Texas Department of Transportation

BOOK 2 – TECHNICAL PROVISIONS

FOR

LOOP 375 - BORDER HIGHWAY WEST EXTENSION

PROJECT

Design-Build Project

ATTACHMENT 21-1
TOLL SYSTEMS RESPONSIBILITIES MATRIX

MARCH 14, 2014

BHW Toll Responsibility Matrix – 03/13/2014

Texas Department of Transportation **Toll Systems Responsibility Matrix**

LEGEND		Work Description		
Primary Responsibility	A	**1**	**2**	**3**
Support Responsibility	B	Design	Procure	Install and/or Construct
Coordination Responsibility Only	C			
No Responsibility	D			

Element/Task/Component/ Sub-system	TxDOT (T)			Developer (D)			CRRMA/System Integrator (SI)			Comments Other Responsibility/Information
	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
FACILITIES										
Toll Zone Layout	B	D	C	B	A	A	A	B	B	Elements of the layout will be constructed by either D or SI as identified in the layout
Metered power service to roadside equipment cabinet	B	D	C	A	A	A	B	D	B	SI to provide power requirements and special requirement for construction of utilities near Toll Zone.
Electrical conductors from Equip Pad to Toll Zone Equipment	B	D	C	D	A	A	A	D	B	
Complete backup power systems: generators, automatic transfer switches, and fuel tanks	C	D	C	D	D	D	A	A	A	
Uninterruptible Power Supplies for the lane controllers/Tolling Equipment at Toll Sites	C	D	C	D	D	D	A	A	A	
Lightning Protection & Grounding	C	D	C	A	A	A	B	D	B	
Duct Bank (Toll Zones)	C	D	C	A	A	A	B	D	B	D to provide fiber in a dedicated vault separate from ITS on opposite sides of roadway.
Fiber Optic cables in Duct Bank for Toll Systems	C	D	C	A	A	A	B	D	B	

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	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Fiber Optic data/communication wire/fiber to ground box at Toll Zone	C	D	C	A	A	A	B	D	B	D to provide fiber, in accordance with SI specs, to ground boxes adjacent to each toll zone equipment cabinet pad
Data/communication wire/fiber from ground box at Toll Zone to toll systems equipment	B	D	C	D	D	C	A	A	A	
Installation/Electrical Design and Plans to junction box at Toll Zone	C	D	C	A	A	A	B	D	B	D to install to electrical junction box adjacent to roadside equipment cabinet.
Installation/Electrical Design and Plans from junction box at Toll Zone to toll systems equipment	C	D	C	B	D	C	A	A	A	SI to install from electrical junction box to gantries.
Toll Zone pavement and structure, using special GFRP section and conduit stub ups for pavement sensors	B	D	C	A	A	A	B	D	B	SI to provide pavement loop details with stub-up locations. Stub-ups to terminate in junction boxes adjacent to Toll Zone pavement, not on structure
Concrete Barrier Installation	B	D	C	A	A	A	D	D	D	D to provide Concrete Barrier as per Toll Plaza Layout. Barrier openings will accommodate maintenance driveways.
Pavement sensors	B	D	C	D	D	C	A	A	A	D to provide access to SI to saw cut and install pavement sensors
Gantries and foundations	B	D	C	A	A	A	B	D	B	T to provide SI specs to D for gantry design. D to coordinate locations with T

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	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Toll Equipment mounts on Gantries	B	D	C	D	D	C	A	A	A	SI to install any required equipment mounts on gantries. SI to coordinate with T during the design phase to incorporate any req'd framing to support equipment mounts.
Concrete Pads for power, elec, roadside toll equip, generator, LP tank	B	D	C	A	A	A	B	D	C	
Roadside equipment cabinets (including HVAC systems)	C	D	C	D	D	C	A	A	A	SI to install complete
Toll Signage	B	D	C	A	A	A	B	A	A	D to design and install foundation and structure. SI to install the SDMS.
Maintenance Driveway (including all roadway items within the toll zones)	B	D	C	A	A	A	B	D	D	For at-grade, D to provide maintenance access driveway w' a min of 6" flex base and 3" HMA
ELECTRONIC TOLL COLLECTION SUB-SYSTEMS (ETC)										
Automatic Vehicle Classification System and Image Capturing System (ICS) Hardware	C	D	C	D	D	C	A	A	A	D to coordinate access to roadway for installations.
Computer rack system, routers, hubs, switches, firewalls, VPN, modems, patch/distribution panels,	C	D	C	D	D	C	A	A	A	D to coordinate access to roadway for installations.
Toll Plaza Host Computer	C	D	C	D	D	D	A	A	A	

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	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Support equipment at designated Customer Service Center	C	D	C	D	D	D	A	A	A	
Commissioning and Operational Testing	C	D	C	D	D	C	A	A	A	D to coordinate access to roadway for installations.
Lane controller software	C	D	C	D	D	D	A	A	A	
Plaza Computer Software	C	D	C	D	D	D	A	A	A	
Host Computer Software	C	D	C	D	D	D	A	A	A	
Toll Collection System Application Software	C	D	C	D	D	D	A	A	A	
Maintenance Online Management System Software	C	D	C	D	D	D	A	A	A	
Site Acceptance Test	C	D	C	D	D	C	A	A	A	D to coordinate access to roadway for installations.
System Acceptance Test	C	D	C	D	D	D	A	A	A	
Training: (User and Maintenance)	C	D	C	D	D	D	A	A	A	
Documentation: (User and Maintenance)	C	D	C	D	D	D	A	A	A	
Documentation: ETS Installation/Electrical Design and Plans	C	D	C	D	D	D	A	A	A	

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Element/Task/Component/ Sub-system	TxDOT (T)			Developer (D)			CRRMA/System Integrator (SI)			Comments Other Responsibility/Information
	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**	
Documentation: Civil As-built Drawings, and Contract Closeout Documents	C	D	C	A	D	D	D	A	A	
Documentation: ETS As-built Drawings	C	D	C	D	D	D	A	A	A	
FCC Licenses/Regulations as applies to toll systems	C	D	C	D	D	D	A	A	A	
Lane Controller Hardware	C	D	C	D	D	C	A	A	A	D to coordinate access to roadway for installations
Communication Equipment	C	D	C	D	D	C	A	A	A	D to coordinate access to roadway for installations.

