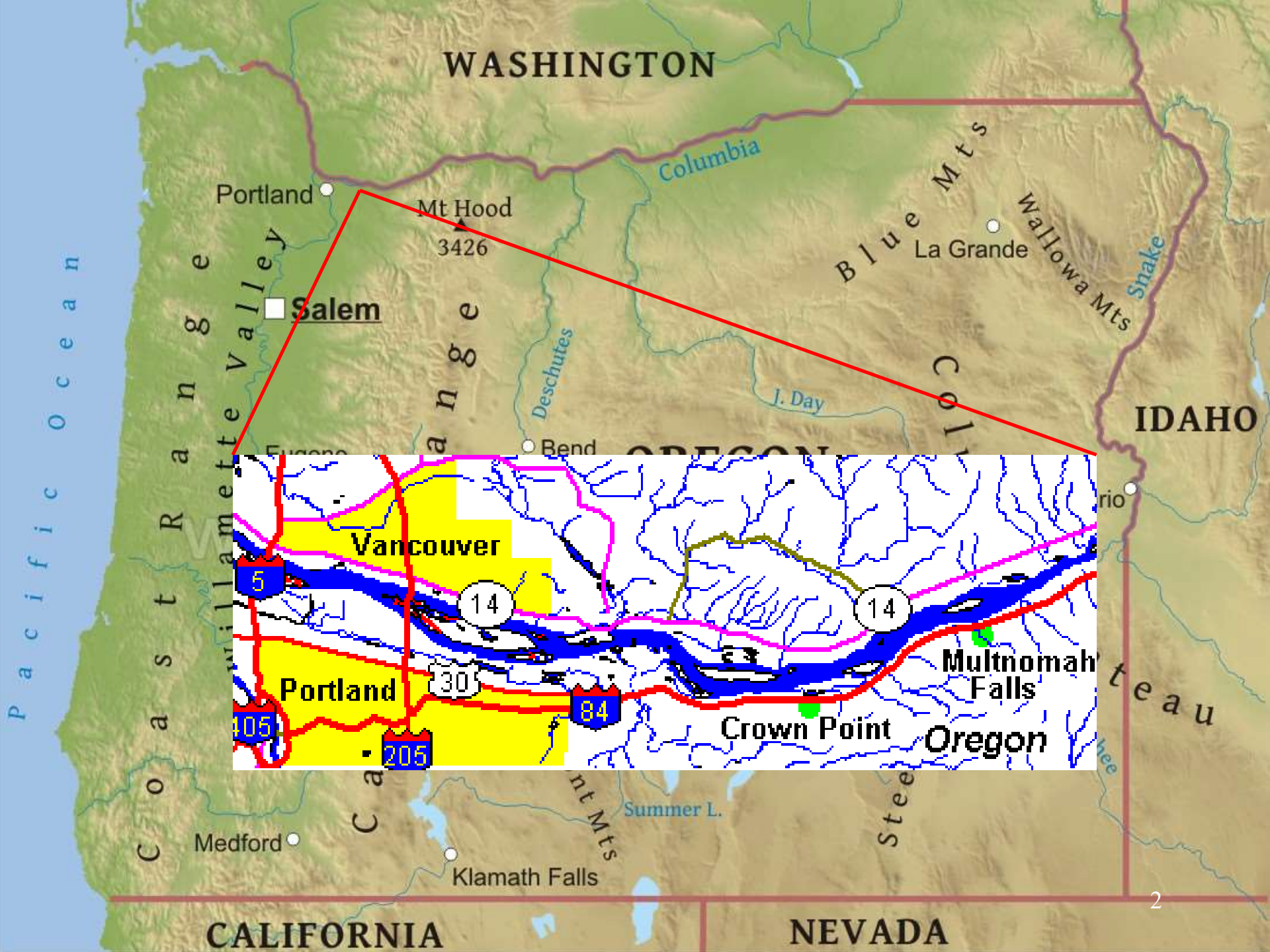
Multnomah Falls Parking Management System

Dennis Mitchell, P.E
ODOT Region 1 Traffic and ITS Engineer

Doug Spencer, P.E.
ODOT ITS Standards Engineer


WASHINGTON
Portland
Mt Hood
3426
Columbia
Blue Mts
La Grande
Wallowa Mts
Snake
Salem
Willamette Valley
Coast Range
Cascade Range
Deschutes
John Day
Bend
IDAHO
Pacific Ocean
Vancouver
5
14
14
Portland
30
84
205
Multnomah Falls
Crown Point
Oregon
Summer L.
Medford
Klamath Falls
CALIFORNIA
NEVADA

Background

- No. 1 tourist destination in the state
  - 2 million visitors per year
- Columbia Gorge National Scenic Area
- ODOT – Interstate freeway and parking lot
- Forest Service – Falls Area
- Vendor - Lodge


Columbia River HWY
84
E Historic Columbia River
391 ft
©2012 Google
Image © 2012 GeoEye
Google earth

Problem

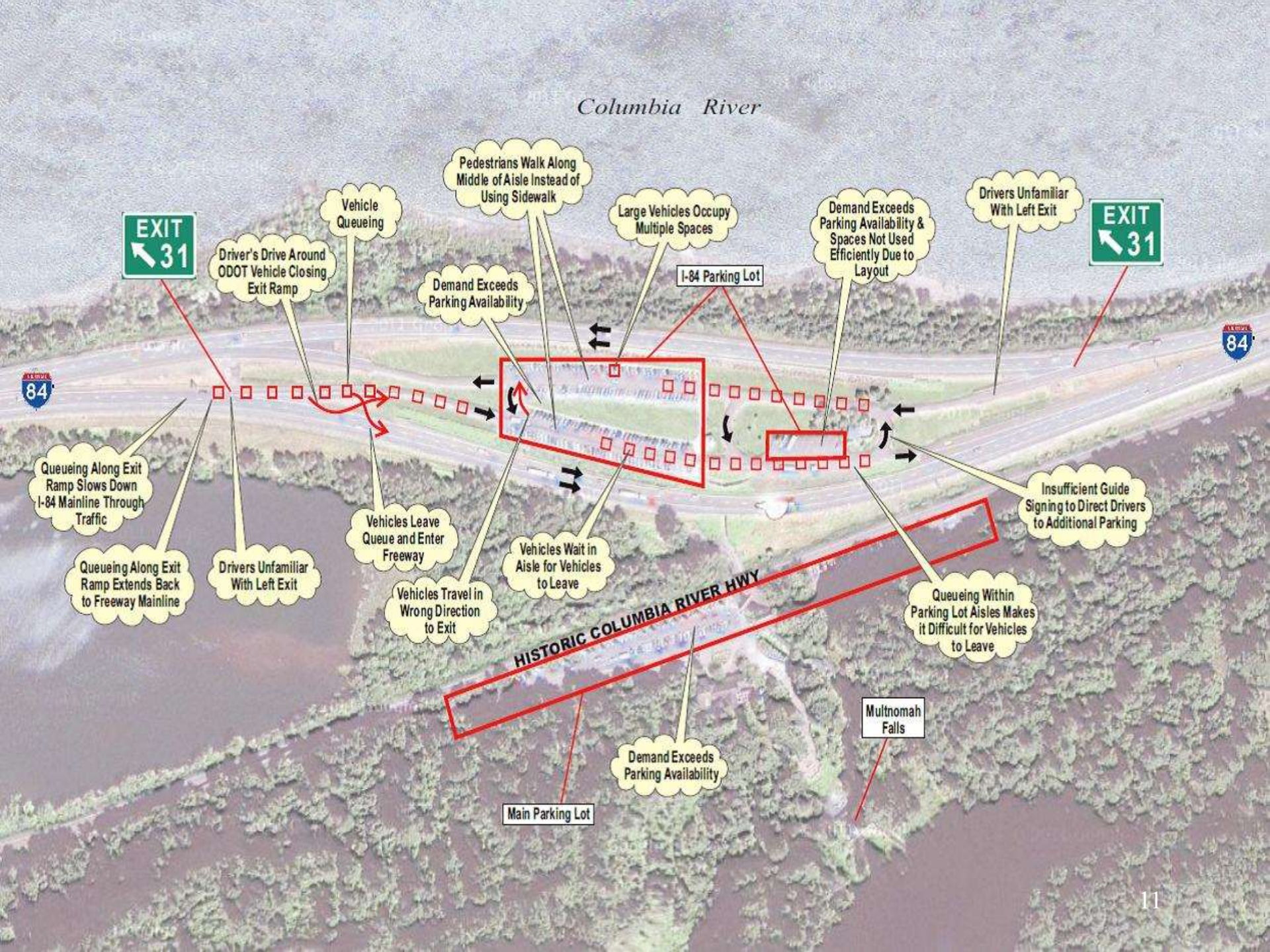
- Vehicles queuing on exit ramp extending onto Interstate freeway
- Dispatching ODOT maintenance to close ramp (delayed response)
- Capacity of parking both freeway and old highway
  - Demand greatly exceeds capacity
  - Unfamiliar drivers

Contributing Factors

- Direct freeway access to/from parking lot
- Parking lot over capacity
  - Limited to 186 spaces
- Left side exit/entrance
- Substandard left shoulder (4 feet)
- Short off ramp eastbound
- High speed
  - Posted speed 65 mph

Crash information

- Last 10 years 47 crashes
  - 70% eastbound
- 14 Injury crashes eastbound
  - 16 separate injuries
- 3 Injury crashes westbound


Columbia River
EXIT 31
Vehicle Queueing
Pedestrians Walk Along Middle of Aisle Instead of Using Sidewalk
Large Vehicles Occupy Multiple Spaces
Demand Exceeds Parking Availability & Spaces Not Used Efficiently Due to Layout
Drivers Unfamiliar With Left Exit
EXIT 31
Driver's Drive Around ODOT Vehicle Closing Exit Ramp
Demand Exceeds Parking Availability
I-84 Parking Lot
84
84
Queueing Along Exit Ramp Slows Down I-84 Mainline Through Traffic
Insufficient Guide Signing to Direct Drivers to Additional Parking
Vehicles Leave Queue and Enter Freeway
Vehicles Wait in Aisle for Vehicles to Leave
Queueing Along Exit Ramp Extends Back to Freeway Mainline
Drivers Unfamiliar With Left Exit
Vehicles Travel in Wrong Direction to Exit
HISTORIC COLUMBIA RIVER HWY
Queueing Within Parking Lot Aisles Makes it Difficult for Vehicles to Leave
Multnomah Falls
Demand Exceeds Parking Availability
Main Parking Lot

