

GENERAL NOTES

ELECTRONIC VERSIONS OF STRUCTURAL DRAWINGS ARE THE SOLE, COPYRIGHTED PROPERTY OF TEXAS A&M TRANSPORTATION INSTITUTE AND TEXAS A&M UNIVERSITY. ELECTRONIC VERSIONS SHALL NOT BE TRANSFERRED OR SHARED WITHOUT THE EXPRESS, WRITTEN PERMISSION OF TEXAS A&M TRANSPORTATION INSTITUTE AND TEXAS A&M UNIVERSITY.

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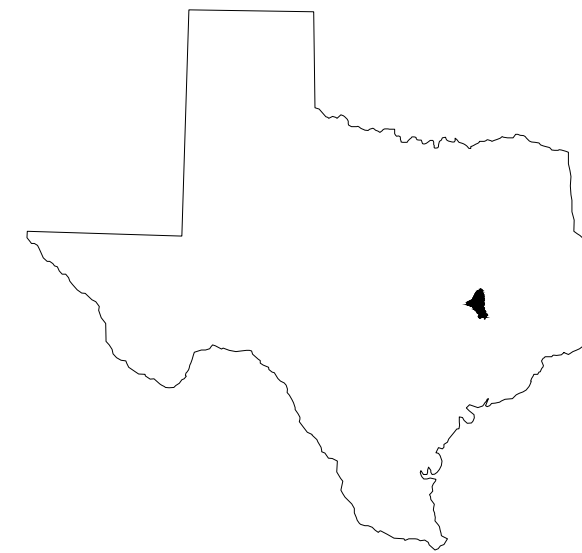
REINFORCEMENT NOT SHOWN FOR CLARITY IN GENERAL SHEETS, SEE STRUCTURAL DRAWINGS

TEXAS A&M TRANSPORTATION INSTITUTE

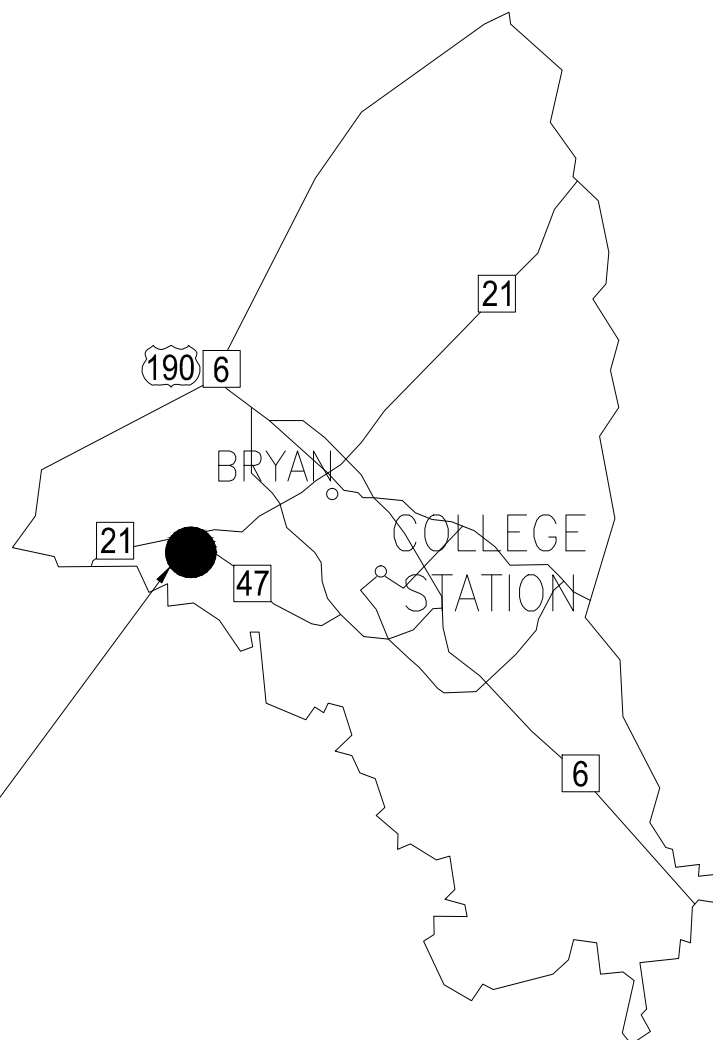
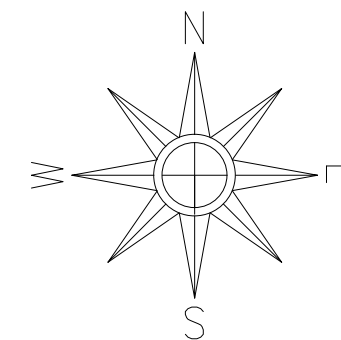
TEXAS A&M UNIVERSITY

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP)
PROJECT 14-28

FOR THE CONSTRUCTION OF THE MOCK-UP SPECIMENS
SPECIFIED WITHIN THE UPDATED INTERIM REPORT II



COUNTY KEY



TEXAS A&M TRANSPORTATION
INSTITUTE'S
RIVERSIDE CAMPUS
(LOCATION OF SPECIMENS)

BRAZOS COUNTY

Revision notes:		
Rev:	Date:	Notes:

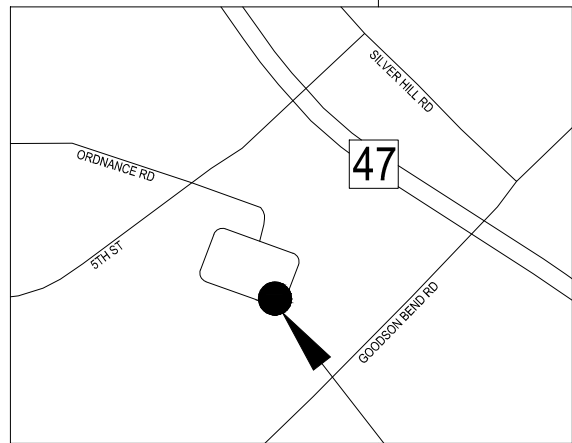
Drawn by: CJ	Checked by: JW
Client: NCHRP 14-28	

Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

Date: 5/31/2014
Scale: N/A
Revision:

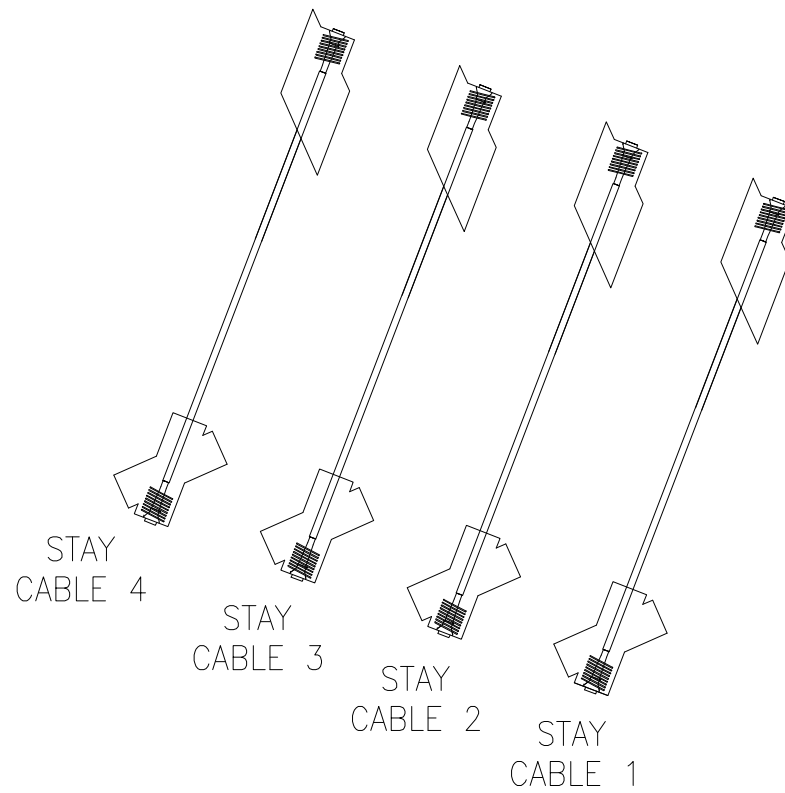
<small>C:\Users\joshw\Documents\TTI-Cable-Appge-Matcon.png</small> TEXAS A&M TRANSPORTATION INSTITUTE 3135 TAMU COLLEGE STATION, TX 77843-3135
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Drawing Title: <h1>G-101</h1> GENERAL NOTES
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RIVERSIDE CAMPUS

LOCATION OF SPECIMENS

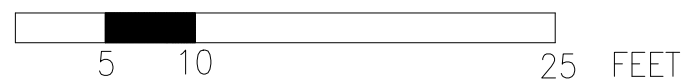
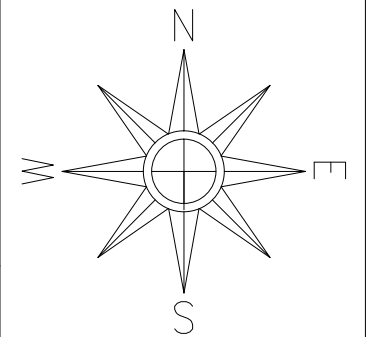


UTILITIES
(ELECTRICITY, WATER)

WNW END

U-BEAM

ESE END



ROADWAY

Revision notes:		
Rev:	Date:	Notes:

Drawn by: CJ	Checked by: JW
Client: NCHRP 14-28	

Project:
**CONDITION ASSESSMENT OF BRIDGE
PT AND STAY CABLE SYSTEMS USING
NDE METHODS**

Date: 5/31/2014
Scale: 3/32"=1'-0"
Revision:

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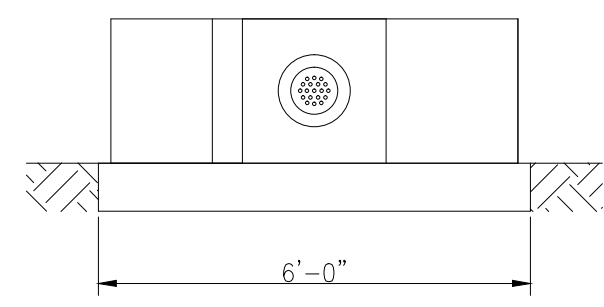
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G-103
SITE PLAN