Texas Department of Transportation

BOOK 2 – TECHNICAL PROVISIONS

FOR

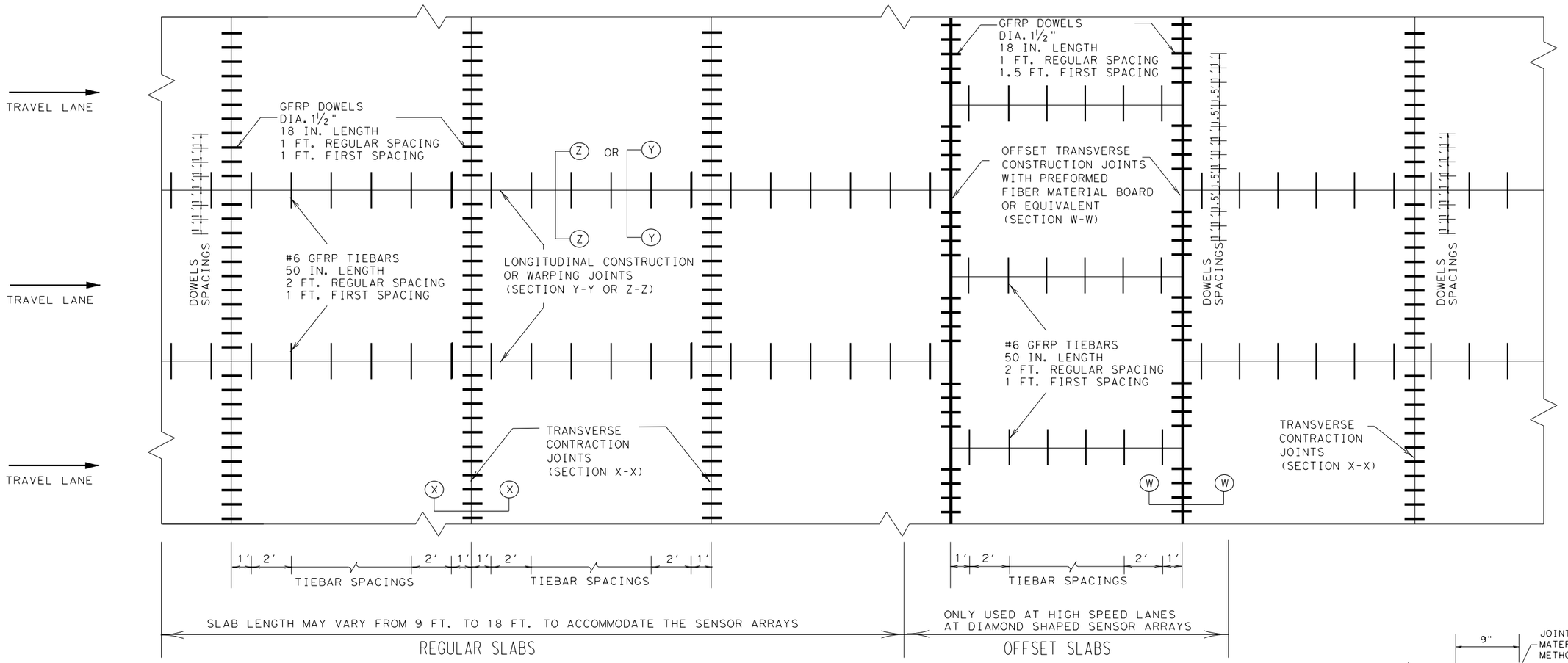
LOOP 375 - BORDER HIGHWAY WEST EXTENSION

PROJECT

Design-Build Project

ATTACHMENT 21-2
JOINTED CONCRETE PAVEMENT DESIGN USING GLASS-REINFORCED POLYMER BARS STANDARD

MARCH 14, 2014

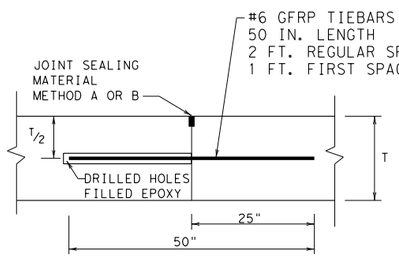


JOINTED PAVEMENT DETAIL LAYOUT

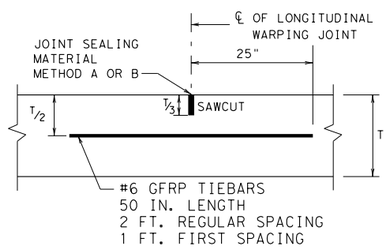
(NOT TO SCALE)