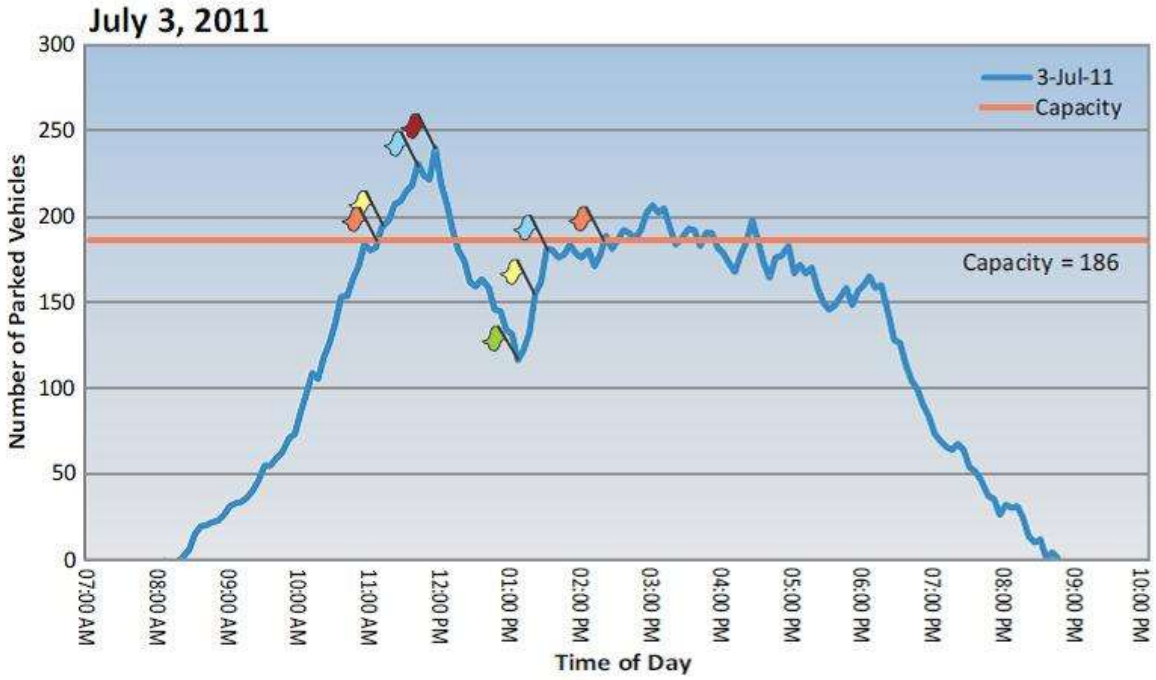
Previous Operations

- State Police
  - Observes back up onto freeway and notifies ODOT
- ODOT
  - Maintenance forces (13 miles away) respond and close exit ramp


4:59:35
SD
JUL. 2. 2011 11:52AM


4:46:19
SD
JUL. 2.2011 11:52AM


4:52:03
SD
JUL. 2. 2011 11:58AM



LEGEND

- Parking Lot Reaches Capacity
- Queue Forms on Exit Ramp but not onto I-84
- Queue Reaches I-84
- ODOT Closes Exit Ramp
- ODOT Opens Exit Ramp

DKS Associates
TRANSPORTATION SOLUTIONS

Figure 10

Multnomah Falls Traffic/ Parking Management System

RELATIONSHIP OF PARKING OCCUPANCY TO RAMP QUEUE AND CLOSURES

Source: Data from 24-hour tube count on July 2 & July 3, 2011, Quality Counts

Concept of Operations

Detection Zone 1 is used to identify initial vehicle queuing along the exit ramp.
Detection Zone 2 is used to confirm vehicle queuing along the exit ramp and count vehicles entering the parking
Detection Zone 3 is used to ensure that the gate closure zone is not occupied so that the gates can safely close.
Count Detectors are used to count vehicles entering and exiting the parking lot.

Concept of Operations

Criteria for Closing the Gate System

Logical Test	***Test Result***										
Scenario	A	B	C	D	E	F	G	H	I	J	K
Does parking occupancy exceed minimum threshold?	No	No	No	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Does parking occupancy exceed maximum threshold?	No	No	No	No	No	No	No	Yes	Yes	Yes	Yes
Is detection zone 1 occupied?	No	Yes	No	No	Yes	No	Yes	No	Yes	No	Yes
Is detection zone 2 occupied?	No	No	Yes	No	No	Yes	Yes	No	No	Yes	Yes
Gate Closure System Response	Do Nothing	Do Nothing	Do Nothing	Do Nothing	Do Nothing	Do Nothing	Activate System	Activate System	Activate System	Activate System	Activate System

Scenarios A, B, C: typical off-season or off-peak conditions; low volume, low parking occupancy. Queuing on ramp indicates stuck detector or stalled/parked vehicle in one of the ramp detection zones. System will not be activated for any scenario that does not meet the minimum parking occupancy threshold.

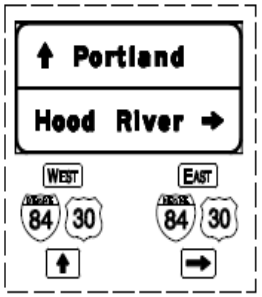
Scenarios D, E, F, G: parking occupancy is above minimum threshold, but below maximum threshold. Indicates mid-level volumes and occupancy is nearing the threshold. Queuing on ramps within this threshold indicates vehicles are likely waiting for stalls to open in the south parking lot.

Scenarios H, I, J, K: typical busy season, high volume, high parking occupancy, queuing on the ramp and I-84 is imminent.

Proposed Project

Physical Improvements

- *Improved parking lot signing*
- Illumination upgrade
- Parking management system
  - Vehicle counters
    - Entrance and exit loops, reset daily
  - CCTV cameras
  - Advance automated signing
  - Gate system



Sign No. 1

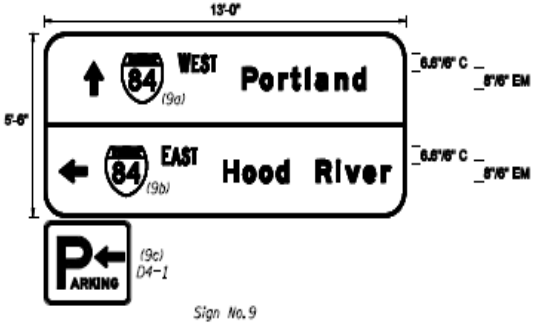
Sign No. 6

Sign No. 7
R5-1

Sign No. 2

Sign No. 8

Sign No. 3
R4-4



Sign No. 9

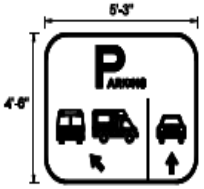
Sign No. 4
R3-8b modified

Sign No. 5

Sign No. 10

Sign No. 11
D4-1

Sign No. 12



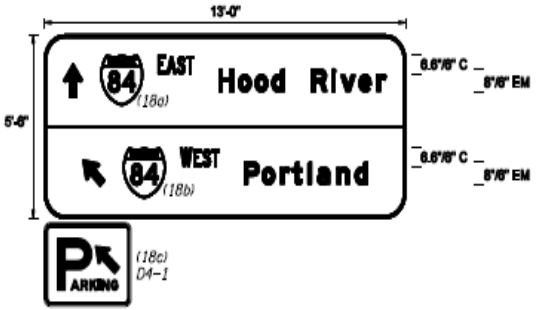
Sign No. 13

Sign No. 14

Sign No. 15

Sign No. 16

Sign No. 17



Sign No. 18

NOTE:
Signs shown with broken borders are existing signs.

REGISTERED PROFESSIONAL ENGINEER
72,367
OREGON
NOVEMBER 12, 2002
JAMES M. PETERS
EXPIRES: DEC. 31, 2012

OREGON DEPARTMENT OF TRANSPORTATION
TRAFFIC - ROADWAY SECTION

DKS
720 SW Washington Street, Suite 500 (503) 243-3500
Portland, Oregon 97205 www.dksassociates.com

2011 RURAL & URBAN CORRIDOR ITS
COLUMBIA RIVER HWY
MULTNOMAH COUNTY

DESIGNED BY: R. Hurtado
REVIEWED BY: J. Peters
DRAWN BY: DKS CAD
PC: 002 MP: 31.14 to 31.47