NOTES:

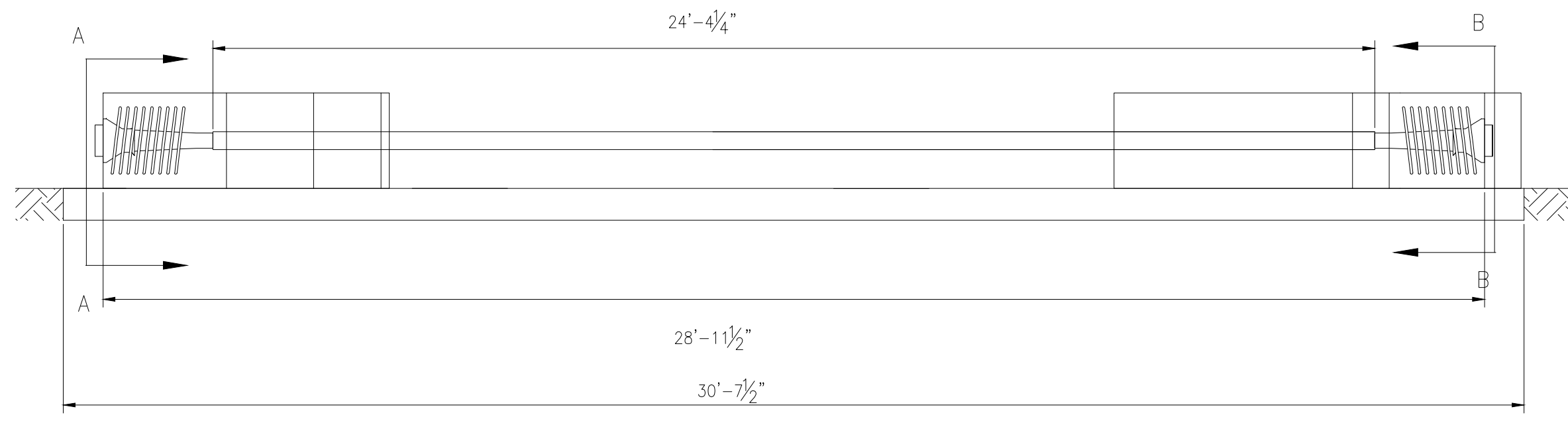
- CONSTRUCTION STAGE SHOWN IN G-401 THRU G-405
- SEE S-SHEETS FOR FOUNDATION DETAILS



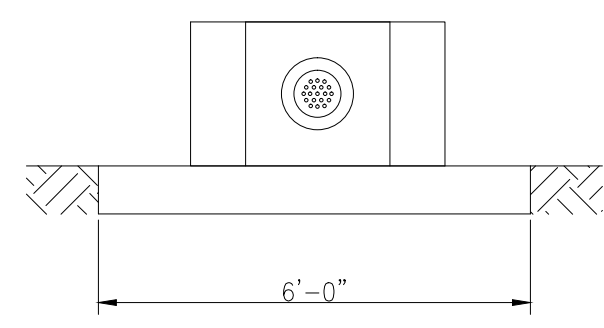
TYP. STAY CABLE PLAN



SECTION A-A
SSW ELEVATION



TYP. STAY CABLE ELEVATION



SECTION B-B
NNE ELEVATION

Revision notes:		
Rev:	Date:	Notes:

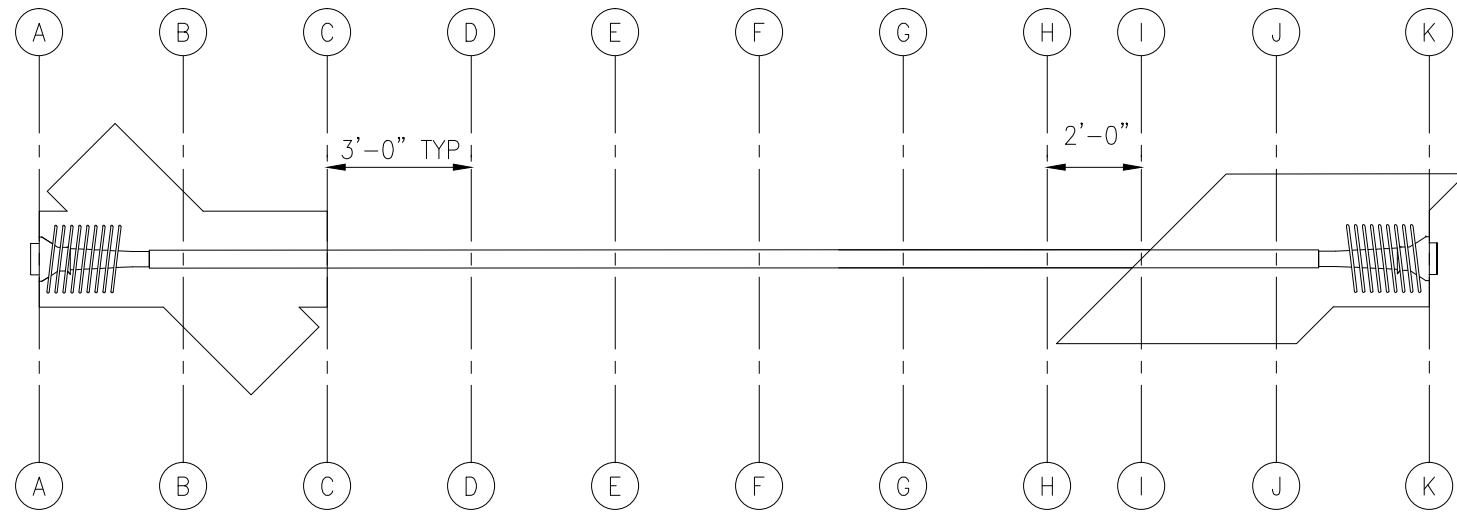
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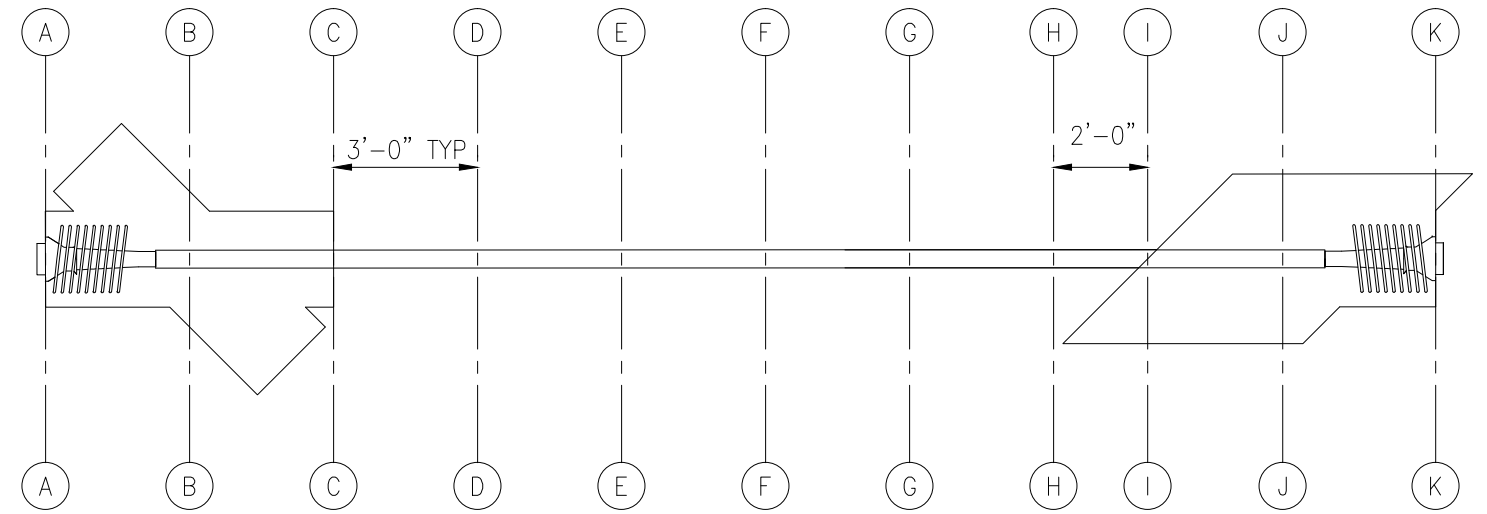
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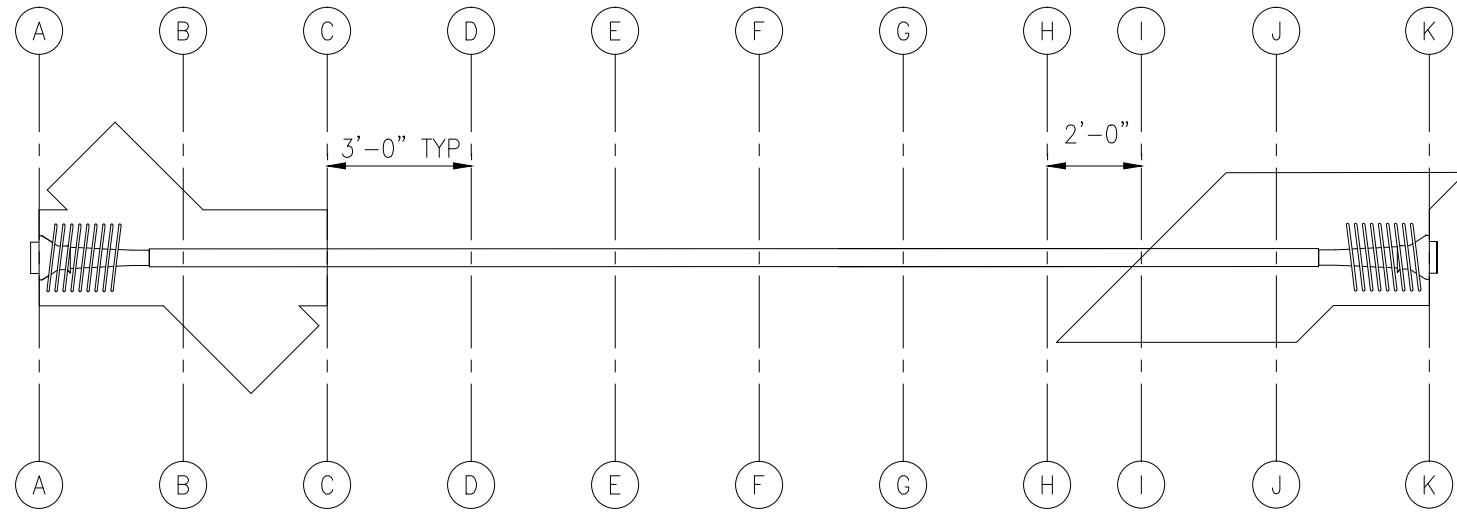
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G-301
STAY CABLE GEOMETRY