GENERAL NOTES

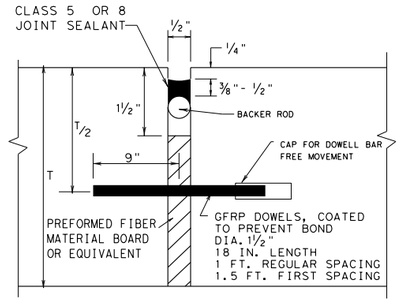
1. THE TERMINAL ANCHOR SLAB DETAILS ARE AS SHOWN ELSEWHERE IN THE PLANS.
2. DETAILS AS TO PAVEMENT SLAB WIDTH, THICKNESS, AND CROWN CROSS-SLOPE SHALL BE AS SHOWN ELSEWHERE ON THE PLANS.
3. THE DETAIL FOR THE JOINT SEALANT AND RESERVOIR SHALL BE SHOWN IN CONCRETE PAVEMENT DETAIL, JOINT SEALS STANDARD (JS-94).
4. FOR FURTHER INFORMATION REGARDING THE PLACEMENT OF CONCRETE AND REINFORCEMENT, REFER TO THE GOVERNING SPECIFICATIONS FOR "CONCRETE PAVEMENT", AND "GFRP REINFORCEMENT."
5. PAVEMENT WIDTH OF MORE THAN 16' SHALL HAVE A LONGITUDINAL JOINT (SECTION Z-Z OR Y-Y). THESE JOINTS SHALL BE LOCATED WITHIN 6" OF THE LANE LINE UNLESS THE JOINT LOCATION IS SHOWN ELSEWHERE ON THE PLANS.
6. SAW CUT DEPTH FOR LONGITUDINAL AND TRANSVERSE CONTRACTION JOINTS MAY BE ONE FOURTH THE SLAB THICKNESS WHEN CRUSHED LIMESTONE IS USED AS THE COARSE AGGREGAE.
7. CONCRETE SLABS WIDER THAN 100' WITHOUT A FREE JOINT, ARE NOT COVERED BY THIS STANDARD.



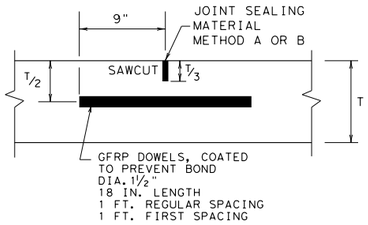
LONGITUDINAL CONSTRUCTION JOINT
SECTION Y-Y



LONGITUDINAL WARPING JOINT
SECTION Z-Z



OFFSET TRANSVERSE
CONSTRUCTION JOINT
SECTION W-W



TRANSVERSE CONTRACTION JOINT
SECTION X-X

Texas Department of Transportation
Design Division (Pavement)

JOINTED CONCRETE PAVEMENT

USING GLASS FIBER REINFORCED POLYMER BARS

T-11 INCHES

JCPGFRPB-04 (TTA STANDARD)

© TxDOT JULY 2004	DN: MCW	CK: MCW	DW: HC	CK: HC	MEG NO.:
MODIFICATIONS					

STATE DISTRICT	FEDERAL REGION	FEDERAL AID PROJECT	SHEET
AUS	6		212A

COUNTY	CONTROL	SECTION	JOB	HIGHWAY
WILLIAMSON	0683	06	027	SH 45 LOOP 1

LEVELS DISPLAYED
1 3 4 5 6 7 8 9 10 11 12 13 14 15 16
17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32
33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48

FILE: <JCPGFRPB-04.DGN>

Texas Department of Transportation

BOOK 2 – TECHNICAL PROVISIONS

FOR

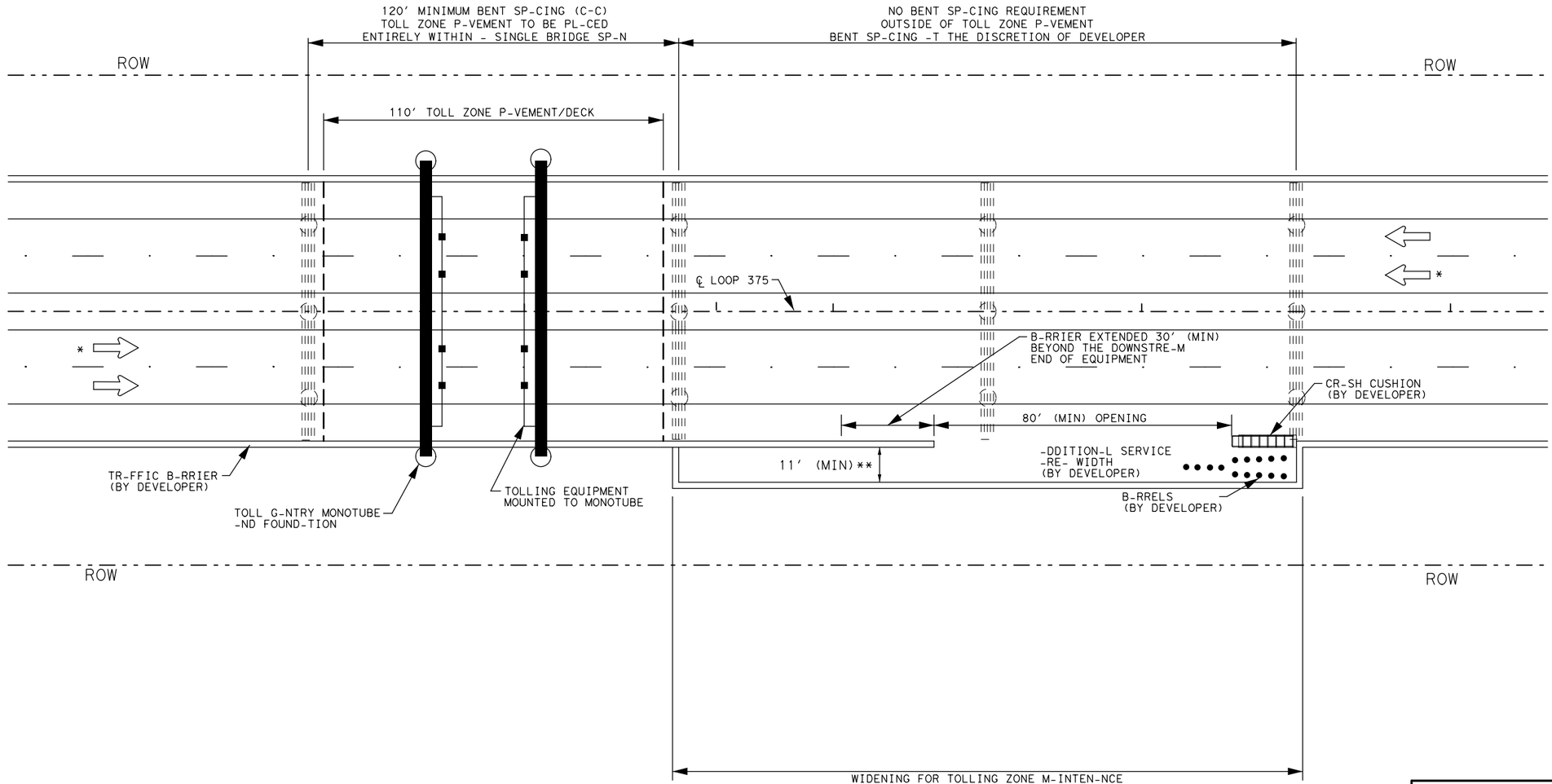
LOOP 375 - BORDER HIGHWAY WEST EXTENSION