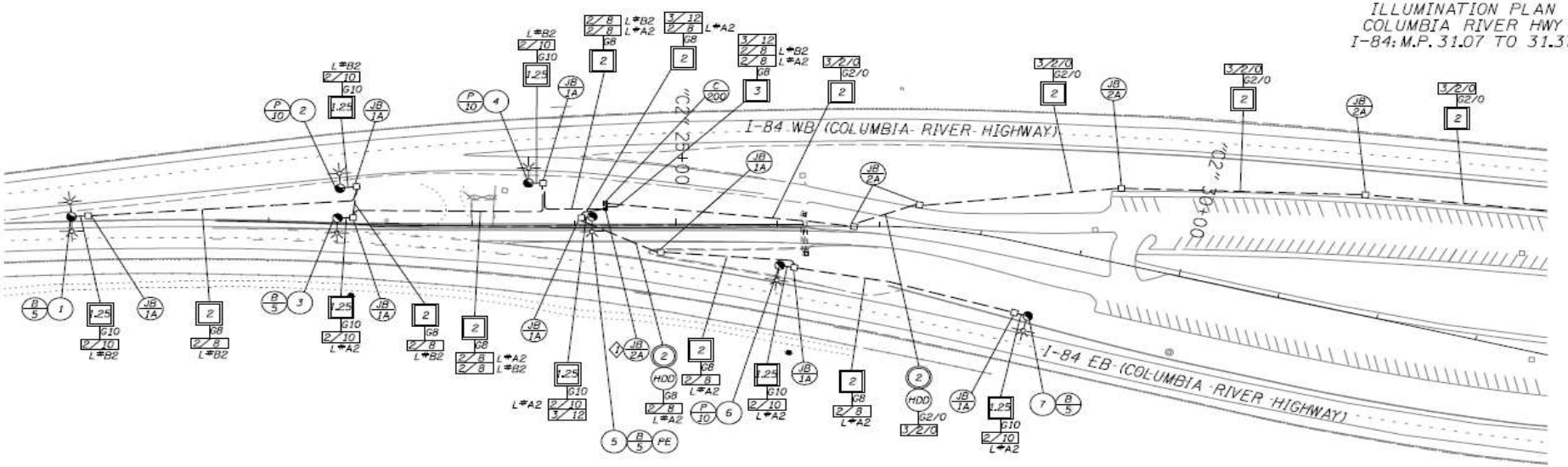
PERMANENT SIGNING

TSU NO. _____ SAS ORG NO. S-1338

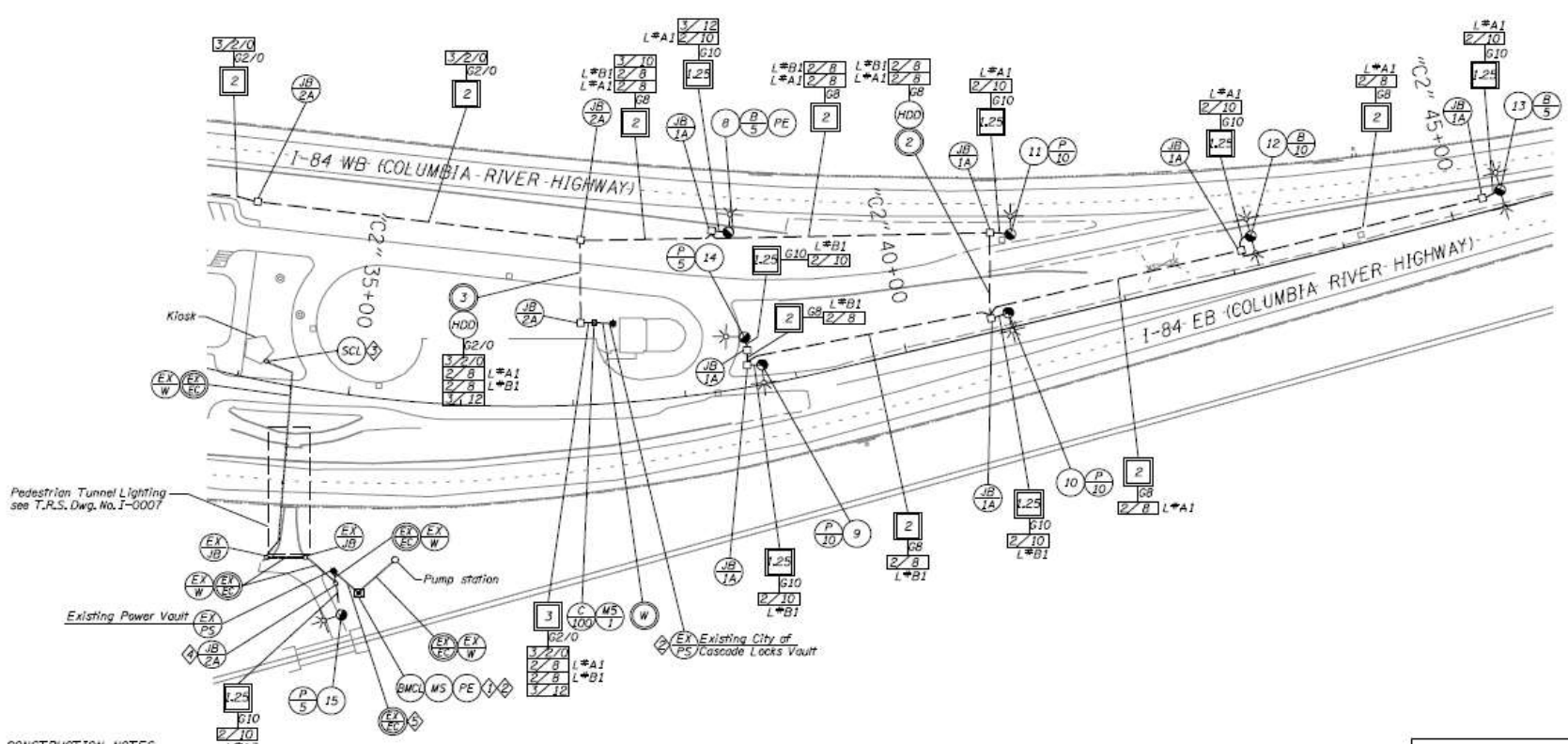
Physical Improvements

- Improved parking lot signing
- *Illumination upgrade*
- Parking management system
  - Vehicle counters
    - Entrance and exit loops, reset daily
  - CCTV cameras
  - Advance automated signing
  - Gate system

ILLUMINATION PLAN
COLUMBIA RIVER HWY
I-84: M.P. 31.07 TO 31.37



ILLUMINATION PLAN
COLUMBIA RIVER HWY
I-84: M.P. 31.37 TO 31.60

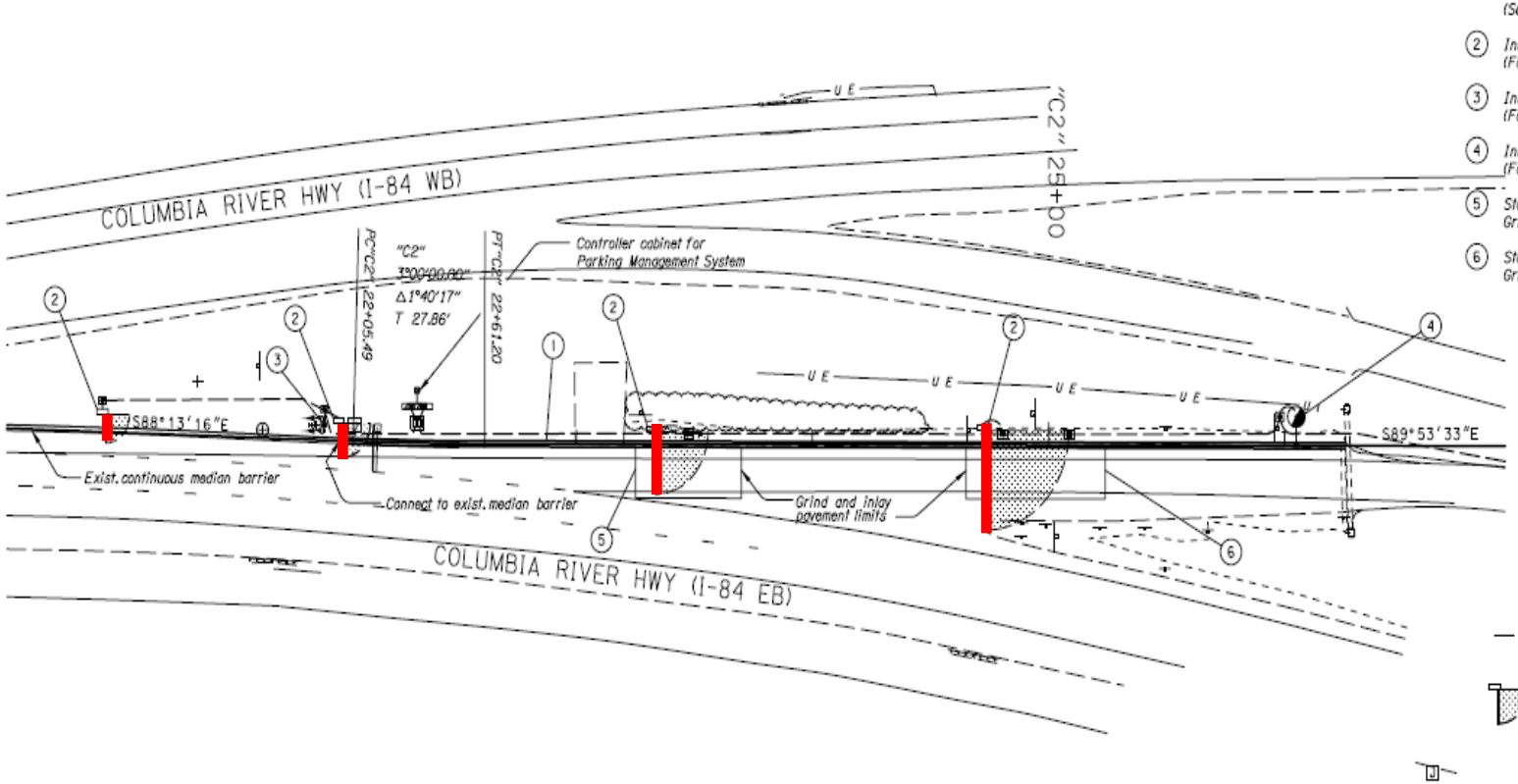


Physical Improvements

- Improved parking lot signing
- Illumination upgrade
- *Parking management system*
  - *Vehicle counters*
    - *Entrance and exit loops, reset daily*
  - *CCTV cameras*
  - *Advance automated signing*
  - *Gate system*

Camera Images

COLUMBIA RIVER HWY
I-84 MP 31.20
(SITE 12)



1. Const. conc. barrier – 375'
   Connect to extg. barrier
   (See drg. no. RD500)
2. Inst. gate and gate footing
   (For drg. nos. see sht 1A)
3. Inst. blank out sign (BOS) and sign post
   (For drg. nos. see sht 1A)
4. Inst. CCTV camera and post
   (For drg. nos. see sht 1A)
5. Sta. "C2" 23+25 to Sta. "C2" 23+70 Rt.
   Grind and inlay existing pavement
6. Sta. "C2" 24+65 to Sta. "C2" 25+24 Rt.
   Grind and inlay existing pavement

LEGEND

—— Proposed conduit (See ITS plans)

Gate, gate footing, and gate arm swing path

Note:
Hand seed all disturbed areas at finished grade.

OREGON DEPARTMENT OF TRANSPORTATION

Parametrix

FINAL PLANS
08-01-12
DO NOT SCALE
DO NOT USE FOR CONSTRUCTION

2011 RURAL & URBAN CORRIDOR ITS
VARIOUS HIGHWAYS
MULTNOMAH COUNTY

Reviewed By - Brian Blenvogen
Designed By - Jim Phillips
Drafted By - Ron Ricks

GENERAL CONSTRUCTION

SHEET NO. 7


EXIT 31
Multnomah Falls
EXIT
LOSED


EXIT 31
Multnomah Falls
EXIT
LOSED

Central Software

- Informational signing leaving Portland
  - 14 miles prior to exit
- Notifications on TripCheck


MULTNOMAH FALLS
EXIT 31 CLOSED
PARKING LOT FULL


257TH WAY
MULT FALLS
EXIT 31
CLOSED
84
30


MULT FALLS
EXIT 31
CLOSED

Central Software

- Informational signing leaving Portland
- Notifications on TripCheck

http://www.tripcheck.com/Pages/RCMap.asp?curRegion=1

ITS Support - Home | Google Maps | Forms - Pa

File Edit View Favorites Tools Help

Google | ODOT Intranet | ODOT | Oregon.gov | Portal 2 | Queue Warning Admin Sit... | TripCheck | http--eam-modules-Dash...

OREGON DEPARTMENT OF TRANSPORTATION

Visit New Map!

