESULTING FROM DECOMPRESSION OF THE TOOLING
2.2. VOIDS RESULTING FROM INFUSED AIR (E.G. CAUSED BY UNCLAMPED HOSE, DRY RESIN BUCKET, ETC.)
2.3. VOIDS CAUSED BY BAG LEAKS WHICH LEAVE TRACES OF AIR IN THE INFUSED PART
3. UNREPAIRED DRY HOSP LARGER THAN 2" DIAMETER
4. COMPOSITE DECK SECTION SHALL CONFORM TO CREATIVE PULTRUSIONS DESIGN GUIDE CHAPTER 8 QUALITY ASSURANCE AND STANDARD TOLERANCES

SHEAR BOLT INSTALLATION NOTES:

NOTE: FOR SKEWED BRIDGES ONLY
1. PLACE ARCHES AND DECKING
2. DRILL PLACEMENT HOLES FOR EACH SHEAR BOLT SPACED PER DESIGN (NOTE: PLACEMENT HOLES SHOULD BE THE SAME DIAMETER AS THE SHEAR BOLT TO ENSURE A TIGHT FIT)
3. PRIOR TO FILLING THE ARCH WITH SELF-CONSOLIDATING CONCRETE, INSTALL SHEAR BOLTS

SPlice INSTALLATION NOTES:

NOTE: FOR SPLICED ARCHES ONLY
1. CLEAR A LEVEL AREA TO SPlice THE ARCHES PRIOR TO ERECTION
2. TAKE TWO ARCH HALVES, SPLICE REINFORCEMENT, AND ONE SPLICE COLLAR. FIT THE SPLICE REINFORCEMENT AND TWO HALVES INSIDE THE SPLICE COLLAR AND VERIFY EXTERNAL ARCH GEOMETRY
3. DRILL AND PLACE BLIND RIvET FASTENERS PER DESIGN
4. ERECT ARCH INTO FINAL POSITION AND CONTINUE TO ITEM 2 OF SUGGESTED CONSTRUCTION SEQUENCE

SUGGESTED CONSTRUCTION SEQUENCE:

1. FORM FOUNDATIONS AND PLACE REBAR
2. INSERT END REINFORCEMENT CAGES INTO ARCH ENDS AND INSTALL ARCHES IN FOOTINGS
3. ATTACH DECKING TO ARCHES
4. POUR FOUNDATIONS
5. DRILL 3" HOLE AT APEX OF ARCH AND FILL ARCHES WITH SELF-CONSOLIDATING CONCRETE. CONSTRUCT...
FINISHING NOTES:
1. ARCH MATERIALS SHALL CONFORM TO SECTION 3:
   MATERIAL SPECIFICATIONS OF AASHTO LRFD GUIDE
   SPECIFICATIONS FOR DESIGN OF CONCRETE-FILLED
   FRP TUBES FOR FLEXURAL AND AXIAL MEMBERS

PROJECT: Sample  JN: YR-XXX (EG. 13020)
LOCATION: Sample
DRAWING STATUS: Sample
Correct scale on size B paper (11x17 Ledger)

MINIMUM OF 1.5'

TIES ACCORDING TO
SECTON 709.1(f) OR 709.1(g)
OF PUB 408 PER DESIGN
LONGITUDINAL
REINFORCEMENT
ACCORDING TO
SECTION 709.1(f) OR
709.1(g) OF PUB 408 PER
DESIGN

CLEAR SPACE NOT MORE THAN 7'

END REINFORCEMENT CAGE LOCATION
NOTE: DESIGNER TO DETAIL
REINFORCEMENT CAGE TO PROVIDE
MINIMUM CLEAR COVER

END REINFORCEMENT CAGE PLAN VIEW
NOTE: DESIGNED AS PER PROJECT

END REINFORCEMENT CAGE SECTION

VARIES

LOW RISE ARCH DETAILS
APPROX. 4' OF TRIM TO BE
REMOVED BEFORE SHIPPING TYP

ARCH LENGTH ALONG SPINE

INSTALLED SPAN MIN 20'-3" TO MAX 65'-0"
INSTALLED RISE 15% TO 50% SPAN

ELEVATION OF FINISHED ABUTMENT
LOCATOR REBAR HOLES PER DESIGN

VARIABLE RADIUS ARCH DETAILS
APPROX. 4' OF TRIM TO BE
REMOVED BEFORE SHIPPING TYP

END REINFORCEMENT CAGE LOCATION
NOTE: DESIGNER TO DETAIL
REINFORCEMENT CAGE TO PROVIDE
MINIMUM CLEAR COVER

INSTALLED RISE 15% TO 50% SPAN

ELEVATION OF FINISHED ABUTMENT
LOCATOR REBAR HOLES PER DESIGN

APPROX. 4' OF TRIM TO BE
REMOVED BEFORE SHIPPING TYP

HIGH RISE ARCH DETAILS

ARCH LENGTH ALONG SPINE

INSTALLED SPAN MIN 20'-3" TO MAX 65'-0"
INSTALLED RISE 15% TO 50% SPAN

ELEVATION OF FINISHED ABUTMENT
LOCATOR REBAR HOLES PER DESIGN

7/7/14

PENNDOT DRAWING 2013-236 PE

PROJECT: Sample  JN: YR-XXX (EG. 13020)
LOCATION: Sample
DRAWING STATUS: Sample
Correct scale on size B paper (11x17 Ledger)