PROJECT

Design-Build Project

ATTACHMENT 21-3
TYPICAL TOLL ZONE LAYOUT

MARCH 14, 2014



* THE M-INLINE TOLL ZONE IS THE ONLY TOLL ZONE WITH MULTIPLE L-NES. THE R-MP TOLL ZONES -RE ONE-L-NE CONFIGUR-TIONS. REFER TO THE TECHNIC-L PROVISIONS FOR RO-DW-Y GEOMETRY -ND L-NE CONFIGUR-TION.

** 11' MINIMUM CLE-R, DRIVE-BLE WIDTH BETWEEN THE INTERIOR -ND EXTERIOR R-IL F-CES.

Texas Department of Transportation

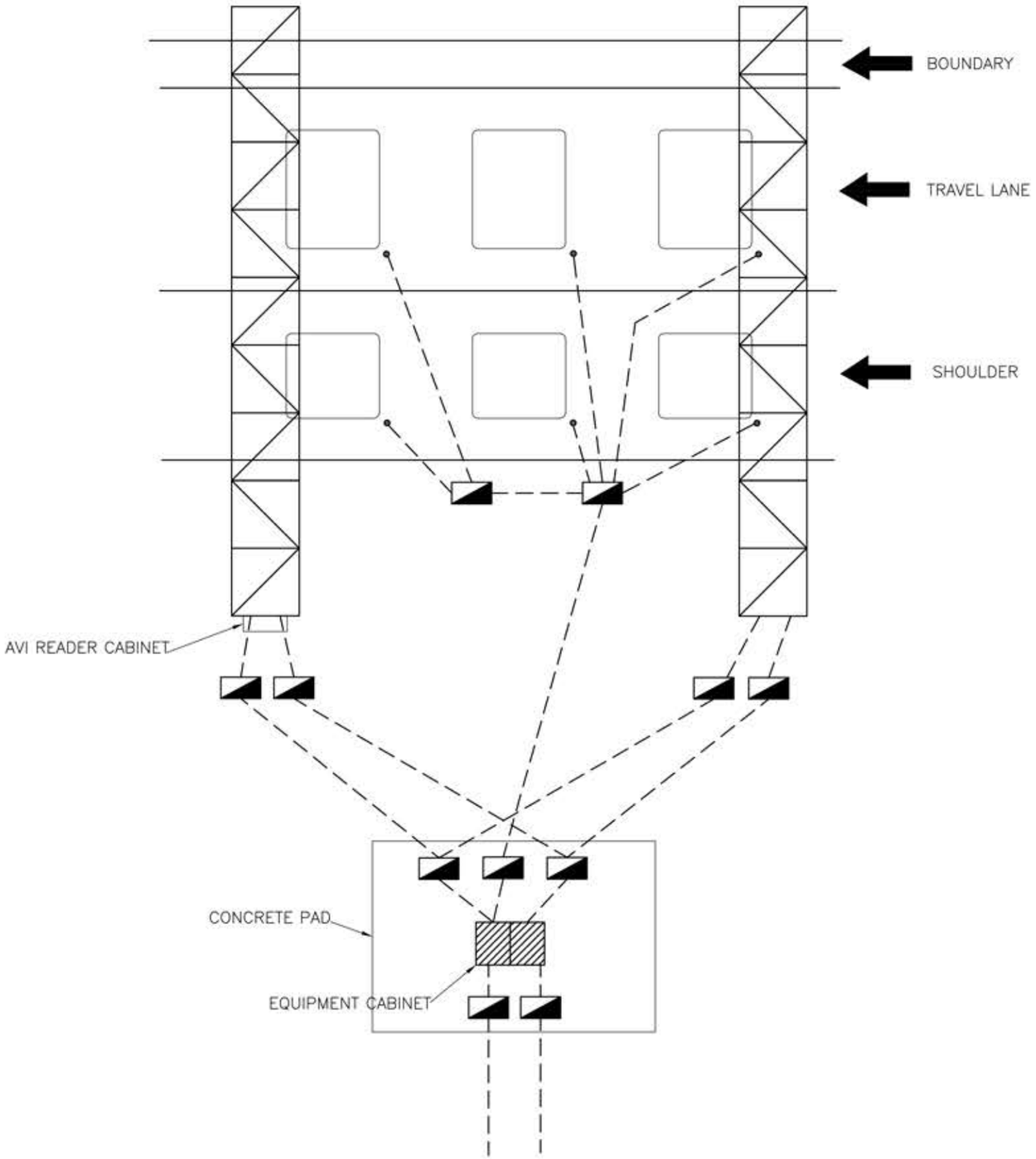
LOOP 375 BORDER HIGHWAY WEST

TYPICAL TOLL ZONE LAYOUT FOR MAINLINE / RAMPS ON BRIDGE OR RETAINING WALLS

NOT TO SC-LE

FILE:	DN: TxDOT	CK:	DW:	CK:
©TxDOT March 2014	CONT	SECT	JOB	HIGHW-Y
REVISIONS				BHW
	DIST	COUNTY		SHEET NO.
	ELP	EL P-SO		

FILE: Z:\Projects\VEC0206 WA 08\Border Highway\dlw\375tollzone.dgn
DATE: 3/6/2014



NOTES:

1. ALL LOOP RISER CONDUIT IS 1.25" SCH. 40 PVC.
2. COMM RUNS MUST NOT EXCEED 300 CABLE FEET.
3. COAX CABLE RUNS MUST NOT EXCEED 115 CABLE FEET.
4. COAX CABLE BEND RADIUS IS 3 INCHES EVERY 90 DEGREES.
5. CABLES MUST NOT EXCEED 270 DEGREES OF BENDS BETWEEN PULL POINTS.
6. RISER CONDUIT CANNOT BE LOCATED INSIDE OF A LOOP.
7. RISER CONDUIT MUST BE LOCATED A MINIMUM OF 0.3" AWAY FROM ANY LONGITUDINAL OR TRANSVERSE JOINT.
8. CONDUIT RISER RUN LENGTH WILL BE SITE SPECIFIC.
9. SEE SHEET 9 FOR CONDUIT RISER DETAILS.