TripCheck

Road & Weather | Travel Center | Transportation Options | About TripCheck | On The Go | Contact Us

Statewide Map

Map Legend

Road cameras

Road closed

> 2hr delay

20mn-2hr delay

< 20mn delay

No to Min. delay

Unconfirmed

Informational

Weather hazard

Weather warning

Snow zone

Weather stations

Construction

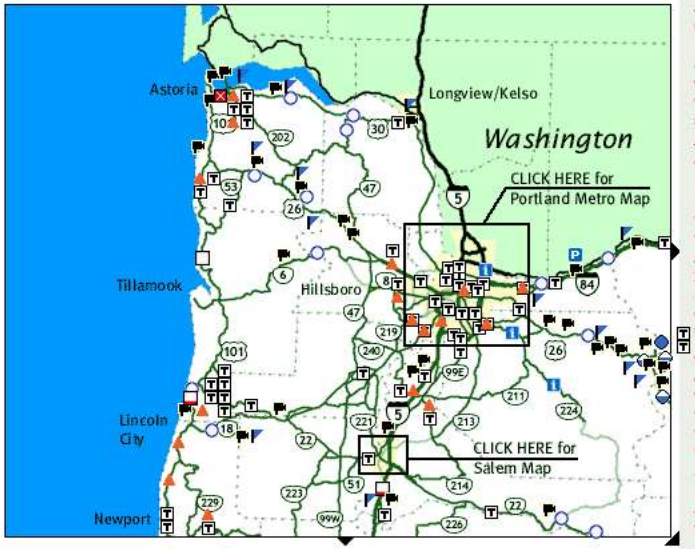
Truck restrictions

Parking

Northwest Oregon

View Road Conditions | View Weather Outlook | View Travel Services

Street Incidents in: Washington County



Road Conditions | NOAA Forecasts | Weather Stations | Cameras | ODOT/OSP Report

Alerts:

Closure with Detour US101B, 2 miles West of Astoria MP 5, updated: 12/10/2014 10:31 am. The Lewis and Clark River Bridge will be closed starting Dece... More

Weather Alert North Cascades, Lane Co. Cascades, WA-South Cascad... Winter Weather Advisory *NOAA Issue Date: 3/23/2015 02:41:00 PM Winter Weather A... More

Weather Alert Central Willamette Valley, South Willamette Valley Wind Advisory *NOAA Issue Date: 3/23/2015 11:50:00 AM This is an unusual storm in t... More

View all alerts

Sitemap | M

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TripCheck-Road Camera - Windows Internet Explorer

http://tripcheck.com/popups/Cam.asp?curRegion=1&camera=2732

I-84 at Multnomah Falls Parking

Updated: Mar 20 2015 9:05 AM Looking East

Elevation 0 TripCheck.com Milepost

TripCheck - Detailed Information

Multnomah Falls Parking

Parking: Parking lot 15% full

Last Updated: 03/20/2015 09:12 am

http://www.tripcheck.com/Pages/RCMap.asp?curRegion=1

Design

- ITS Cabinet
- Gate Design
- ATC and Firmware
- System Software

Cabinet – Front View

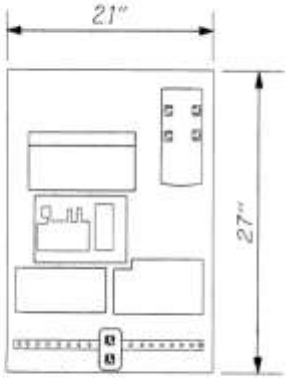
Cabinet Layout

- Left Side – Pushbutton panel, relays, terminal blocks, and circuit breaker panel. Manual control of gates for use by maintenance staff and electricians.
- Right Side – Controller, detection, etc.

Cabinet – Rear View

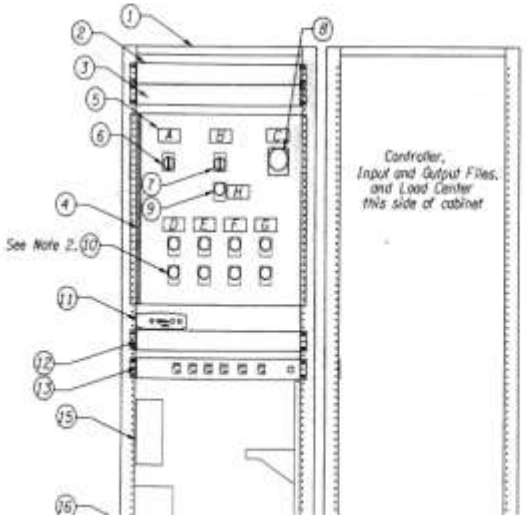
Cabinet – ITS Side

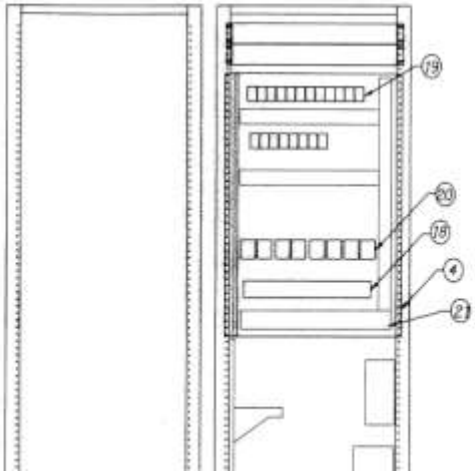
NAMEPLATE SCHEDULE	
LETTER	ENGRAVING
A	AUTO/MANUAL/OFF
B	SIGNS ON/OFF
C	E-STOP
D	GATE 1
E	GATE 2
F	GATE 3
G	GATE 4
H	BENSON SIGN ON



Remote Processing Unit (RPU)

MATERIAL/PARTS LIST			
ITEM	QTY	NOMENCLATURE	MATERIAL DESCRIPTION
1	As Req.	EIA Rack	See Special Provisions.
2	1	Network Router	State furnished and installed. Leave 2" of rack height available.
3	1	Network Switch	State furnished and installed. Leave 2" of rack height available.
4	2	Backplane	Aluminum. Continuous piano hinge left side. Swings forward.
5	8	Nameplate	1/16" thick laminated plastic stock with white surface and black lettering.
6	1	Switch	Three position selector switch, 30mm, with legend plate, 120V.
7	1	Switch	Two position selector switch, 30mm, with legend plate, 120V.
8	1	Emergency Stop Pushbutton	Two position push pull button, 30mm, red, with legend plate, 120V.
9	1	Pilot Light	30mm, oil tight, 120V, green
10	8	Pushbutton	30mm, oil tight, spring return, with legend plate, 120V
11	1	Video Encoder	See Special Provisions.
12	1	Shelf/Tray	19" rack slide out tray.
13	1	Power Strip	19" rack mountable, 12 NEMA 5-20R outlets, 120VAC, 1U height.
14	1	Remote Processing Unit (RPU)	State furnished. Contractor to mount in cabinet. 0001 will wire inputs.
15	1	DSL Demarcation	Provided by Telco. Contractor to coordinate mounting.
16	1	Camera Power Supply	See Special Provisions
17	1	Receptacle	General purpose, 5-20R, duplex, ivory, 120V, UL 498, 3 wire
18	As Req.	Terminal Blocks	600V, block, barrier, rail, end clamp, UL 1059.
19	20	Relay	120V AC coil, SPDT, DIN rail mount, 10A contact rating, UL listing.
20	8	Motor Contactor	Magnetic contractor, NEMA 4X, sized per gate motor supplied
21	As Req.	Cable Management	Plastic, flexible fingers, dual hinged cover, wall mount.





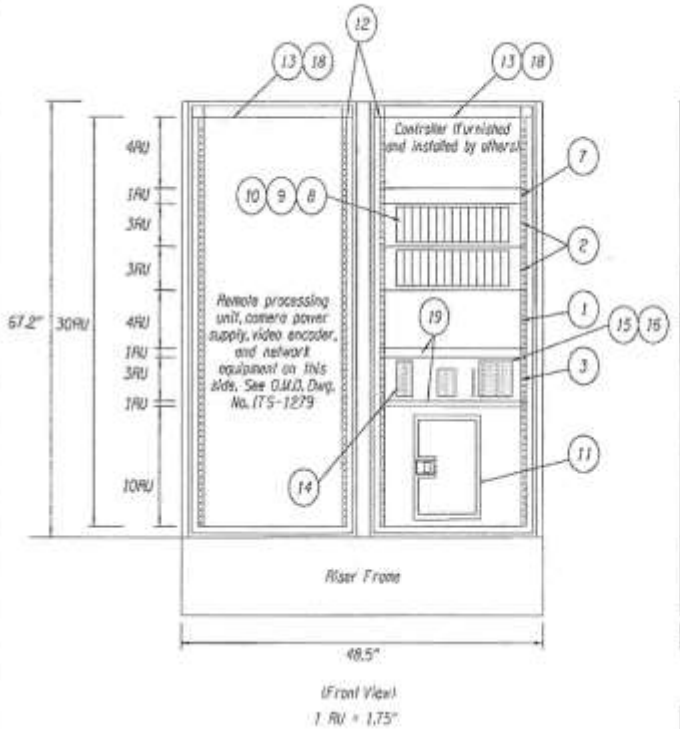
Notes:

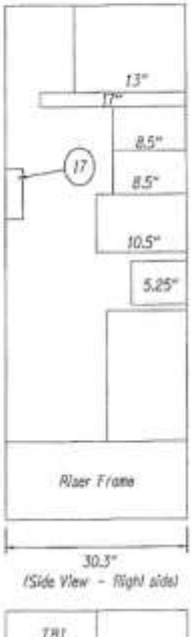
1. Nameplate text height shall be 1/4" minimum on plastic engraving.
2. Text shall be "OPEN" and "CLOSE" for pushbutton legend plate.
3. Mount RPU backplane to EIA rack with stainless steel hardware.
4. "Open" pushbuttons shall be directly above "Close" pushbuttons.
5. The entire cabinet assembly shall be UL 508A listed. Submit to the Engineer product cutsheets, panel layout drawings, and wiring diagrams for approval prior to fabrication.
6. Cabinet layout may change due to dimensions of the parts supplied by the Contractor.
7. UL panel shop shall demonstrate manual functionality of the cabinet to the Engineer prior to installation in the field. Contractor shall coordinate with the Engineer on a time at least 2 weeks in advance of testing.
8. All conductors shall be clearly marked with heat shrink type tags. Label on the conductors shall match the wiring diagram provided by the UL panel shop.
9. Label all terminal blocks, relays, and motor contactors with permanent means. Labeling shall match the construction drawings and the drawings submitted by the UL panel shop.