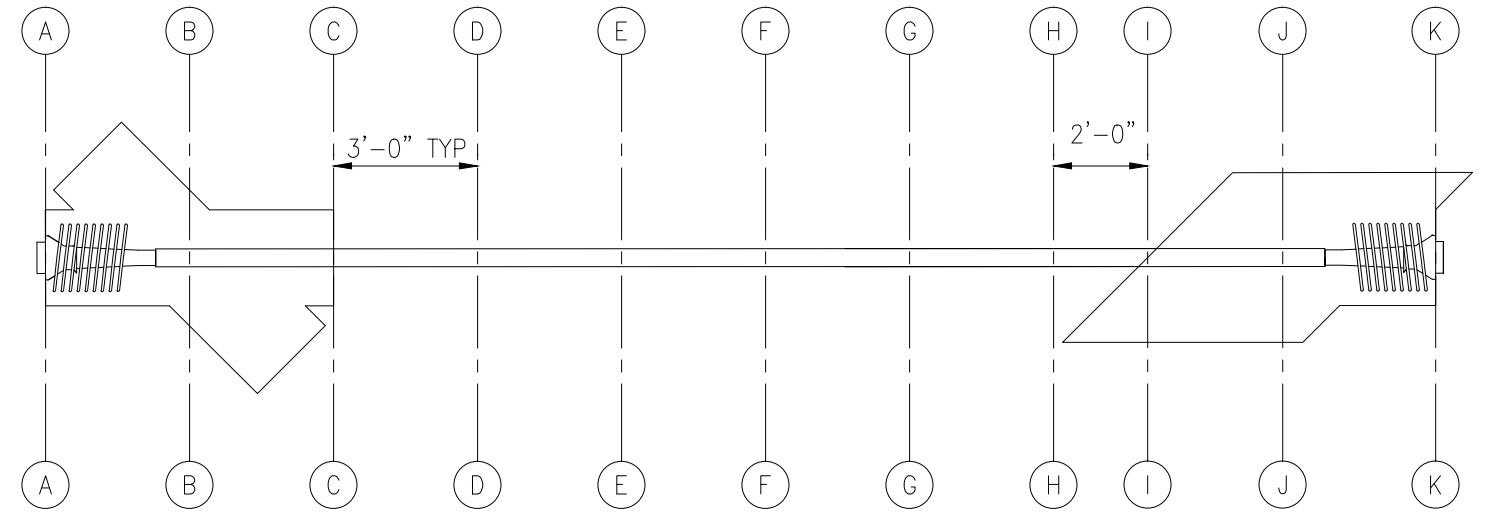
STAY CABLE SPECIMEN 1 (SC1)



STAY CABLE SPECIMEN 2 (SC2)



STAY CABLE SPECIMEN 3 (SC3)



STAY CABLE SPECIMEN 4 (SC4)

NOTES:

- CONSTRUCTION STAGES SHOWN IN G-401 THROUGH G-405
- GRID H-I IS 2'-0", ALL OTHER DEFECT GRIDS ARE 3'-0"

STAY CABLE ID	STAY CABLE CONFIGURATIONS
SC1	GRouted STRANDS IN STEEL PIPE
SC2	GRouted STRANDS IN HDPE PIPE
SC3	UNGRouted MONOSTRANDS GREASED & SHEATHED IN HDPE PIPE
SC4	UNGRouted EPOXY COATED STRANDS IN HDPE PIPE

Revision notes:		
Rev:	Date:	Notes:

Drawn by: CJ	Checked by: JW
Client: NCHRP 14-28	

Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

Date: 5/31/2014
Scale: 1/4"=1'-0"
Revision:

<small>C:\Users\joshw\Documents\TTI-Cable-Appx-Matcon.png</small> TEXAS A&M TRANSPORTATION INSTITUTE 3135 TAMU COLLEGE STATION, TX 77843-3135

Drawing Title: <h1 style="margin: 0;">G-302</h1> <h2 style="margin: 0;">STAY CABLE GEOMETRY</h2>

CONDITION DESCRIPTIONS

CONDITION TYPE	CONDITION CODE	CONDITION DESCRIPTION	CONDITION TYPE	CONDITION CODE	CONDITION DESCRIPTION
WIRE CORROSION	CW1	LIGHT-MODERATE WIRE PITTING (<15% WCS, <2% SCS, <1% TCS)	STRAND BREAKAGE	BS1	1 OF 7 WIRES FRACTURED (14% SCS, <2% TCS)
	CW2	SEVERE WIRE PITTING (35-65% WCS, 5-9% SCS, <1% TCS)		BS2	3 OF 7 WIRES FRACTURED (43% SCS, 2-4% TCS)
	CW3	EXTREME WIRE PITTING (85-100% WCS, 12-14% SCS, <2% TCS)	TENDON BREAKAGE	BT1	1 OF 19 STRANDS OR 1 OF 12 STRANDS FRACTURED (5-8% TCS)
STRAND CORROSION	CS1	1-2 OF 7 WIRES FULLY CORRODED (14-29% SCS, <3% TCS)		BT2	3 OF 19 STRANDS OR 2 OF 12 STRANDS FRACTURED (16-17% TCS)
	CS2	3-4 OF 7 WIRES FULLY CORRODED (43-57% SCS, 2-5% TCS)		BT3	10 OF 19 STRANDS OR 6 OF 12 STRANDS FRACTURED (50-53% TCS)
	CS3	7 OF 7 WIRES FULLY CORRODED (100% SCS, 5-9% TCS)	BT4	19 OF 19 STRANDS OR 12 OF 12 STRANDS FRACTURED (100% TCS)	
TENDON CORROSION	CT1	1-2 OF 19 STRANDS OR 1-2 OF 12 STRANDS FULLY CORRODED (5-16% TCS)	COMPROMISED GROUT	GS1	APPROXIMATELY 50% FULL OF SEGREGATED GROUT
	CT2	3-4 OF 19 STRANDS OR 2-3 OF 12 STRANDS FULLY CORRODED (16-25% TCS)		GS2	100% FULL OF SEGREGATED GROUT
	CT3	9-10 OF 19 STRANDS OR 6-7 OF 12 STRANDS FULLY CORRODED (47-59% TCS)		GU1	APPROXIMATELY 50% FULL OF UNHYDRATED GROUT
	CT4	19 OF 19 STRANDS OR 12 OF 12 STRANDS FULLY CORRODED (100% TCS)		GU2	100% FULL OF UNHYDRATED GROUT
WATER INFILTRATION	W1	APPROXIMATELY 25% FULL OF WATER	VOID	GG	100% FULL OF GASED GROUT
	W2	APPROXIMATELY 75% FULL OF WATER		V1	APPROXIMATELY 25% VOIDED
	W3	100% FULL OF WATER		V2	APPROXIMATELY 50% VOIDED
SHEATHING DAMAGE	S1	EPOXY-COATING OF STRAND REMOVED		V3	APPROXIMATELY 75% VOIDED
	S2	SHEATHING OF STRAND REMOVED	V4	100% VOIDED	

NOTES:

WCS - WIRE CROSS SECTION

SCS - STRAND CROSS SECTION

TCS - TENDON CROSS SECTION

SHEATHING DAMAGE DEFECTS ONLY APPLY TO CERTAIN SC SYSTEMS:

S1 - SC4

S2 - SC3

Revision notes:		
Rev:	Date:	Notes:

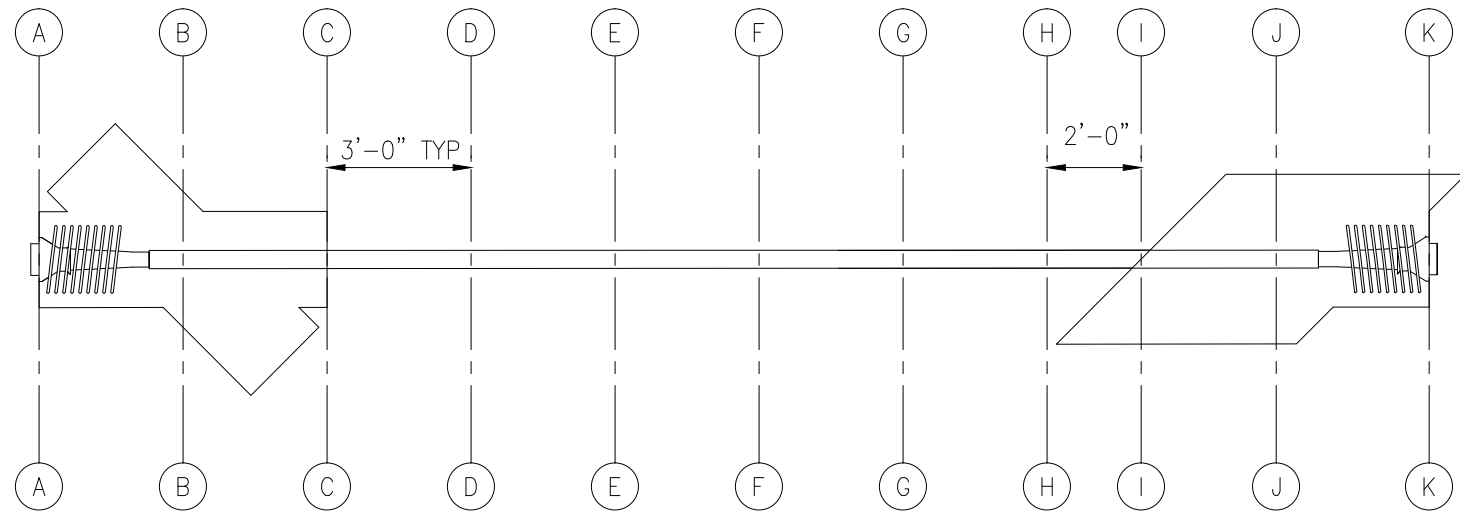
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Client: NCHRP 14-28	

Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

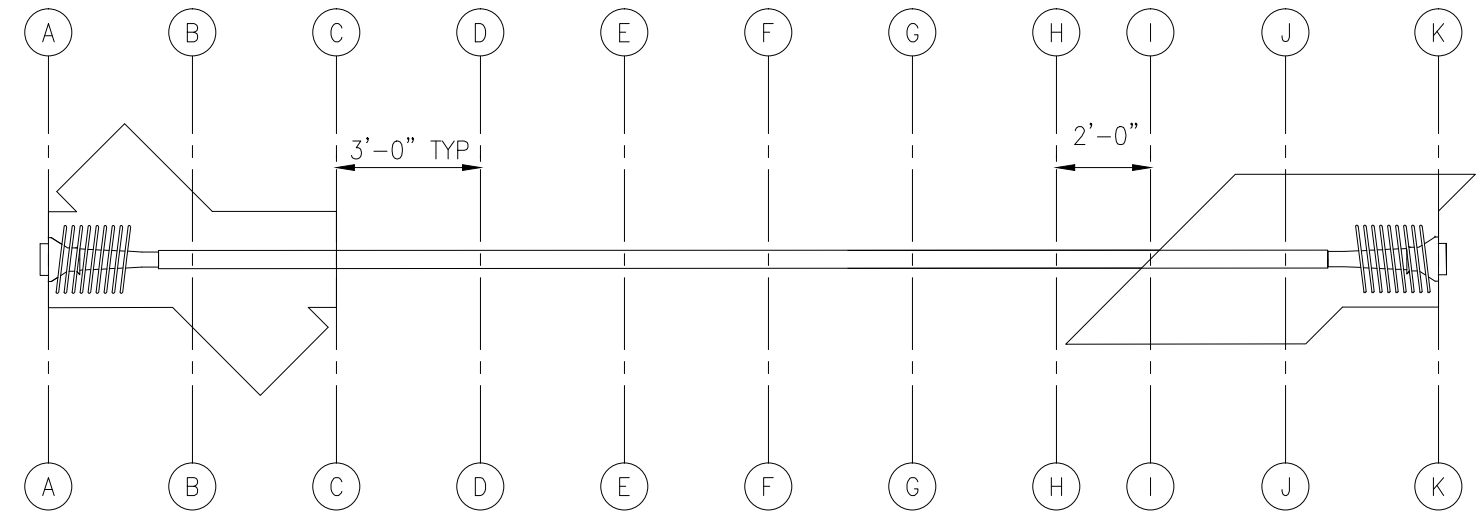
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Drawing Title: <h1 align="center">G-501</h1> <h2 align="center">CONDITION DESCRIPTIONS</h2>
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STAY CABLE SPECIMEN 1 (SC1)



STAY CABLE SPECIMEN 2 (SC2)

CONDITION PLACEMENT DIAGRAM AND SCHEDULE-STAY CABLE 1	
LOCATION	CONDITION CODE
A-B	CT3
B-C	INTACT
C-D	INTACT
D-E	W2
E-F	CT3
F-G	V4
G-H	BT1
H-I	GS1
I-J	W1/CT1
J-K	W1

CONDITION PLACEMENT DIAGRAM AND SCHEDULE-STAY CABLE 2	
LOCATION	CONDITION CODE
A-B	INTACT
B-C	CW1
C-D	INTACT
D-E	W2
E-F	CT3
F-G	V4
G-H	BT1
H-I	GS1
I-J	V1/CT1
J-K	V1

STAY CABLE ID	STAY CABLE CONFIGURATIONS
SC1	GROUTED STRANDS IN STEEL PIPE
SC2	GROUTED STRANDS IN HDPE PIPE

- NOTES:
- CONSTRUCTION STAGE SHOWN IN G-401 THRU G-405
 - SEE S-400 SHEETS FOR FOUNDATION DETAILS
 - GRID H-I IS 2'-0", ALL OTHER DEFECT GRIDS ARE 3'-0"

Revision notes:		
Rev:	Date:	Notes:

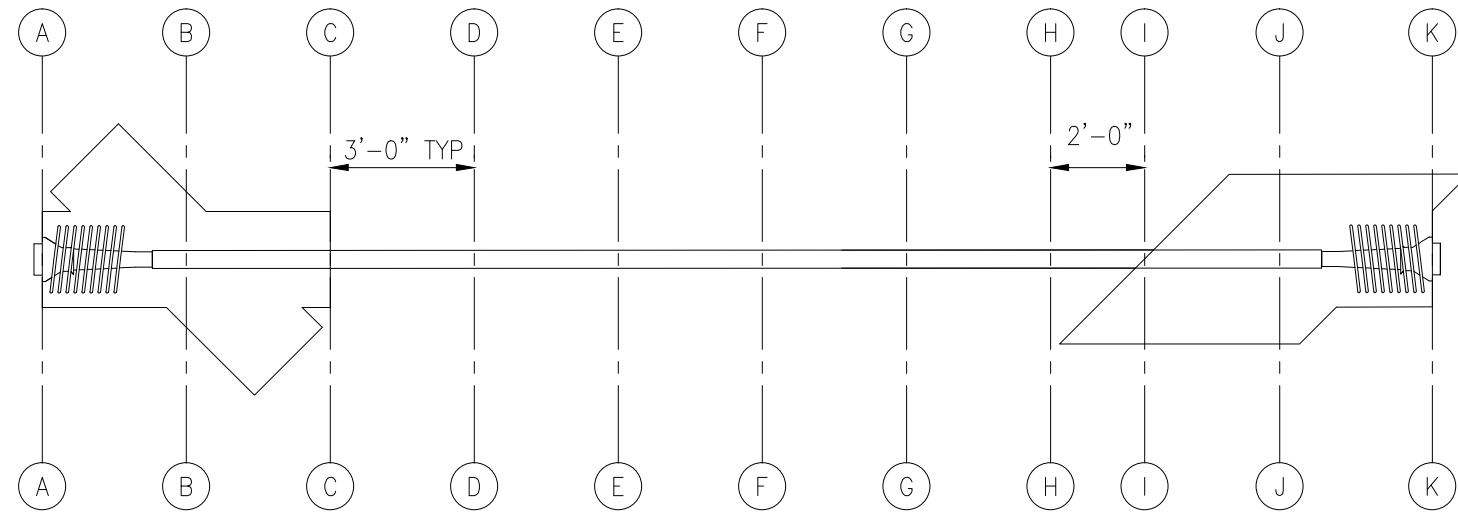
Drawn by: CJ	Checked by: JW
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Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

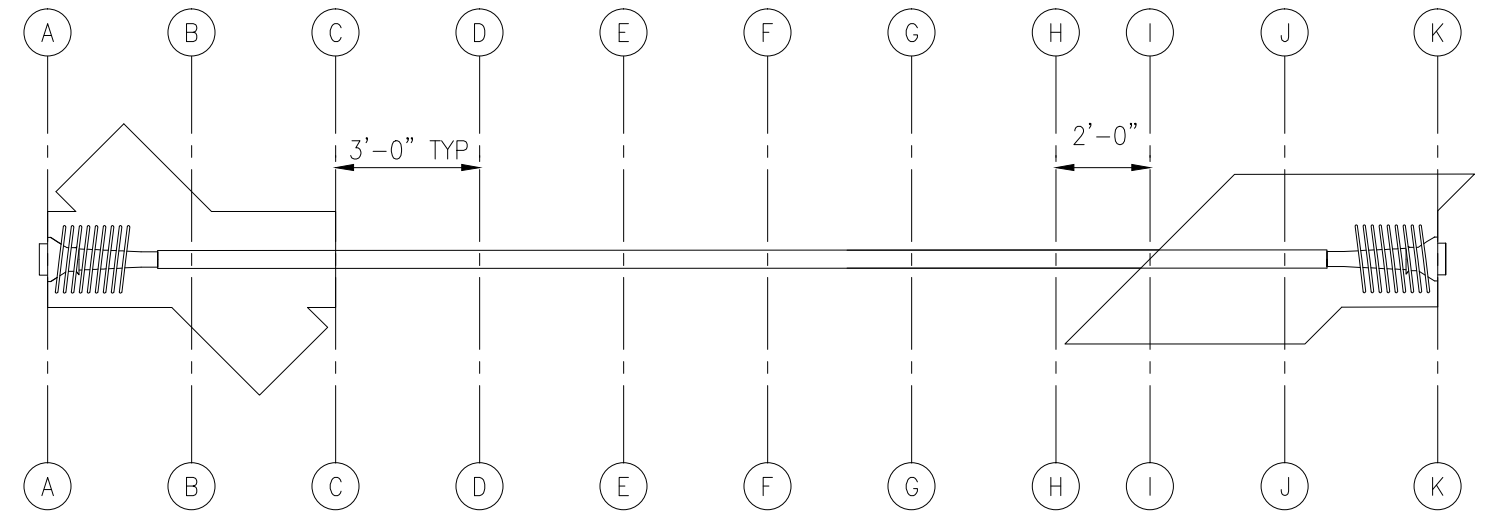
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Drawing Title: <h1 style="margin: 0;">G-514</h1> <h2 style="margin: 0;">CONDITION PLACEMENT SCHEDULE</h2>
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STAY CABLE SPECIMEN 3 (SC3)



STAY CABLE SPECIMEN 4 (SC4)