NOT TO SCALE

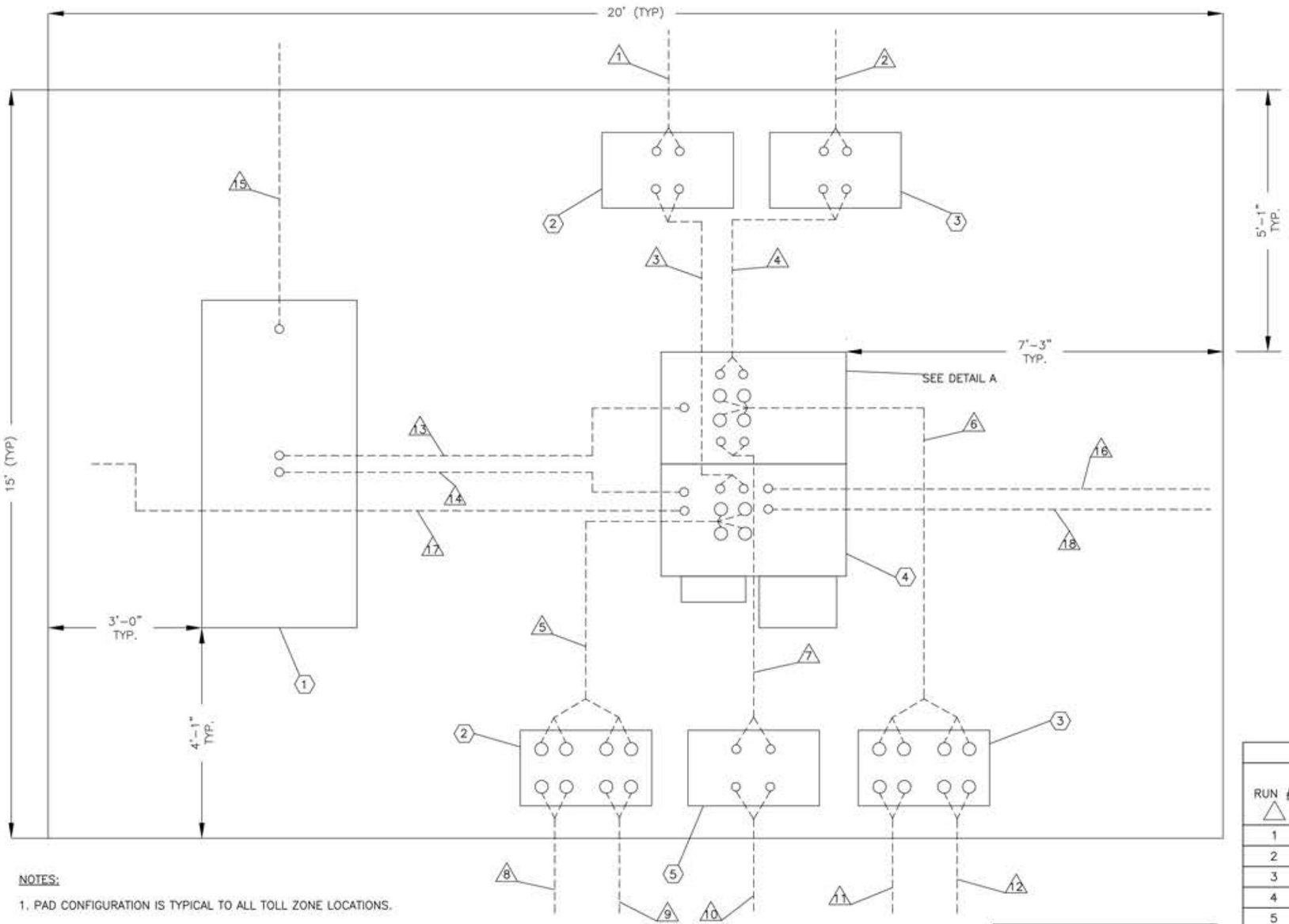
PRELIMINARY / DRAFT

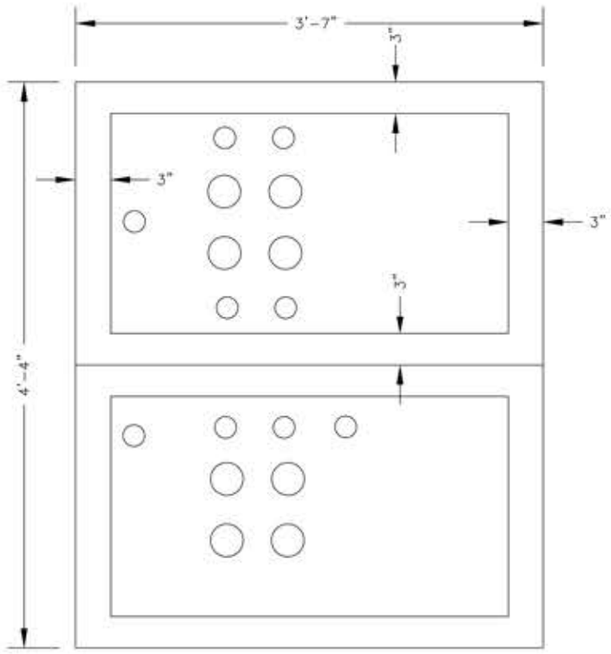
FOR REVIEW ONLY. NOT FOR BUILD OR DESIGN WITHOUT APPROVAL BY AUTHORIZED REPRESENTATIVE

DATE	DESCRIPTION	REV.
10/9/13	ADDED AVI READER CABINET	3
10/1/13	REMOVED AXLE RISERS	2
9/24/13	REDUCED LOOP GBOXES TO 2	1
9/24/13	ADDED AXLE RISERS	1

TOLL ZONE LAYOUT (TYPICAL)

DATE: 08/05/2013





DETAIL A
TEC RISER DETAIL

NOT TO SCALE

NOTES:

1. PAD CONFIGURATION IS TYPICAL TO ALL TOLL ZONE LOCATIONS.
2. GROUND BOXES ARE TYPE D WITH NO APRON.
3. ATS, MANUAL DISCONNECT AND BREAKER BOX SHALL BE NEMA 4 OR BETTER AND MOUNTED ON OUTSIDE OF TEC.
4. ATS, MANUAL DISCONNECT AND BREAKER BOX SUPPLIED BY SYSTEM INTEGRATOR.
5. GENERATOR WILL HAVE A DEDICATED LNG LINE FOR FUEL (BY OTHERS).
6. LIGHTNING PROTECTION SUPPLIED BY OTHERS.
7. CONCRETE PAD SHALL EXTEND 8-12 INCHES ABOVE FINISHED GRADE.
8. CONDUIT STUBOUTS SHALL EXTEND 10-12 INCHES ABOVE FINISHED PAD.