OREGON DEPARTMENT OF TRANSPORTATION

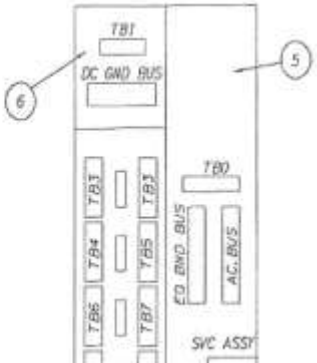
Cabinet – Traffic Side

ITS DETAILS



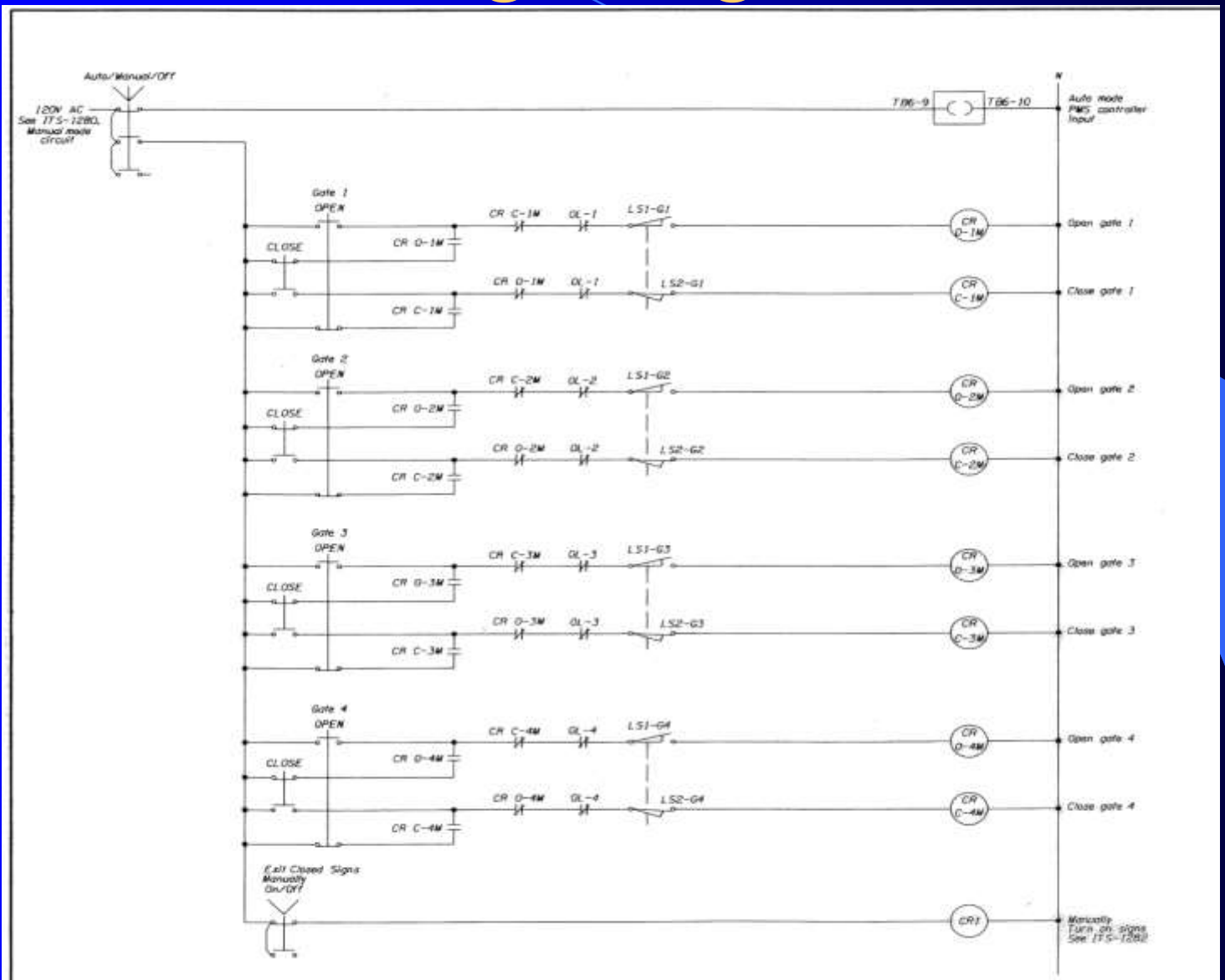


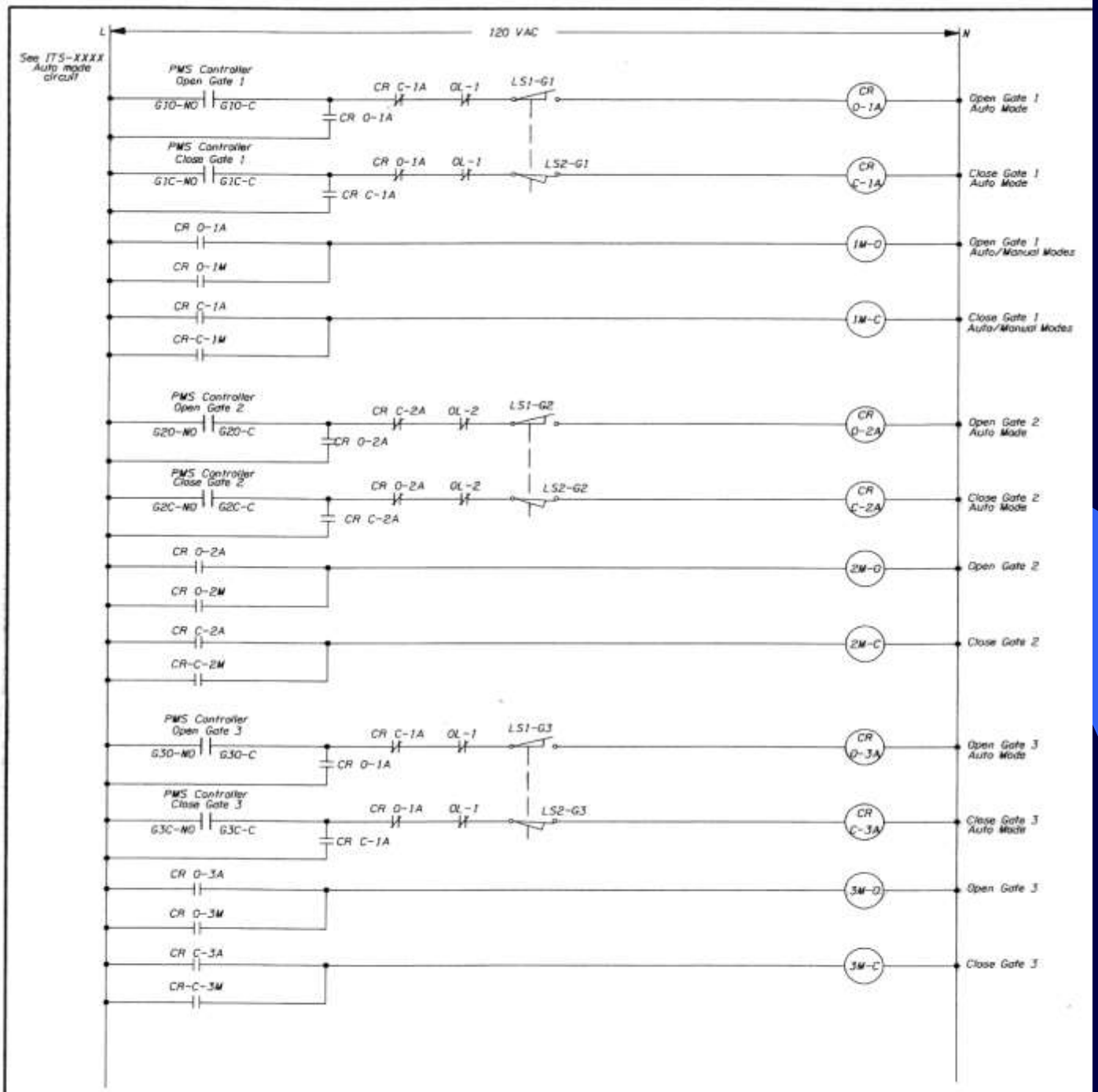
Item No.	Qty.	Nomenclature	Material Description
1	1	PDA #2	Model PDA #2 Power supply and power distribution assembly
2	2	Input File	Input File (14 position)
3	1	Rack Mount Din Bracket	See O.M.O. Dwg. No. ITS-1276
4	1	C1 Harness	See Special Provisions
5	1	Service Panel	See detail this sheet
6	1	Input Panel	See detail this sheet
7	1	Pull Out Drawer Assembly	19" rack slide out tray
8	8	Loop Amplifier	Two Channel Loop Detector Amplifier (See QPL list)
9	1	VIP 3.2 Module	VIP 3.2 Video Detection Board (see QPL list)
10	4	AC Isolator	Two Channel AC Isolator (see QPL list)
11	1	Load Center	100 amp Load center. See O.M.O. Dwg. No. ITS-1280 for service diagram
12	2	19 Inch Rack	Removable 19 inch EIA rack
13	4	Fan	Thermostatically controlled 100CFM fan
14	9	Relay	4-32VDC SSR, SPDT, 10 amp, NS 35-15, UL listing
15	23	Terminal Block	300 V, Screw connection, 20 amp, NS 35-15, UL 1059
16	1	PE Terminal Block	DIN rail grounding block, green or green-yellow, NS 35-15
17	1	Flasher	Model 204 dual circuit solid state flasher
18	2	Light	Self starting fluorescent cabinet light
19	1	-	Leave 1 unit of rack height available