CONDITION PLACEMENT DIAGRAM AND SCHEDULE-STAY CABLE 3	
LOCATION	CONDITION CODE
A-B	CT2
B-C	INTACT
C-D	CS1
D-E	BS1
E-F	CT3
F-G	BT1
G-H	INTACT
H-I	S2
I-J	INTACT
J-K	CS2

CONDITION PLACEMENT DIAGRAM AND SCHEDULE-STAY CABLE 4	
LOCATION	CONDITION CODE
A-B	CT3
B-C	CS2
C-D	BS1
D-E	CT3
E-F	BT1
F-G	CW1
G-H	INTACT
H-I	S1
I-J	INTACT
J-K	CS1

STAY CABLE ID	STAY CABLE CONFIGURATIONS
SC3	UNGROUTED MONOSTRANDS GREASED & SHEATHED IN HDPE PIPE
SC4	UNGROUTED EPOXY COATED STRANDS IN HDPE PIPE

- NOTES:
- CONSTRUCTION STAGE SHOWN IN G-401 THRU G-405
 - SEE S-400 SHEETS FOR FOUNDATION DETAILS
 - GRID H-I IS 2'-0", ALL OTHER DEFECT GRIDS ARE 3'-0"

Revision notes:		
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Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

Date: 5/31/2014
Scale: 1/4"=1'-0"
Revision:

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Drawing Title: <h1 style="margin: 0;">G-515</h1> <h2 style="margin: 0;">CONDITION PLACEMENT SCHEDULE</h2>
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DESIGN LOADS:

THE STRUCTURAL SYSTEM FOR BUILDING DEPICTED HEREON HAS BEEN DESIGNED ACCORDING TO THE 2012 EDITION OF THE AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS (6TH ED).

THE STRUCTURE HAS BEEN DESIGNED TO RESIST THE FOLLOWING SUPERIMPOSED LOADS.

- LIVE LOAD: 75 PSF
- DEAD LOAD: ONLY SELF-WEIGHT (150 PCF)

DESIGN APPROACH:

THE STRUCTURE WAS DESIGNED USING LOAD AND RESISTANCE FACTOR DESIGN (LRFD) AS OUTLINED IN THE FOLLOWING DESIGN STANDARDS:

- AASHTO LRFD BRIDGE DESIGN SPECIFICATIONS, 6TH EDITION, 2012. (CHECKED 2013 REVISIONS)
- PCI BRIDGE DESIGN MANUAL, 3RD EDITION, 2011.

CONSTRUCTION:

ALL CONSTRUCTION DRAWINGS ARE PRESENTED AS AN AID TO THE CONTRACTOR AND NOT CONSIDERED WORKING DRAWINGS. ALL DETAILS OF THE CONTRACTOR'S ERECTION SCHEME AND CALCULATIONS TO BE PRESENTED TO THE EOR FOR APPROVAL PRIOR TO IMPLEMENTATION.

TEXAS A&M TRANSPORTATION INSTITUTE



TEXAS A&M UNIVERSITY

NATIONAL COOPERATIVE HIGHWAY RESEARCH PROGRAM (NCHRP)
PROJECT 14-28

FOR THE CONSTRUCTION OF THE MOCK-UP SPECIMENS
SPECIFIED WITHIN THE UPDATED INTERIM REPORT II

FOUNDATIONS:

SHALLOW FOUNDATIONS ARE DESIGNED FOR AN ALLOWABLE SOIL BEARING PRESSURE OF 2000 psf. THIS PRESSURE WAS VERIFIED IN THE REPORT "THE NATIONAL GEOTECHNICAL EXPERIMENTATION SITES AT TEXAS A&M UNIVERSITY: CLAY AND SAND" BY JEAN-LOUIS BRIAUD IN 1997. THE BUILDING PAD SHALL BE COMPACTED TO 95% MODIFIED PROCTOR DENSITY DETERMINED IN ACCORDANCE WITH ASTM D-1557.

FORM WORK AND SHORING:

DESIGN, ERECTION AND REMOVAL OF ALL FORM WORK, SHORES AND RESHORES SHALL MEET REQUIREMENTS SET FORTH IN ACI STANDARDS 347 AND 301. NO FORMWORK SHALL BE STRIPPED UNTIL STRUCTURAL CONCRETE HAS REACHED AT LEAST TWO-THIRDS OF THE 28 DAY DESIGN STRENGTH.

MATERIALS:

CONCRETE:

CONCRETE SHALL BE AN APPROVED MIX DESIGN PROPORTIONED TO ACHIEVE STRENGTHS AS LISTED BELOW WITH A PLASTIC AND WORKABLE MIX:

- FOUNDATIONS AND SLABS ON GRADE: 3000 psi @ 28 DAYS
- ALL STRUCTURAL COMPONENTS: 5500 psi @ 28 DAYS
- ALL STRUCTURAL COMPONENTS: 4400 psi @ TIME OF INITIAL PRESTRESSING

MINIMUM REQUIRED COVER FOR REINFORCING AND PRESTRESSING STEEL:
1½ IN.

CONCRETE SHALL COMPLY WITH THE REQUIREMENTS OF ASTM C-94 FOR MEASURING, MIXING, TRANSPORTING, ETC. MAXIMUM TIME ALLOWED FROM THE TIME THE MIXING WATER IS ADDED UNTIL IT IS DEPOSITED IN ITS FINAL POSITION SHALL NOT EXCEED ONE AND ONE HALF (1-1/2) HOURS.

CONCRETE REINFORCING:

SHALL BE ASTM A615 GRADE 60 DEFORMED BARS, FREE FROM OIL, SCALE AND RUST AND PLACED IN ACCORDANCE WITH THE TYPICAL BENDING DIAGRAM AND PLACING DETAILS OF ACI STANDARDS AND SPECIFICATIONS. SHOP DRAWINGS DEPICTING QUANTITY AND INTENDED PLACEMENT LOCATION OF REINFORCING STEEL ARE DOCUMENTED HEREIN.

POST-TENSIONING STRANDS:

FOR LOCATION OF POST-TENSIONED TENDONS, SEE GENERAL SHEETS. ALL PT STRANDS ARE 0.6" DIA. GRADE 270 LOW RELAXATION STRANDS ASSUMED YIELD STRENGTH: 243 ksi
ALL TENDONS TO BE STRESSED FROM ESE SIDE.

DESIGN PARAMETERS:

- FRICTION COEFFICIENT: 0.23
- WOBBLE COEFFICIENT: 0.0002
- ANCHORAGE SET: 0.375 IN.
- APPARENT MODULUS TO BE VERIFIED BY MILL REPORT FOR CALCULATIONS OF ELONGATION

POST-TENSIONING ANCHORAGES:

PERFORMANCE OF THE ANCHORAGE DEVICE AND FURNISHING OF ANY SUPPLEMENTARY REINFORCEMENT REQUIRED IN THE "LOCAL ZONE" SHALL BE THE RESPONSIBILITY OF THE MATERIAL SUPPLIER. THE "LOCAL ZONE" IS THE REGION IMMEDIATELY SURROUNDING EACH ANCHORAGE DEVICE. IT SHALL BE CONSIDERED A PRISM WITH TRANSVERSE DIMENSIONS EQUAL TO THE SUM OF THE PROJECTED SIZE OF THE BEARING PLATE PLUS THE MANUFACTURER'S SPECIFIED MINIMUM EDGE COVER. THE LENGTH OF THE LOCAL ZONE EXTENDS FOR THE LENGTH OF THE ANCHORAGE DEVICE PLUS AN ADDITIONAL DISTANCE IN FRONT OF THE ANCHOR EQUAL TO THE MAXIMUM LATERAL DIMENSIONS OF THE ANCHOR.

STRESSING SCHEDULE:

SEE G-209 FOR STRESSING SCHEDULE.

GROUTING INFORMATION:

ALL TENDONS TO BE GROUTED.
SEE S-601 FOR GROUTING INFORMATION.