9. CONDUIT STUBOUTS IN THE TEC SHALL FALL WITHIN THE RISER OPENING SHOWN IN DETAIL A.
10. CONDUIT QUANTITIES AND SIZES MAY CHANGE BASED UPON SITE SURVEYS AND GANTRY LAYOUTS.
11. SEE ADDITIONAL CONDUIT NOTES ON ZONE LAYOUT DRAWING.
12. GENERATOR AND TOLL CABINET DOORS MUST HAVE 3 FEET OF CLEARENCE FOR SERVICE PERSONNEL.

COMPONENT WEIGHTS		
ITEM # ⬡	COMPONENT	COMP. WEIGHT (lbs.)
1	GENERATOR	1340.0
2	POWER GROUND BOX	N/A
3	COMMS GROUND BOX	N/A
4	DUAL BAY CABINET	750.0
5	LOOP GROUND BOX	N/A
6	ELECTRONICS	1000.0
	TOTAL	3090.0

CONDUIT SCHEDULE			
RUN # △	CONDUIT FUNCTION	CONDUIT QUANTITY	CONDUIT SIZE
1	INCOMING POWER	2	2"
2	INCOMING COMMS	2	2"
3	INCOMING POWER	2	2"
4	INCOMING COMMS	2	2"
5	POWER	4	3"
6	COMMS	4	3"
7	LOOPS	2	2"
8	EXIT GANTRY POWER	2	3"
9	ENTRY GANTRY POWER	2	3"
10	LOOPS	2	2"
11	EXIT GANTRY COMMS	2	3"
12	ENTRY GANTRY COMMS	2	3"
13	GENERATOR COMMS	1	3"
14	GENERATOR POWER	1	3"
15	GENERATOR LNG	1	N/A
16	TO EARTH GROUND	1	2"
17	TO PAD ILLUMINATION	1	2"
18	TO PAD ILLUMINATION	1	2"