MINIMUM OF 1.5'

TIES ACCORDING TO
SECTON 709.1(f) OR 709.1(g)
OF PUB 408 PER DESIGN
LONGITUDINAL
REINFORCEMENT
ACCORDING TO
SECTION 709.1(f) OR
709.1(g) OF PUB 408 PER
DESIGN

CLEAR SPACE NOT MORE THAN 7'

END REINFORCEMENT CAGE LOCATION
NOTE: DESIGNER TO DETAIL
REINFORCEMENT CAGE TO PROVIDE
MINIMUM CLEAR COVER

END REINFORCEMENT CAGE PLAN VIEW
NOTE: DESIGNED AS PER PROJECT

END REINFORCEMENT CAGE SECTION

VARIES

LOW RISE ARCH DETAILS
APPROX. 4' OF TRIM TO BE
REMOVED BEFORE SHIPPING TYP

ARCH LENGTH ALONG SPINE

INSTALLED SPAN MIN 20'-3" TO MAX 65'-0"
INSTALLED RISE 15% TO 50% SPAN

ELEVATION OF FINISHED ABUTMENT
LOCATOR REBAR HOLES PER DESIGN

VARIABLE RADIUS ARCH DETAILS
APPROX. 4' OF TRIM TO BE
REMOVED BEFORE SHIPPING TYP

END REINFORCEMENT CAGE LOCATION
NOTE: DESIGNER TO DETAIL
REINFORCEMENT CAGE TO PROVIDE
MINIMUM CLEAR COVER

INSTALLED RISE 15% TO 50% SPAN

ELEVATION OF FINISHED ABUTMENT
LOCATOR REBAR HOLES PER DESIGN

APPROX. 4' OF TRIM TO BE
REMOVED BEFORE SHIPPING TYP

HIGH RISE ARCH DETAILS

ARCH LENGTH ALONG SPINE

INSTALLED SPAN MIN 20'-3" TO MAX 65'-0"
INSTALLED RISE 15% TO 50% SPAN

ELEVATION OF FINISHED ABUTMENT
LOCATOR REBAR HOLES PER DESIGN

7/7/14

PENNDOT DRAWING 2013-236 PE

PROJECT: Sample  JN: YR-XXX (EG. 13020)
LOCATION: Sample
DRAWING STATUS: Sample
Correct scale on size B paper (11x17 Ledger)
FASCIA PLATE NOTES:
- PROJECT TO INCLUDE "X" TOTAL \( \frac{1}{8} \)" THICK E-GLASS PANELS ACCORDING TO ASTM D578-98 WITH DEREKANE 610C-200 VINYL ESTER RESIN

FASTEN TO HEADWALL PANEL WITH 1\(^{\prime}\) STAINLESS STEEL SELF-DRILLING SCREWS (3 PER PLATE) ASTM F593 LOCATED PER DESIGN

FIELD TRIM TO MATCH FOOTING

ARCH LENGTH ALONG SPINE Requires "X" PANELS PER SIDE

ARCH CONSTRUCTION SPlice ELEVATION

FASCIA PLATE JOINT CENTERED AT CROWN

ELEVATION OF FINISHED ABUTMENT

LOCATOR HOLE ELEVATION

FASCIA PLATE INSTALLATION ELEVATION

1\(^{\prime}\) OR 1\(^{\prime}\)-3\(^{\prime}\) Ø FRP TUBE SLIT COLLAR AS REQUIRED PER DESIGN

4.25" CIRCUMFERENTIALLY

ASTM A307 \( \frac{3}{8} \)" HUCK BA-BOM R10-14 BLIND RIVET WITH ASTM F436 1\(^{\prime}\)-2\(^{\prime}\) Ø WASHER

2\(^{\prime}\) EDGE DISTANCE

LIMITS OF MATING ARCH HALVES

5\(^{\prime}\) TYP

ARCH CONSTRUCTION SPlice ELEVATION

BLIND RIVETS ACCORDING TO ASTM F436 PER DESIGN

SPIRAL REINFORCEMENT ACCORDING TO SECTION 709.1(1) OR 709.1(g) OF PUB 408

LONGITUDINAL REINFORCEMENT ACCORDING TO SECTION 709.1(1) OR 709.1(g) OF PUB 408

IF NECESSARY FOR SHIPPING
NOTE: LOCATION DETAILED PER DESIGN

PROJECT: Sample
JN: YR-XXX (EG. 13020)
LOCATION: Sample
DRAWING STATUS: Sample

PROJECT TO INCLUDE "X" TOTAL \( \frac{1}{8} \)" THICK E-GLASS PANELS ACCORDING TO ASTM D578-98 WITH DEREKANE 610C-200 VINYL ESTER RESIN

Correct scale on size B paper (11x17 Ledger)