Revision notes:		
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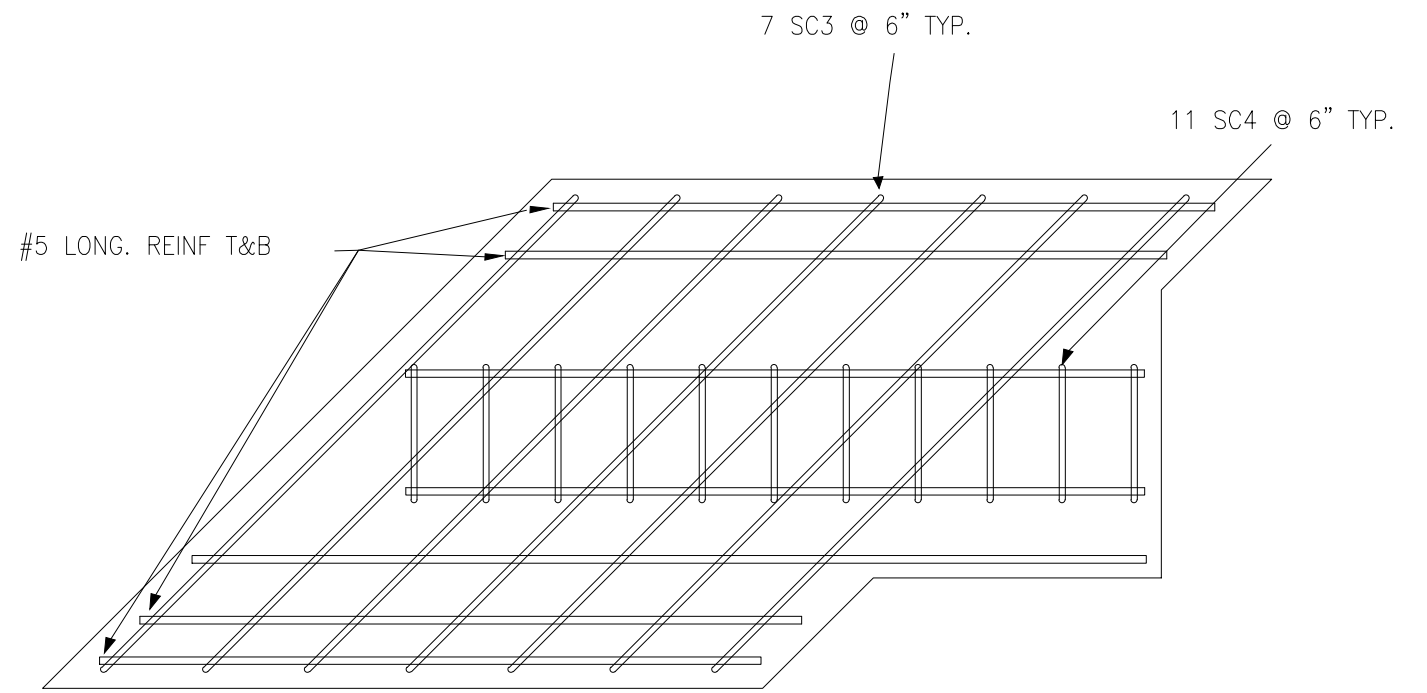
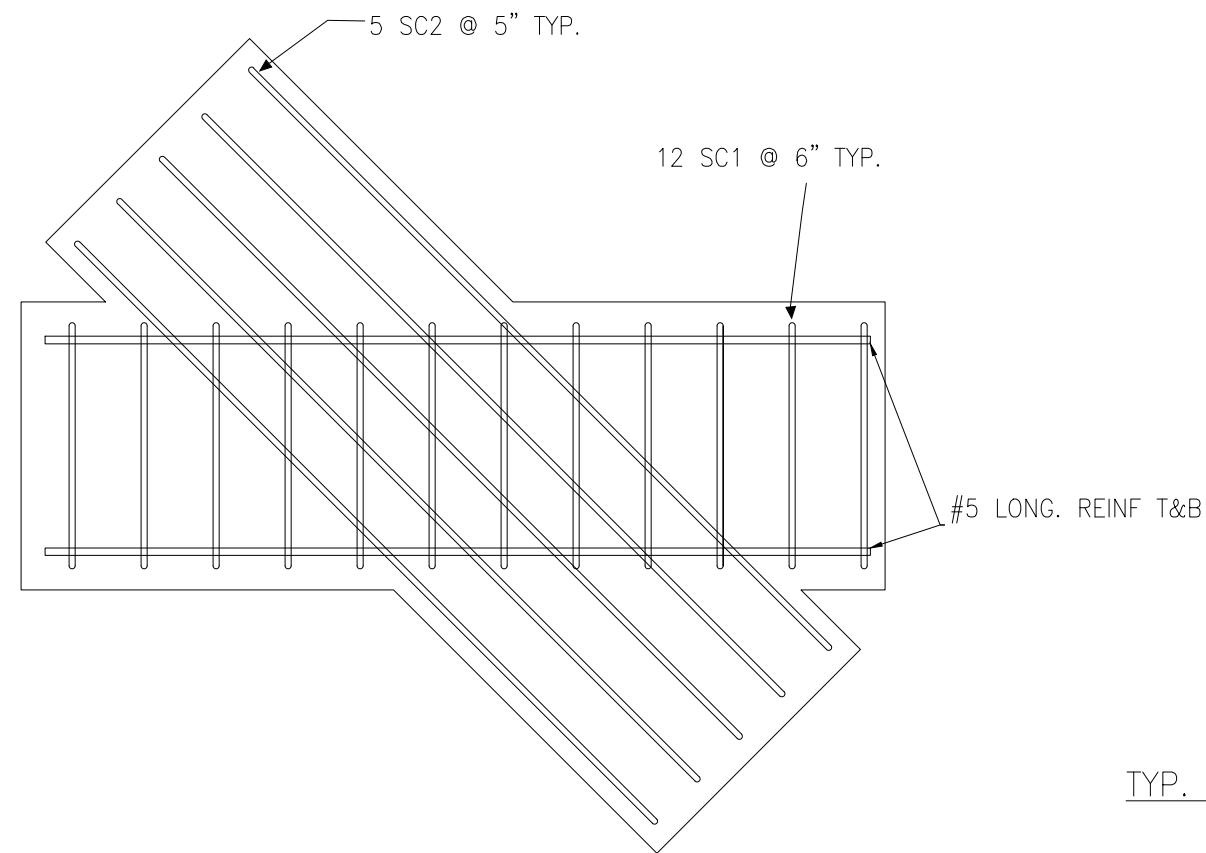
Drawn by: CJ	Checked by: JW
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Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

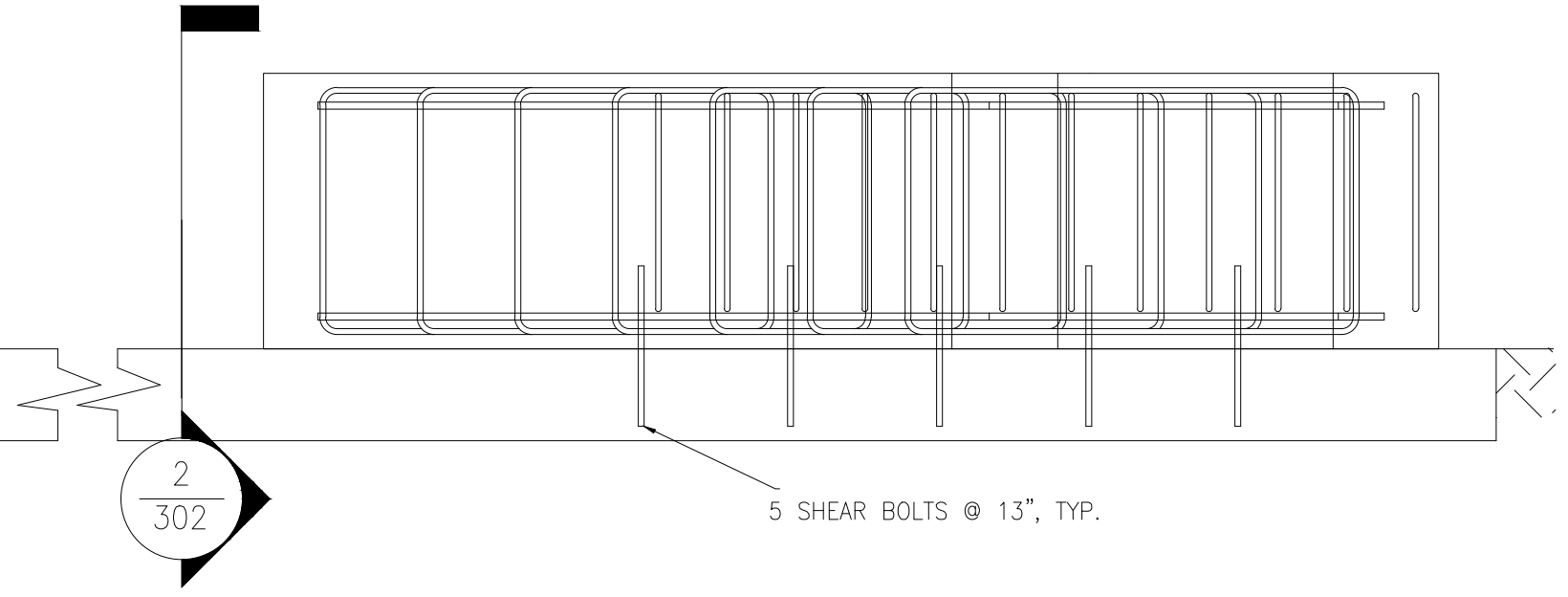
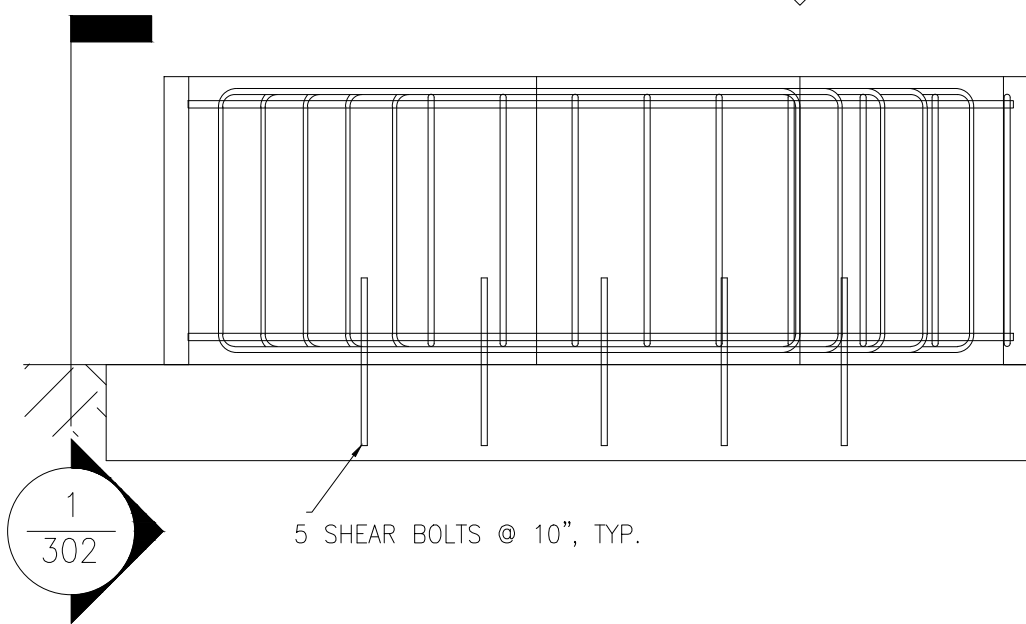
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Drawing Title: <h1>S-101</h1> STRUCTURAL NOTES



TYP. REINF. PLAN



SHEAR BOLTS POSITIONED TO CLEAR REINFORCEMENT
4" CLEARANCE FROM EDGE, TYP.