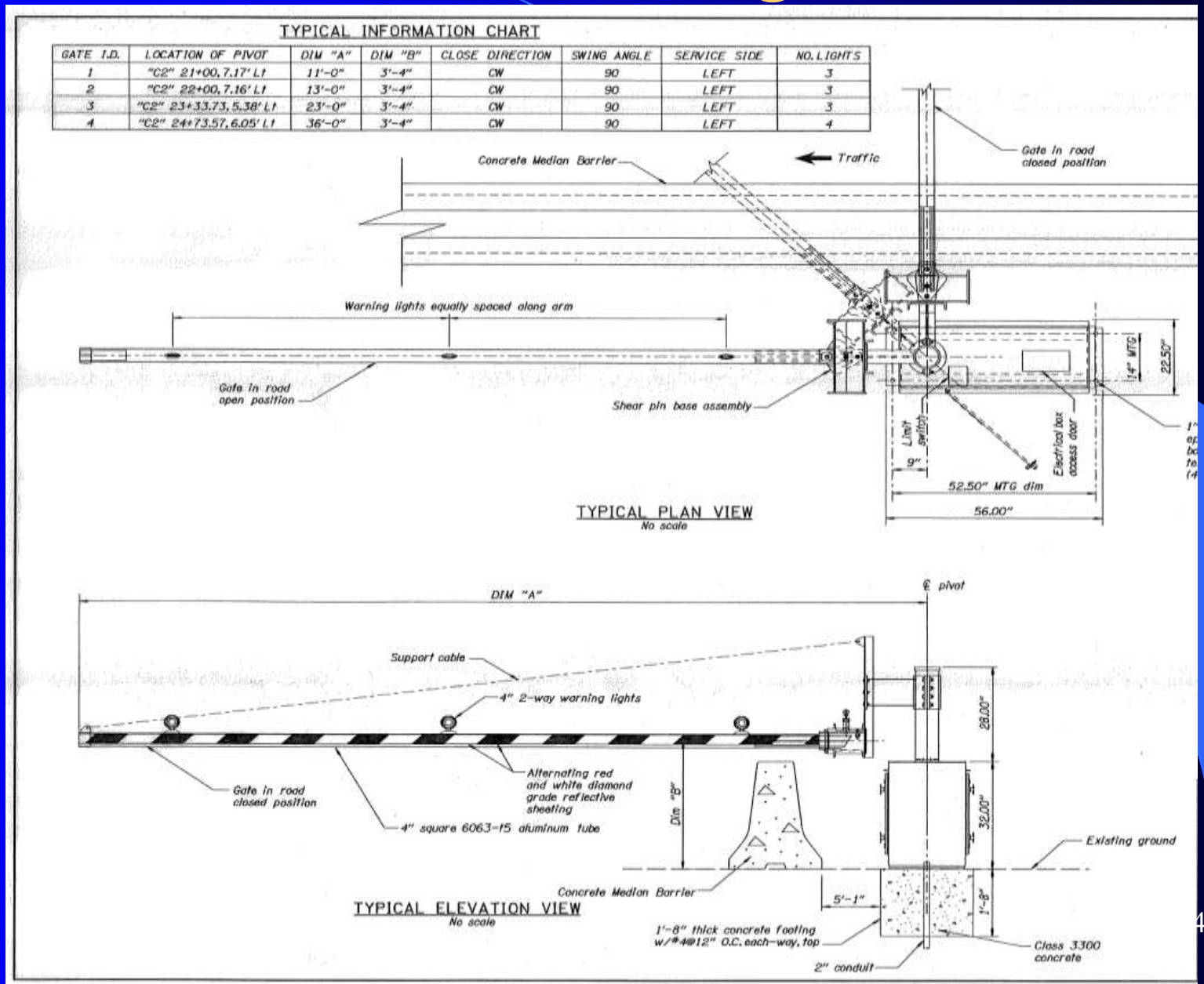
General notes:
1. Mount load center to EIA rack with stainless steel hardware.
2. Label all terminal blocks, relays, and connections with permanent means.
3. The entire cabinet assembly shall be UL 508A listed.
4. All conductors shall be clearly marked with heat shrink type tags.

Wiring Diagrams




L
120 VAC
N
See ITS-XXXX Auto mode circuit
PMS Controller Open Gate 1
G1O-NO
G1O-C
CR O-1A
CR C-1A
OL-1
LS1-G1
CR O-1A
Open Gate 1 Auto Mode
PMS Controller Close Gate 1
G1C-NO
G1C-C
CR C-1A
CR O-1A
OL-1
LS2-G1
CR C-1A
Close Gate 1 Auto Mode
CR O-1A
CR O-1M
1M-O
Open Gate 1 Auto/Manual Modes
CR C-1A
CR-C-1M
1M-C
Close Gate 1 Auto/Manual Modes
PMS Controller Open Gate 2
G2O-NO
G2O-C
CR O-2A
CR C-2A
OL-2
LS1-G2
CR O-2A
Open Gate 2 Auto Mode
PMS Controller Close Gate 2
G2C-NO
G2C-C
CR C-2A
CR O-2A
OL-2
LS2-G2
CR C-2A
Close Gate 2 Auto Mode
CR O-2A
CR O-2M
2M-O
Open Gate 2
CR C-2A
CR-C-2M
2M-C
Close Gate 2
PMS Controller Open Gate 3
G3O-NO
G3O-C
CR O-1A
CR C-1A
OL-1
LS1-G3
CR O-1A
Open Gate 3 Auto Mode
PMS Controller Close Gate 3
G3C-NO
G3C-C
CR C-1A
CR O-1A
OL-1
LS2-G3
CR C-1A
Close Gate 3 Auto Mode
CR O-3A
CR O-3M
3M-O
Open Gate 3
CR C-3A
CR-C-3M
3M-C
Close Gate 3

Gate Design



TYPICAL INFORMATION CHART

GATE I.D.	LOCATION OF PIVOT	DIM "A"	DIM "B"	CLOSE DIRECTION	SWING ANGLE	SERVICE SIDE	NO. LIGHTS
1	"C2" 21+00, 7.17' Lt	11'-0"	3'-4"	CW	90	LEFT	3
2	"C2" 22+00, 7.16' Lt	13'-0"	3'-4"	CW	90	LEFT	3
3	"C2" 23+33.73, 5.38' Lt	23'-0"	3'-4"	CW	90	LEFT	3
4	"C2" 24+73.57, 6.05' Lt	36'-0"	3'-4"	CW	90	LEFT	4

TYPICAL PLAN VIEW
No scale

TYPICAL ELEVATION VIEW
No scale

ATC Firmware
General Status Screen

INTELIGHT

Home Manual Mobile

- Front Panel Emulator
- Status
  - General Status
  - Object Status and Alarms
  - Manual Control
  - Input & Output Status
- Controller
- Administration

Main Status

Operational Mode	Capacity	Percent Full	Cars in Lot	Lock Time	Lock Time Remaining	Status	Close Threshold	Open Threshold
Cabinet	150	0	0	300	0	Unknown	90	70

Gate Status

Gate ID	Description	Status	Open Fail Time	Close Fail Time	Detection	Open Switch	Closed Switch
1	Gate 1 - upstream	Unknown	20	20			
2	Gate 2	Unknown	20	20			
3	Gate 3	Unknown	20	20			
4	Gate 4 - downstream	Unknown	20	20			

Exit Sign Status

Exit Sign ID	Description	Position	Lag Time	Lag Time Left
1	Blank Out Exit Sign	Off	30	0

Queue Status

Queue ID	Description	Status	Time to Queue	Queued Duration	Detection
1	Zone 1	Not Queued	10.0	0	
2	Zone 2	Not Queued	10.0	0	

Detector Status

	1								2								3							
Detector	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
Occupied																								
Alarms	●	●	●	●	●	●	●	●	●	●	●	●	●	●										

Figure 2: ATC Web Interface General Status

Input Screen

INTELIGHT

Home Manual Mobile

- Front Panel Emulator
- Status
  - General Status
  - Object Status and Alarms
    - Gate
    - Exit Sign
    - Queue
    - Detector
  - Manual Control
  - Input & Output Status
- Controller
  - System Parameters
  - Manual Count Adjustment
  - Gate Configuration
  - Exit Sign Configuration
  - Queue Configuration
  - Detector Configuration
  - Advanced IO
    - Cabinet Configuration
      - IO Modules
      - Input Points
      - Output Points
- Administration

Input Points

IO Module: 1

Input Point	Description	Input Control Type	Index
1	C1-39	vehicleDetectorCall	1
2	C1-40	vehicleDetectorCall	11
3	C1-41	gateOpenStatus	1
4	C1-42	gateOpenStatus	3
5	C1-43	vehicleDetectorCall	2
6	C1-44	vehicleDetectorCall	12
7	C1-45	gateClosedStatus	1
8	C1-46	gateClosedStatus	3
9	C1-47	vehicleDetectorCall	5
10	C1-48	vehicleDetectorCall	7
11	C1-49	notActive	0
12	C1-50	notActive	0
13	C1-51	notActive	0
14	C1-52	notActive	0
15	C1-53	notActive	0
16	C1-54	notActive	0
17	C1-55	vehicleDetectorCall	10
18	C1-56	vehicleDetectorCall	9
19	C1-57	vehicleDetectorCall	8
20	C1-58	vehicleDetectorCall	6
21	C1-59	notActive	0
22	C1-60	modeAutoSwitch	1
23	C1-61	notActive	0
24	C1-62	blankOutSignStatus	1
25	C11-10	notActive	0
26	C11-11	notActive	0
27	C11-12	notActive	0
28	C11-13	notActive	0
29	C1-63	vehicleDetectorCall	3
30	C1-64	vehicleDetectorCall	13
31	C1-65	gateOpenStatus	2
32	C1-66	gateOpenStatus	4

Apply

Next

Main Control Screen

Home Manual Mobile

- Front Panel Emulator
- Status
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    - Gate
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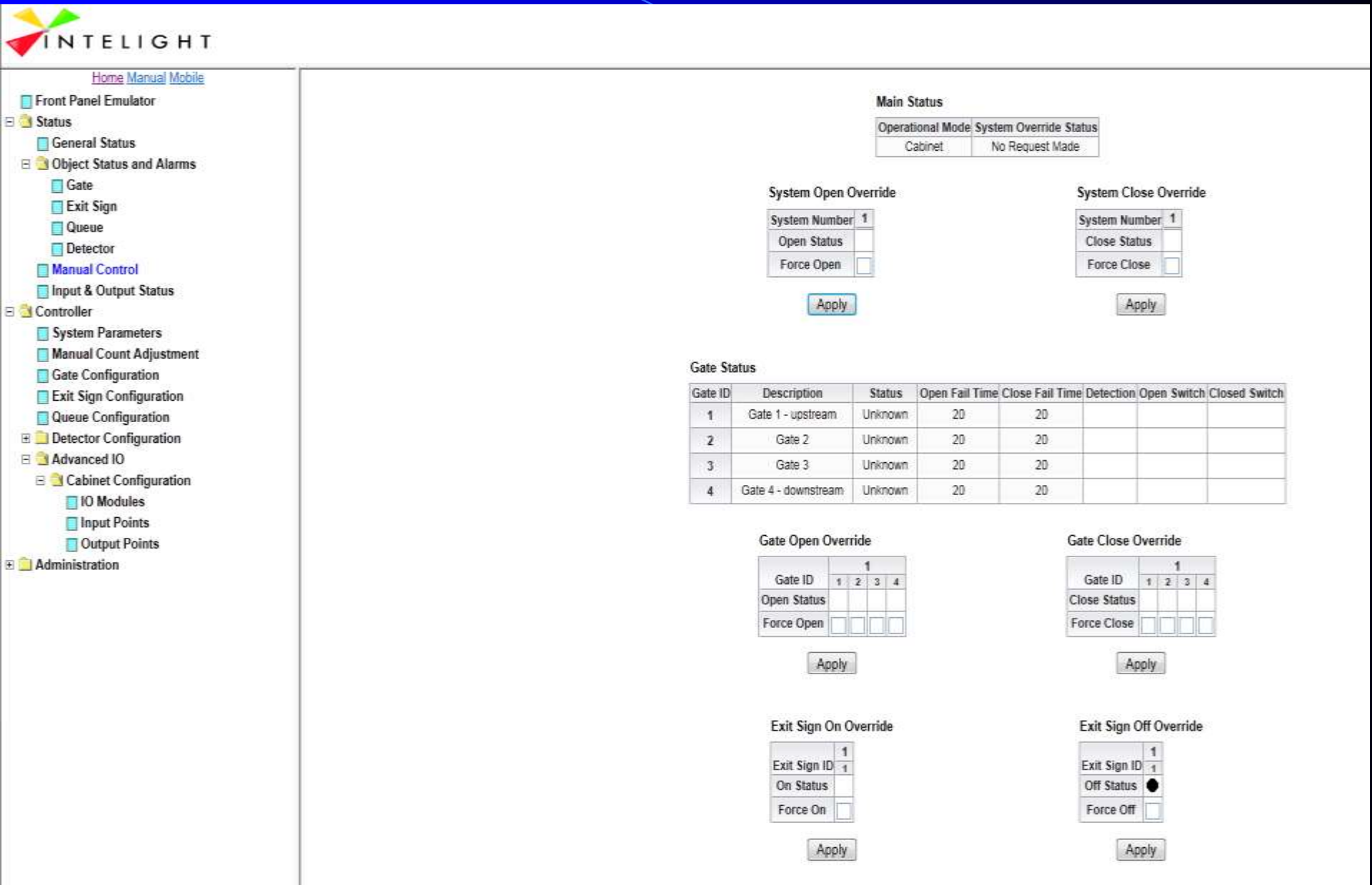
    - Detector
  - Manual Control
  - Input & Output Status
- Controller
  - System Parameters
  - Manual Count Adjustment
  - Gate Configuration
  - Exit Sign Configuration
  - Queue Configuration
  - Detector Configuration
  - Advanced IO
    - Cabinet Configuration
      - IO Modules
      - Input Points
      - Output Points
- Administration