PRELIMINARY / DRAFT

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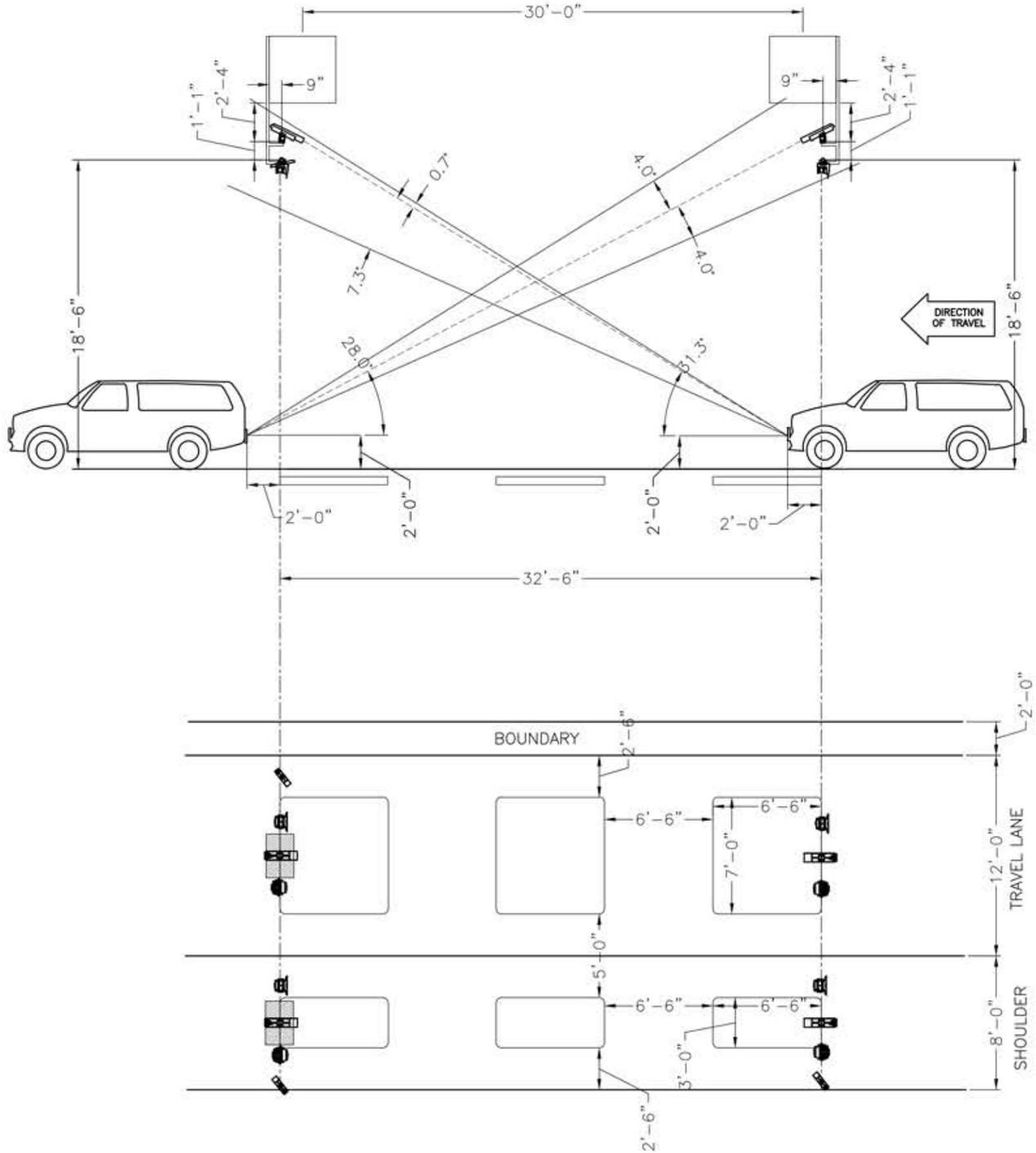
DATE	DESCRIPTION	REV.
10/9/13	ADDED PAD ILLUMINATION	2
10/2/13	ADDED CABINET & GEN. POSITIONING	1
10/2/13	ADDED CABINET & GEN. POSITIONING	1
10/2/13	ADDED NOTES 11 & 12	1
10/2/13	RMVD RUN 16 DEST. STUBOUT	1

TOLL PAD LAYOUT (TYPICAL)

DATE: 08/05/2013



NOTES:

1. SEE GANTRY ELEVATION DETAILS SHEET FOR PROPOSED EQUIPMENT LOCATION ON HANGERS.
2. ANY VARIATION IN THE CRITICAL DIMENSIONS SHOWN ARE TO BE APPROVED BY THE TOLL INTEGRATOR.
3. HANGER DESIGN MUST ACCOUNT FOR LINE OF SIGHTS OF ALL TOLLING EQUIPMENT SHOWN.
4. HANGER DESIGN MUST PROVIDE FOR VES CAMERA ANGLES BETWEEN 24 AND 32 DEGREES.
5. LOWER LIMIT: DISTANCE FROM THE CENTER POINT OF THE LOWEST HANGERS' BOTTOM CROSS MEMBER SHALL BE 18'-6" ABOVE THE FINISHED GRADE OF THE ROADWAY.
6. UPPER LIMIT: DISTANCE FROM THE CENTER POINT OF THE HIGHEST HANGER'S BOTTOM CROSS MEMBER SHALL BE NO LESS THAN 2'-0" BELOW THE GANTRY LOWER TRUSS.