TYP. REINF. ELEVATION

Revision notes:		
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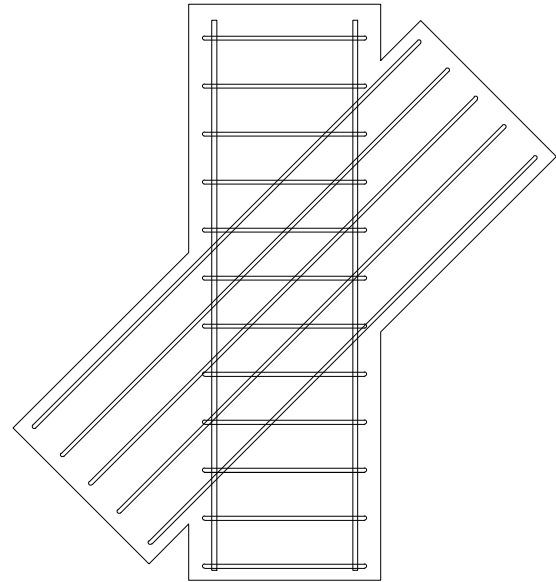
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Drawing Title: <h1>S-301</h1> STAY CABLE

NOTES:

- SEE S-500 SHEETS FOR REINFORCEMENT DETAILS
- SPACE ALL REINFORCING TO CLEAR POST-TENSIONED TENDONS
- SHEAR BOLT CONNECTIONS OMITTED IN PLAN VIEW FOR CLARITY

PLAN

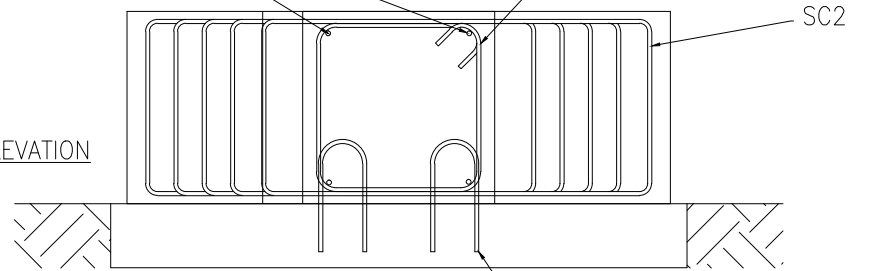


#5 LONG.
REBAR, TYP.

SC1

SC2

ELEVATION



SHEAR BOLT CONNECTION, TYP.

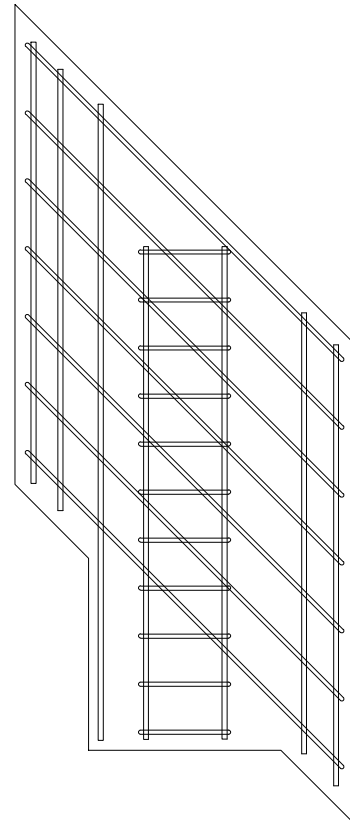
WSW STAY CABLE REINFORCEMENT DETAIL

1/2"=1'-0" ①

NOTES:

- SEE S-500 SHEETS FOR REINFORCEMENT DETAILS
- SPACE ALL REINFORCING TO CLEAR POST-TENSIONED TENDONS
- SHEAR BOLT CONNECTIONS OMITTED IN PLAN VIEW FOR CLARITY

PLAN

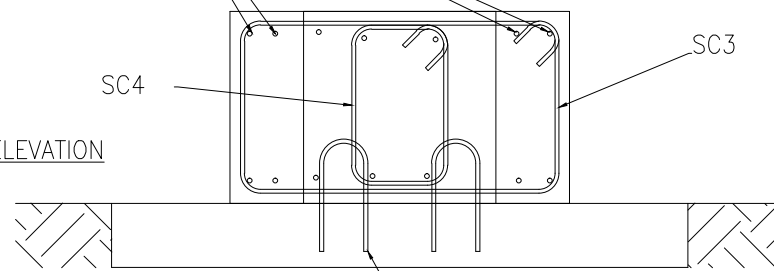


#5 LONG.
REBAR, TYP.

SC4

SC3

ELEVATION



SHEAR BOLT CONNECTION, TYP.

ENE STAY CABLE REINFORCEMENT DETAIL

1/2"=1'-0" ②

Revision notes:

Rev:	Date:	Notes:

Drawn by: CJ Checked by: JW

Client: NCHRP 14-28

Project:
CONDITION ASSESSMENT OF BRIDGE
PT AND STAY CABLE SYSTEMS USING
NDE METHODS

Date:
5/31/2014

Scale:
N/A

Revision:

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TEXAS A&M TRANSPORTATION INSTITUTE
3135 TAMU
COLLEGE STATION, TX 77843-3135

Drawing Title:

S-302
STAY CABLE DETAILS

CONSTRUCTION PHASE 4

TABLE OF ESTIMATED QUANTITIES				
BAR	SIZE	NO.	LENGTH (FT-IN)	TOTAL WEIGHT (LBS)
STRAIGHT	5	102	5 - 8	603
REINFORCING STEEL			LBS	1644
CLASS "C" CONCRETE			CY	18.7

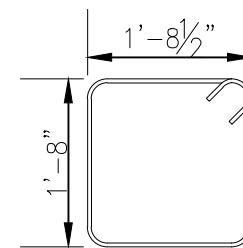
TABLE OF ESTIMATED QUANTITIES				
PIPE	NO.	CURVATURE RAD. (FT)	LENGTH (FT-IN)	TOTAL WEIGHT (LBS)
1	2	15	5 - 1	80
2	8	15	5 - 1/2	79

NOTES

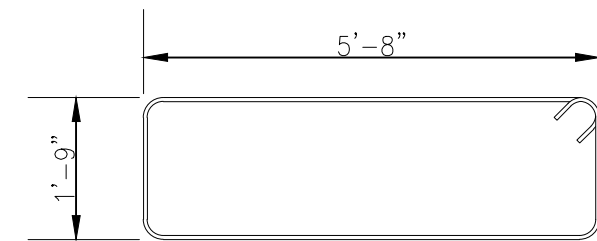
- ALL PIPES TO EXTEND 6" PAST DIAPHRAGM/DEVIATOR FACE
- (12) STEEL PIPES IN DIAPHRAGM TO BE MEASURED BASED ON TRUMPET SIZE

STAY CABLE CONSTRUCTION

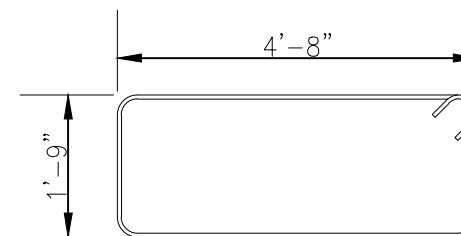
TABLE OF ESTIMATED QUANTITIES (INCLUDES ALL STAY CABLE SPECIMENS)				
BAR	SIZE	NO.	LENGTH (FT-IN)	TOTAL WEIGHT (LBS)
SC01	4	48	7 - 10	252
SC02	4	20	15 - 10	212
SC03	4	28	13 - 10	259
SC04	4	44	6 - 4	187
STRAIGHT	5	16	5 - 9	96
STRAIGHT	5	32	4 - 7	153
REINFORCING STEEL			LBS	1159
CLASS "C" CONCRETE			CY	11.3



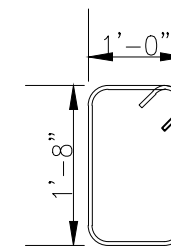
SC1



SC2



SC3



SC4

Revision notes:		
Rev:	Date:	Notes:

Drawn by: CJ	Checked by: JW
Client: NCHRP 14-28	

Project: CONDITION ASSESSMENT OF BRIDGE PT AND STAY CABLE SYSTEMS USING NDE METHODS

Date: 5/31/2014
Scale: 1/2"=1'-0"
Revision:

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Drawing Title: <h1>S-504</h1> REINFORCEMENT DETAILS
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TEXAS A&M
TRANSPORTATION
INSTITUTE

TEXAS A&M UNIVERSITY

1.0 GENERAL NOTES

THIS GROUTING PLAN IS PROVIDED PER PTI 4.6.1
PRIMARY GROUTING PERSONNEL:
JOSHUA WHITE, ASBI GROUTING TRAINING CERTIFICATE
CASEY JONES, ASBI GROUTING TRAINING CERTIFICATE
KATLYN MCCOY

2.0 GROUT SELECTION

TYPE C PREPACKAGED THIXOTROPIC GROUT TO BE USED, TO CONFORM TO PTI M55
TYPE C GROUT TO BE USED BECAUSE MAXIMUM HEAD IS KNOWN, NO VERTICAL
TENDONS TO BE GROUTED

3.0 DUCT/VENT PREPARATION

POSITIVE SHUT-OFF GROUT PORTS TO BE USED
ALL DUCT COUPLERS WILL BE HEAT SHRINK SLEEVES ATTACHED AT CONNECTIONS
AIR PRESSURE TESTING UP TO 30 PSI WILL BE PERFORMED ON ALL TENDONS PRIOR
TO GROUTING
ANY AIR LEAKS WILL BE SEALED USING EPOXY PRIOR TO GROUTING
NO FLUSHING OF DUCTS WITH WATER WILL BE DONE
PRELIMINARY CLEANING OF DUCTS USING OIL-FREE AND WATER-FREE COMPRESSED
AIR WILL BE DONE A MAXIMUM OF 48 HOURS PRIOR TO GROUTING
GROUTING MUST BE DONE WITHIN 7 DAYS FROM INSTALLING THE TENDONS