Main Control

Operational Mode	Manual
Lot Capacity	186
Min Closed Time	300
Lot Close Threshold	90
Lot Open Threshold	70

Apply

Manual Control Screen



Output Screen

Output Points

IO Module: 1

Output Point	Description	Output Control Type	Index
1	C1-2	closeGate	1
2	C1-3	openGate	1
3	C1-4	closeGate	2
4	C1-5	switchBlankOutSign	1
5	C1-6	openGate	2
6	C1-7	closeGate	3
7	C1-8	openGate	4
8	C1-9	openGate	3
9	C1-10	notActive	0
10	C1-11	notActive	0
11	C1-12	notActive	0
12	C1-13	notActive	0
13	C1-15	notActive	0
14	C1-16	notActive	0
15	C1-17	notActive	0
16	C1-18	notActive	0
17	C1-19	notActive	0
18	C1-20	notActive	0
19	C1-21	notActive	0
20	C1-22	notActive	0
21	C1-23	notActive	0
22	C1-24	notActive	0
23	C1-25	notActive	0
24	C1-26	notActive	0
25	C1-27	notActive	0
26	C1-28	notActive	0
27	C1-29	notActive	0
28	C1-30	notActive	0
29	C1-31	notActive	0
30	C1-32	notActive	0
31	C1-33	notActive	0
32	C1-34	notActive	0

Apply

Next

System Software - Central

Camera Images

Maintenance Manuals

1 ITS General Information

Quick references can be found here in order to find necessary information in the Maintenance and Electrician manuals for the Traffic/Parking Management System.

1.1 Reference Material

The following is a description of where specific information can be located within the Maintenance and Electrical Manuals.

Maintenance Manual: This is a description of maintenance staff specific system components, and how to sustain them. Included in the manual are the following features:

Concept of Operations: General description of how the overall system operates.
Button Layout Description: Full manual control button explanation and use.
Main Circuit Breaker: Breaker box layout with descriptions of each breaker.
Procedure for Replacing Shear Pins: How to properly replace shear pins internally and externally.
Procedure for Replacing Gate Arms: How to replace the gate arms when damaged, it requires electrician assistance for final connection.
Procedure to turn off Blank Out Signs: How to cut power to signs when they are not responsive.
Maintenance Routine and Checklist: What maintenance staff needs to do in order to keep the system operational.
Maintenance Parts List: Part numbers and supplier contact for maintenance staff specific components.
Gate Manual: OEM manual for gates

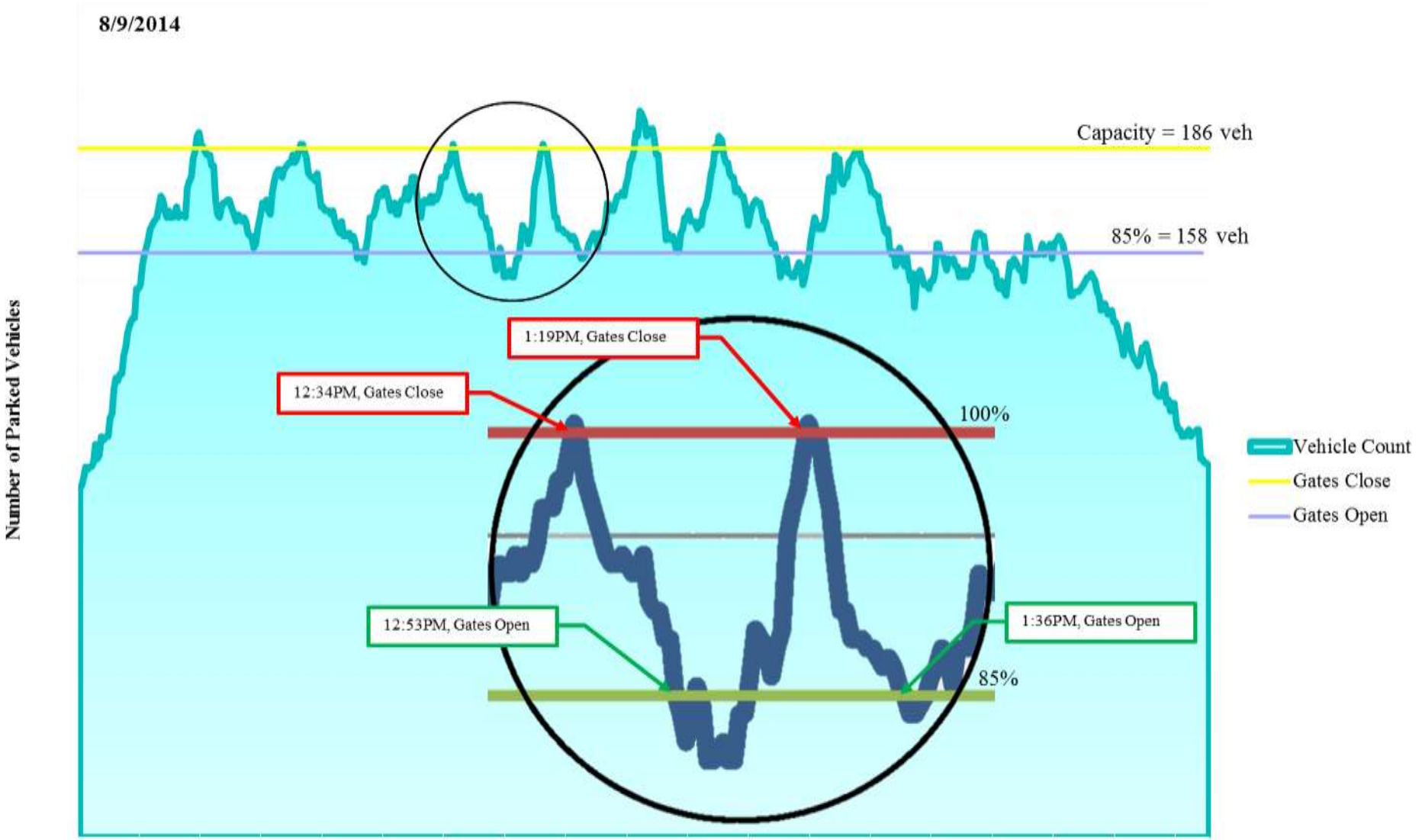
Electrician Manual: Provides information for electricians to service the Parking/Traffic Management System. Procedures require input from maintenance staff, so maintenance manual is accessible to electricians. Included in the manual are the following features:

Primary Components: General descriptions of primary electrical components and their uses.
Camera Operations and Access: Links for camera access.
Detector Layout: Portrayal of how the detectors are placed and their concept of operation.
Procedure to Connect Gate Arm Light Cable: How to connect the lights after the maintenance staff replaces a gate arm.
Procedure to Reset Gate Position after Lockup: When the manual control buttons lock up the system, this procedure describes how to correct the unresponsive gate position.
Electrician Parts List: Part numbers and supplier contact for electrician specific components.
Electrical Drawings: Wiring Diagrams, As-Build Construction Drawing, and control schemes specific to the Multnomah Falls Parking/Traffic Management System.

Operational Experience

- Configuration
  - What percent lot full before closing and opening
- Multnomah Falls vendor concerns
- Observation of driver actions
- Gate damage

Parking Occupancy vs Gate Activations - Saturday, 8/9/2014



Operational Experience

- Configuration
  - What percent lot full before closing and opening
- Multnomah Falls vendor concerns
- Observation of driver actions
- Gate damage


25
MPH
EXIT
31

Upgrades made

- Bigger lights on gate arm
- Added no stopping signs on gate arms
- Cable bracket

SIGN DETAIL

HIGHWAY	HIGHWAY		ROUTE	XXXXX	EXP. ACCOUNT	X	
DATE	XX-XX-02	S.O.I.*	XXXXX	DATE		S.O.I.*	

MILEPOINT	I-84EB EXIT 31
WIDTH x HGHT.	3'-6" x 1'-0"
BORDER WIDTH	0.38"
CORNER RADIUS	1.5"
MOUNTING	on gate
BACKGROUND	TYPE: ASTM TYPE III or IV
	COLOR: White / White
LEGEND/BORDER	TYPE: ASTM TYPE III or IV
	COLOR: Red