LANE EQUIPMENT CONFIGURATION			
LANE ID	LANE WIDTH	ENTRY GANTRY CONFIG	EXIT GANTRY CONFIG
BOUNDARY	2'	N/A	N/A
TRAVEL LANE	12'	A1	A2
SHOULDER	8'	A1	A2

0 4' 8' 16'

PRELIMINARY / DRAFT

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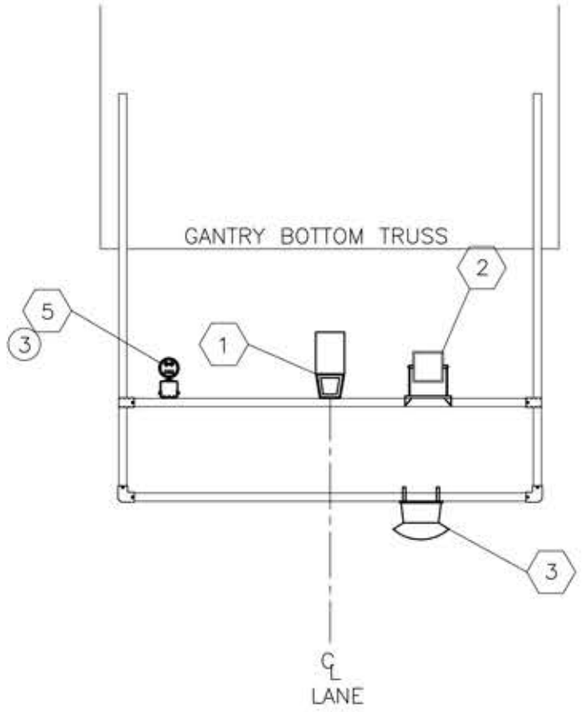
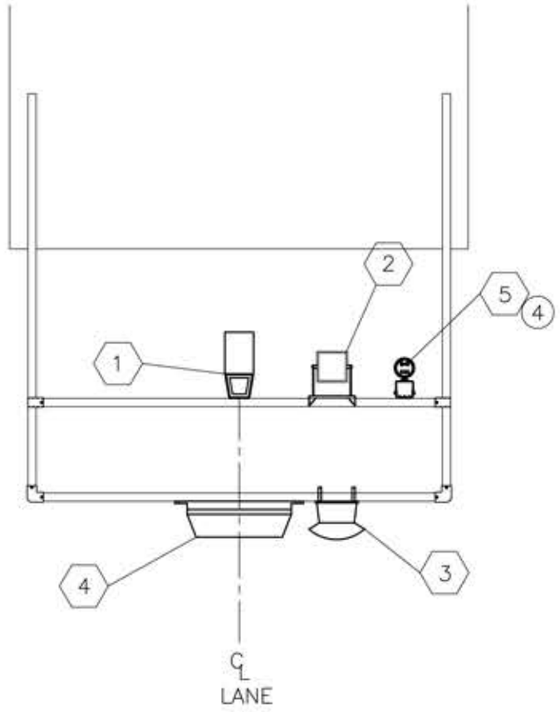
DATE	DESCRIPTION	REV.
10/9/13	ADDED PROPOSED HANGER DESIGN	3
10/1/13	UPDATED NOTE 6	2
9/27/13	UPDATED CRITICAL DIMENSIONS	1
9/27/13	UPDATED LOOP LAYOUT	1

PLAN/PROFILE LAYOUT CRITICAL DIMENSIONS

DATE: 08/05/2013



ELEVATION
ENTRY GANTRY
TYPE (A1)



ELEVATION
EXIT GANTRY
TYPE (A2)

NOTES:

1. COMPONENT LOCATIONS ARE SUBJECT TO CHANGE DUE TO SITE SURVEYS, GANTRY LOCATIONS AND HANGER DESIGN.
2. ITEM 5, DVAS CAMERA & ILLUM.: EXIT GANTRY WILL HAVE TWO INSTALLED IF EQUIPMENT PAD IS WITHIN SIGHT OF THE ZONE.
3. (3) INSTALLED ON THE SHOULDER A1 HANGER ONLY.
4. (4) INSTALLED ON THE TRAVEL LANE A2 HANGER ONLY.
5. ITEM 6, VES LIGHT SENSOR: ONLY ONE PER ZONE WILL BE INSTALLED. IT WILL BE INSTALLED ON THE GANTRY'S TOP CROSS MEMBER.
6. WEIGHTS LISTED ABOVE DO NOT TAKE TOLL CABLE OR CONDUIT INTO ACCOUNT.

EQUIPMENT WEIGHTS

ITEM # ⬡	COMPONENT	COMP. WEIGHT (lbs.)	BRACKET WEIGHT (lbs.)	ENTRY GANTRY QTY.	ENTRY GANTRY WEIGHT (lbs.)	EXIT GANTRY QTY.	EXIT GANTRY WEIGHT (lbs.)
1	VES CAMERA	21.7	3.2	1	24.9	1	24.9
2	VES STROBE	9.1	5.4	1	13.5	1	13.5
3	AVC SCANNER	13.2	5.4	1	18.6	1	18.6
4	AVI ANTENNA	6.6	N/A	0	0.0	1	6.6
5	DVAS CAMERA & ILLUM.	12.3	3.2	1	15.5	2	31.0
6	VES LIGHT SENSOR	9.1	N/A	1	9.1	0	0.0
TOTAL COMPONENT WEIGHT PER LANE, ENTRY GANTRY					81.6		
TOTAL COMPONENT WEIGHT PER LANE, EXIT GANTRY							94.6

NOT TO SCALE

PRELIMINARY / DRAFT
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DATE	DESCRIPTION	REV.
9/27/13	UPDATED COMPONENT LAYOUT	1

GANTRY ELEVATION DETAILS (TYPICAL)

DATE: 08/05/2013