4.0 EQUIPMENT/MATERIALS/TESTING

COLLODIAL MIXER TO BE USED
INSPECTION OF ALL MATERIALS & EQUIPMENT TO BE DONE PRIOR TO EACH DAY OF
GROUTING
TYPE C THIXOTROPIC GROUT TO BE STORED ON SITE FOR NO MORE THAN ONE
MONTH PRIOR TO USE
GROUT TO BE STORED IN LARGE CONTAINER FOR PROTECTION FROM SUN/MOISTURE
ONLY POTABLE WATER WILL BE USED, CHLORIDE LEVELS TO BE CHECKED PRIOR TO
EACH DAY OF GROUTING AND MUST MEET THE REQUIREMENTS OF ASTM C1602
WATER CONTENT OF GROUT MIXTURES MUST BE WITHIN 1% OF MANUFACTURER'S
SPECS

THE FOLLOWING TESTS WILL BE PERFORMED ON THE GROUT:

- WET DENSITY TEST (ANSI/API MUD BALANCE TEST)
 - REQUIRED EQUIPMENT:
 - 1. MUD BALANCE SCALE
 - TEST FREQUENCY = EVERY NEW MIX OF GROUT
 - EXPECTED RESULT = 1.8-2.2
- MODIFIED FLOW CONE (ASTM C939 MODIFIED)
 - REQUIRED EQUIPMENT:
 - 1. STANDARD GROUT FLOW CONE
 - 2. RECEIVING CONTAINER (MIN 2000 mL)
 - 3. RING STAND FOR FLOW CONE
 - 4. LEVEL
 - 5. STOP WATCH
 - TEST FREQUENCY = EVERY NEW MIX OF GROUT
 - EXPECTED RESULT = 7-30 SECONDS

- WICK-INDUCED BLEED TEST (ASTM 940)
REQUIRED EQUIPMENT
1. TRANSPARENT TUBE (APPROX. 1000 mm TALL, NOMINAL DIAMETER OF 80 mm)
 2. 1000 mm CONDITIONED, CLEANED SEVEN-WIRE STRAND
 3. DUCT/ELECTRICAL TAPE

TEST FREQUENCY = 1/DAY
EXPECTED RESULT = 0.0% AT THREE HOURS
SCHUPACK PRESSURE BLEED TEST (ASTM C1741)

- REQUIRED EQUIPMENT
1. GELMAN FILTER WITH STAINLESS STEEL SCREEN
 2. TYPE A FIBERGLASS FILTER
 3. AIR PRESSURE SUPPLY
 4. 10 mL GRADUATED CYLINDER
 5. TRANSPARENT TUBE

TEST FREQUENCY = 1/DAY
EXPECTED RESULT = MAX. 4% @ 20 PSI
GROUT STRENGTH

- REQUIRED EQUIPMENT
1. SCALES, MASSES, SIEVES, GLASS GRADUATES, AND THREE GANG MOLDS FOR 2-IN CUBE SPECIMENS
 2. PLATES TO COVER MOLDS
 3. WEIGHT TO HOLD DOWN COVER PLATES

TEST FREQUENCY = 1/DAY
EXPECTED RESULT = MIN. 3 KSI @ 7 DAYS, MIN. 5 KSI @ 28 DAYS
IF THE TEST RESULTS DO NOT COMPLY TO REQUIRED VALUES PER PTI M55 CH. 4,
PROPERLY DISPOSE OF GROUT AND MIX AGAIN, RECHECK TEMPERATURES AND
MEASUREMENTS, WATER SHALL NOT BE USED AT GREATER THAN 90 DEGREES F
EACH SHIFT WILL CONSIST OF 4 WORKERS:

- 1: MIXING GROUT/RUNNING THE PUMP
- 2: ASSISTING WITH GROUT PUMP/MIXER
- 3: CLOSING VENT VALVES
- 4: RUNNING GROUT TESTS

A GROUT LOG WILL ALSO BE KEPT INCLUDING AT MINIMUM THE FOLLOWING INFORMATION:

1. DATE/TIME OF GROUTING
2. ELAPSED TIME
3. DAILY NOTES
4. DATA/RESULTS OF PORT CHECK
5. AMOUNT OF GROUT USED
6. TEMPERATURES OF WATER ADDED/GROUT MIXES
7. FINAL VOLUMES OF GROUT PUMPED
8. EFFLUX TIME
9. TENDON IDS
10. SIGNATURE OF OPERATOR

A PREGROUTING MEETING WILL OCCUR A MAXIMUM OF 48 HOURS PRIOR TO EACH
GROUTING SESSION

5.0 PUMPING

GROUT WILL BE MIXED IN COLLODIAL MIXER, PUMPED AT DEFINED PRESSURES, AND VALVE
CLOSING SEQUENCES DEPENDS ON WHICH TENDON IS BEING GROUTED, AS SHOWN IN
VALVE CLOSING SEQUENCE

MAXIMUM PRESSURES AT INLETS:

- EXTERNAL HDPE DUCTS- 145 PSI
- INTERNAL CIRCULAR DUCTS - 245 PSI

NORMAL OPERATIONS PRESSURE RANGE: 50-75 PSI

IF PUMP CANNOT STAY WITHIN THIS RANGE, STOP THE GROUTING OPERATION

ALL GROUTING WILL USE ONE-WAY FLOW, AS ILLUSTRATED BY VALVE CLOSING SEQUENCES
A MINIMUM OF ONE GALLON OF GROUT WILL POUR OUT OF EACH VALVE PRIOR TO
CLOSING AS IN RECOMMENDED PRACTICE

THIS GROUT SHALL BE DISCARDED, NOT REUSED

SEQUENCE OF CLOSING VALVES LISTED BELOW. REFER TO SECTION G6 FOR VALVE
LABELING:

- TENDON 1: 1C, 1B, 1A (1A INLET)
- TENDON 2: 2C, 2B, 2A (2A INLET)
- TENDON 3: 3C, 3B, 3D, 3A (3A INLET)
- TENDON 4: 4C, 4B, 4D, 4A (4A INLET)
- TENDON 5: 5C, 5B, 5D, 5A (5A INLET)
- TENDON 6: 6B, 6A, 6C (6C INLET)
- TENDON 7: 7B, 7A, 7C (7C INLET)
- TENDON 8: 8B, 8A, 8C (8C INLET)
- TENDON 9: 9B, 9A, 9C (9C INLET)
- TENDON 10: 10B, 10A, 10C (10C INLET)
- TENDON 11: 10B, 10A, 10C (10C INLET)
- TENDON 12: 11B, 11A, 11C (11C INLET)
- TENDON 13: 13C, 13B, 13A (13A INLET)
- TENDON 14: 14C, 14B, 14A (14A INLET)
- TENDON 15: 15A, 15B, 15C (15C INLET)
- TENDON 16: 16A, 16B, 16C (16C INLET)
- TENDON 17: 17D, 17A, 17B, 17C (17C INLET)
- TENDON 18: 18D, 18A, 18B, 18C (18C INLET)
- TENDON 19: 19D, 19A, 19B, 19C (19C INLET)
- TENDON 20: 20D, 20A, 20B, 20C (20C INLET)

TENDONS WILL BE GROUTED ONE AT A TIME DUE TO EQUIPMENT RESTRICTIONS
EACH TENDON WILL REQUIRE APPROX. 42 GALLONS GROUT (INCLUDING TESTS)
IF ANY BLOCKAGES, SYSTEM MALFUNCTIONS, OR MAJOR SPILLS OCCUR, IMMEDIATELY
STOP THE GROUTING OPERATION
IDENTIFY THE PROBLEM, FIX THE ISSUE, AND TEST THE ENTIRE SYSTEM PRIOR TO
RESTARTING THE GROUTING OPERATION

6.0 GENERAL GROUTING PROCEDURE

1. GATHER ALL MATERIALS NECESSARY FOR GROUTING, CLEAN-UP, AND ANY POSSIBLE
GROUT DISPOSAL
2. INSPECT ALL MATERIALS AND EQUIPMENT (MONITOR WATER TEMP.)
3. START THE MIXER
4. WEIGH OUT GROUT BAGS AND WATER, POUR INTO MIXER
5. MIX FOR 3-5 MINUTES
6. PERFORM PRE-PUMP WET DENSITY AND PUMPABILITY TESTS
7. IF GROUT MIX PASSES THE TESTS IN STEP 6, MAKE SURE ALL VENTS ARE OPEN
AND START PUMP (DO NOT SHUT OFF MIXER)
8. CLOSE VENTS IN CORRECT ORDER
9. AS SOON AS POSSIBLE AFTER CLOSING THE LAST VENT, STOP THE PUMP AND SHUT
OFF THE VALVE FROM THE HOSE
10. DISCONNECT THE HOSE FROM THE INLET
11. POUR EXCESS GROUT INTO GREASED TRASH CAN TO DRY
12. CLEAN-UP: RUN WATER ENTIRELY THROUGH THE SYSTEM UNTIL IT IS CLEAR, RUN
IN HOPPER FOR EXTENDED TIME

7.0 POST-GROUTING PROCEDURES

VALVES, CAPS, AND PIPES AT ALL INLETS/OUTLETS SHALL NOT BE REMOVED UNTIL THE
GROUT IS SET
NOT LESS THAN 24 HOURS AFTER GROUTING, INSPECT LEVEL OF GROUT IN OUTLETS
AND CAPS, TOP WITH FRESHLY MIXED GROUT AS NECESSARY
DO NOT SUBJECT THE FILLED DUCTS TO VIBRATION FOR A MIN. OF 24 HOURS
INTERNAL TENDONS SHALL HAVE INLET AND OUTLET OPENINGS REMOVED AT LEAST 1 IN.
BELOW THE CONCRETE SURFACE AND FILLED USING FRESHLY MIXED GROUT
FOR EXTERNAL TENDONS, ALL OUTLET AND INLET OPENINGS SHALL BE PERMANENTLY
SEALED
REPAIR SPLITS, HOLES, OR OTHER DAMAGE TO EXPOSED DUCTS

Revision notes:		
Rev:	Date:	Notes:

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Client: NCHRP 14-28	

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<small>C:\Users\joshwhite\Documents\TTI-Cable-Appge-Matcon.png</small> TEXAS A&M TRANSPORTATION INSTITUTE 3135 TAMU COLLEGE STATION, TX 77843-3135

Drawing Title: <h1 style="margin: 0;">S-601</h1> <h2 style="margin: 0;">GROUTING PLAN</h2>