SYMBOL	X	Y	WID	HT

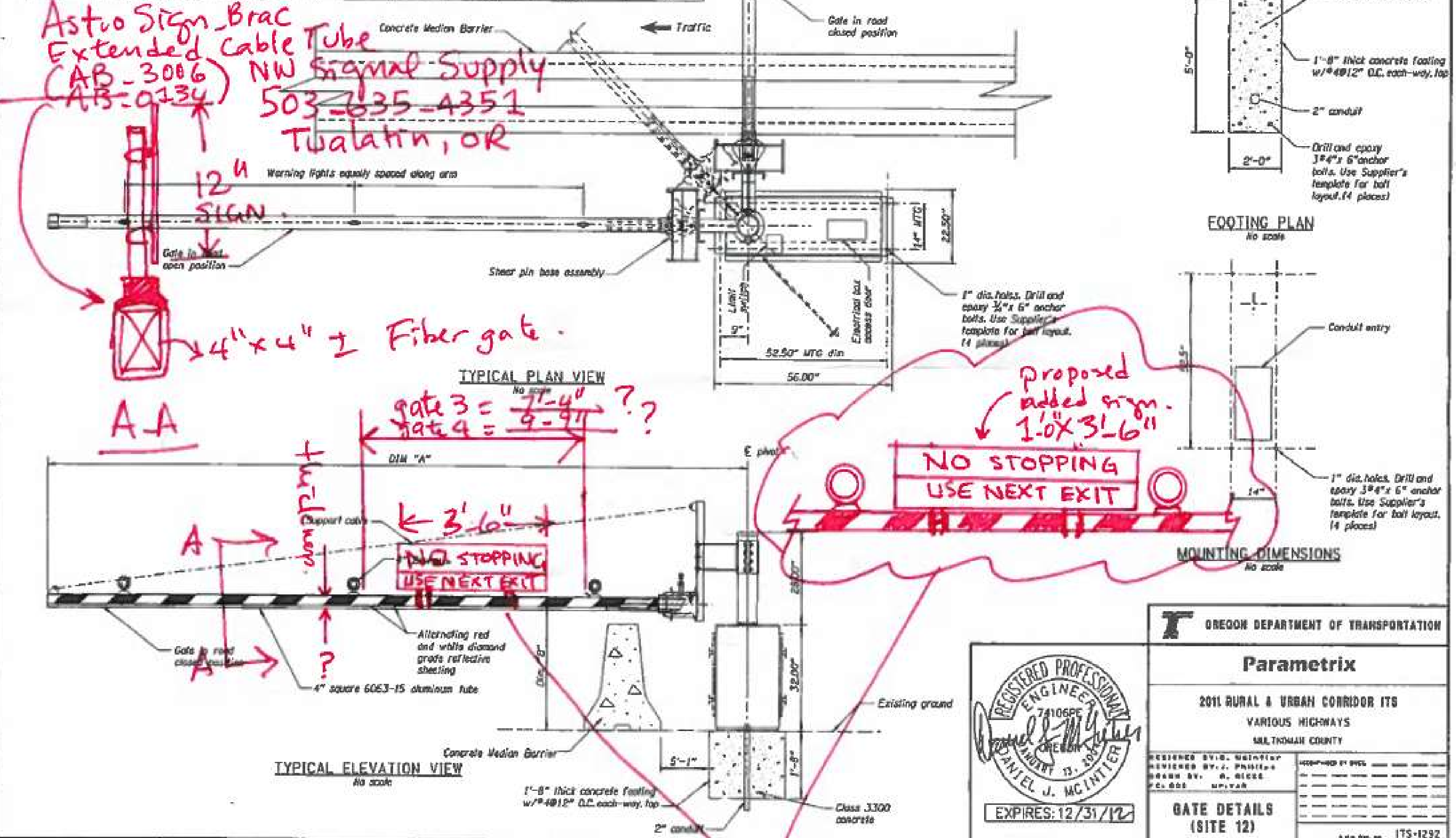
2 Required Sign Type: 'R2' Substrate: SHEET ALUMINUM

Dimensions are in inches.tenths Letter locations are panel edge to lower left corner

LETTER POSITIONS (X)																				LENGTH	SIZE/SERIES
N	O		S	T	O	P	P	I	N	G											4 D 2000
3.6	7.2	10.1	14.1	17.1	20.1	23.8	27.1	30.5	32.1	35.7										34.8	
U	S	E		N	E	X	T		E	X	I	T									3 D 2000
6.2	8.8	11.3	13.2	16.2	19	21.1	23.4	25.3	28.3	30.4	33	33.9								29.5	

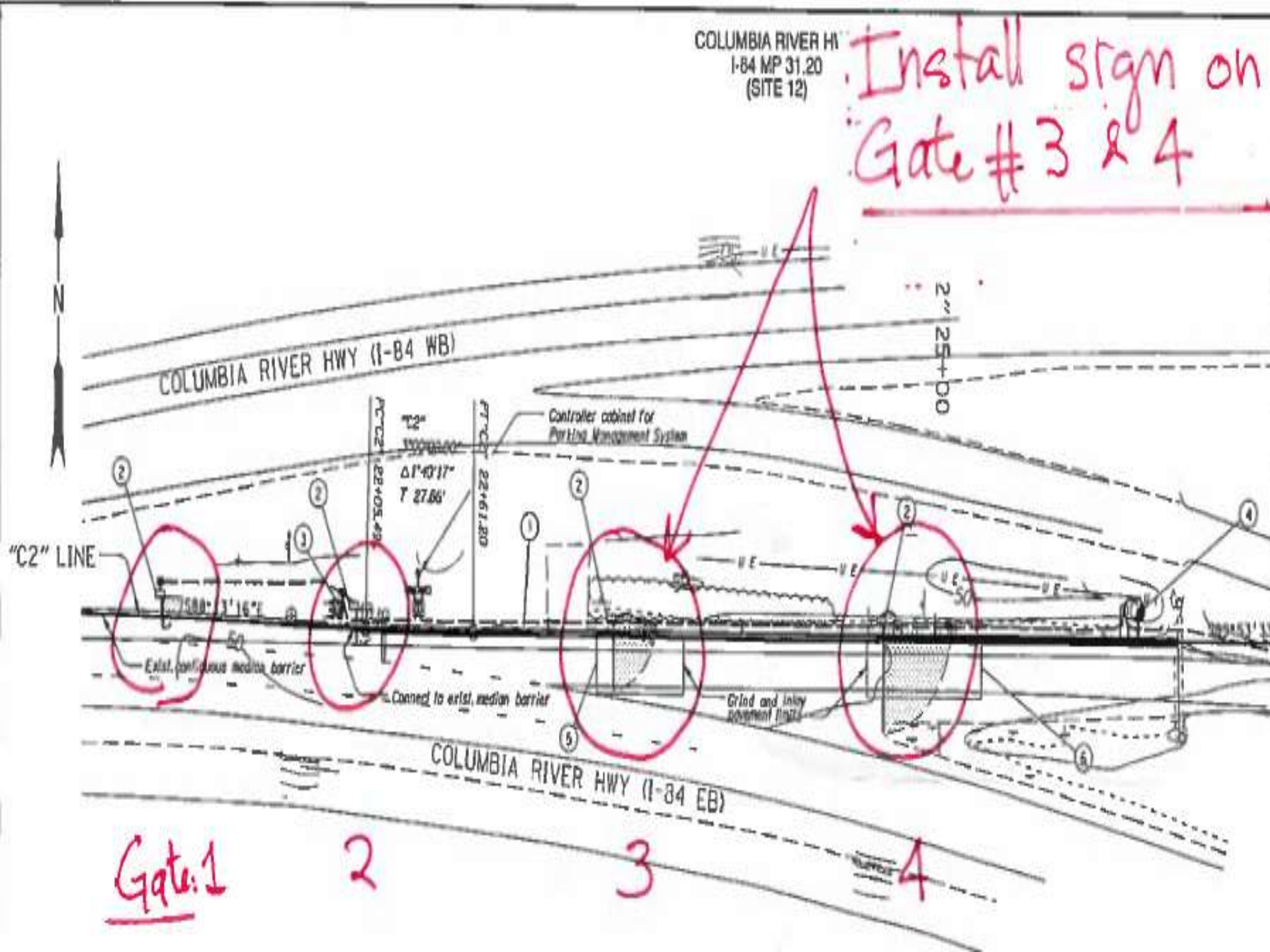
TYPICAL INFORMATION CHART

GATE I.D.	LOCATION OF PIVOT	DIM "A"	DIM "B"	CLOSE DIRECTION	SWING ANGLE	SERVICE SIDE	NO. LIGHTS
1	"C2" 21+00, 7.17' Lt	11'-0"	3'-4"	CW	90	LEFT	3
2	"C2" 22+00, 7.16' Lt	13'-0"	3'-4"	CW	90	LEFT	3
3	"C2" 23+33.73, 5.38' Lt	23'-0"	3'-4"	CW	90	LEFT	3
4	"C2" 24+73.57, 6.05' Lt	36'-0"	3'-4"	CW	90	LEFT	4



\Port\Projects\Clients\2284-DKS Assoc\214-2284-017 2011Rural-UrbanCorrITS\99Svcs\CADD\DGN\Site 12\I5037itsl2-pmx.dtl Default 8/14/2012 9:58:42 AM rickaron

Install sign above gate
(not to cover red/white stripes)


COLUMBIA RIVER HI
I-84 MP 31.20
(SITE 12)
Install sign on Gate #3 & 4
N
COLUMBIA RIVER HWY (I-84 WB)
"C2" LINE
Controller cabinet for Parking Management System
Exist. continuous median barrier
Connect to exist. median barrier
Grind and inlay pavement limits
COLUMBIA RIVER HWY (I-84 EB)
Gate 1
2
3
4

Upgrades made

- Bigger lights on gate arm
- Added no stopping signs on gate arms
- Cable bracket

Cable Bracket

- Moved arm upward to clear barrier.
- Custom design and fabricated bracket to relocate cable attachment.
- To align with arm pivot and release pin in order to reduce arm twisting.

Continuing Issues

- Gate Damage
- Claims


NO STOPPING
USE NEXT EXIT


2014/12/03 09:06


STOP
NEXT
2014/12/03 09:07

Potential next steps

- Brighter lights on gates
- Upgrade advance signs to VMS rather than blank out – can be used for other events in corridor
- Upgrade exit sign to VMS to make more visible


EXIT 31
Multnomah Falls
EXIT
LOSED

Summary

- We recognize this as a new treatment for a rather unique safety and operational issue
  - Queuing on exit ramp
  - Dispatch ODOT to close ramp
- While we continue to improve the solution to the immediate problem, we did not address the root problem
  - Demand greatly exceeds capacity
  - Unfamiliar drivers

Summary

- Human Factors contribute to some of the ongoing problems we are experiencing
  - Tourists unfamiliar with area exits and options
  - Intent to try to wait until gate opens - parking on closed ramp
  - Not knowing what to do/where to go
  - Unwillingness to conform to traffic messages - driving around gates.

Summary

- We do not yet have the necessary data to determine the effectiveness
  - B/C cannot be calculated at this time

- Takeaways
  - Software and Hardware installed and operating
  - Real time data collection and cameras have proven to be beneficial

Summary

- Takeaways (cont.)
  - Backups on the freeway have been reduced through a mechanical interface, drastically reducing involvement by ODOT and Police personnel and improving responsiveness
  - However, more time needed to be spent on anticipating driver reactions to the new system.