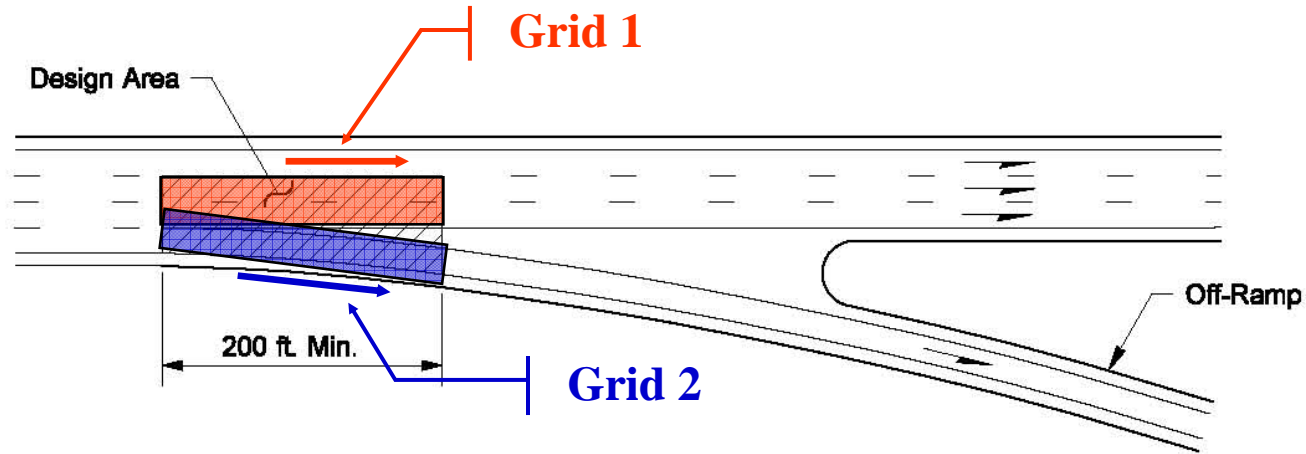


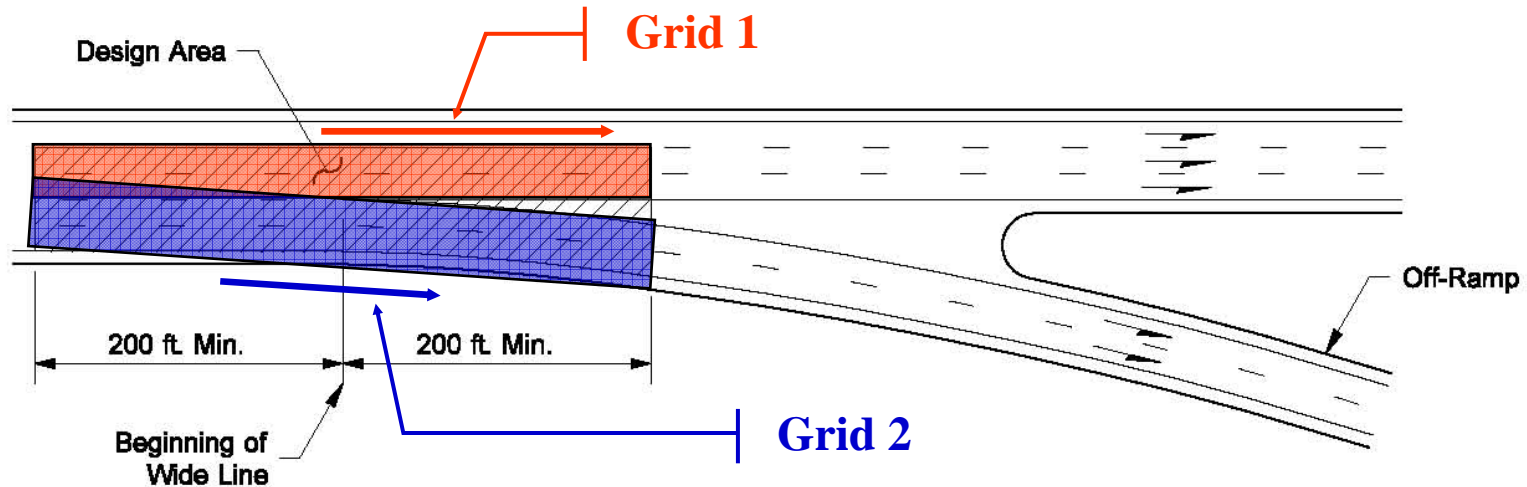
Illumination Design Supplement

Published February, 2018
Based on 2007 Training Materials

How to place Luminance & Veiling Luminance Grids

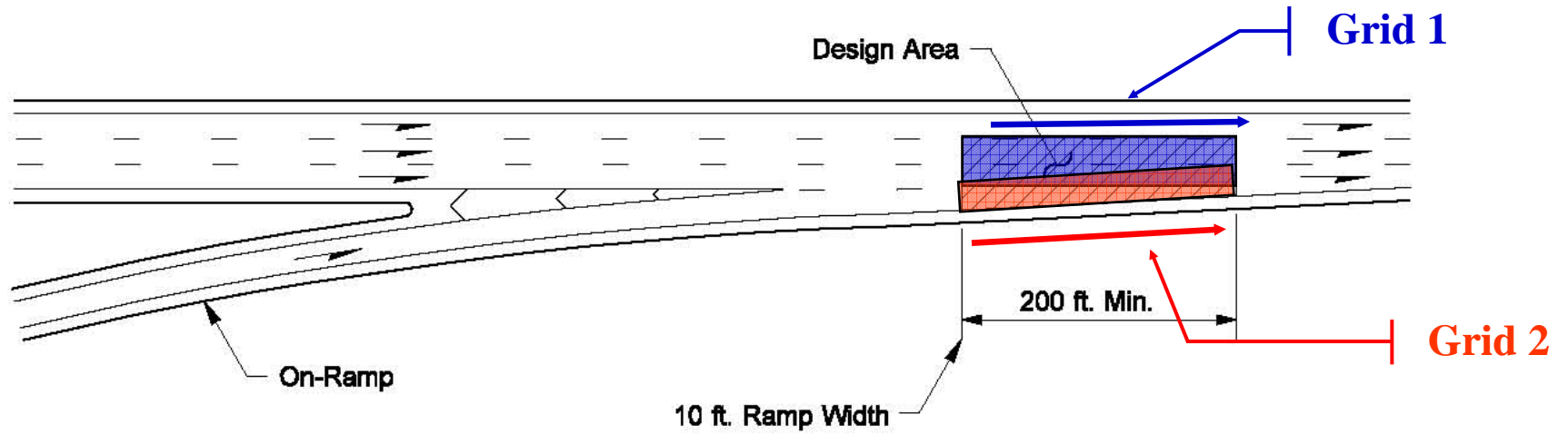


Single-Lane Off-Connection
(The Design Area May Be Shifted up to 100 Feet From the Beginning of the Wide Line)

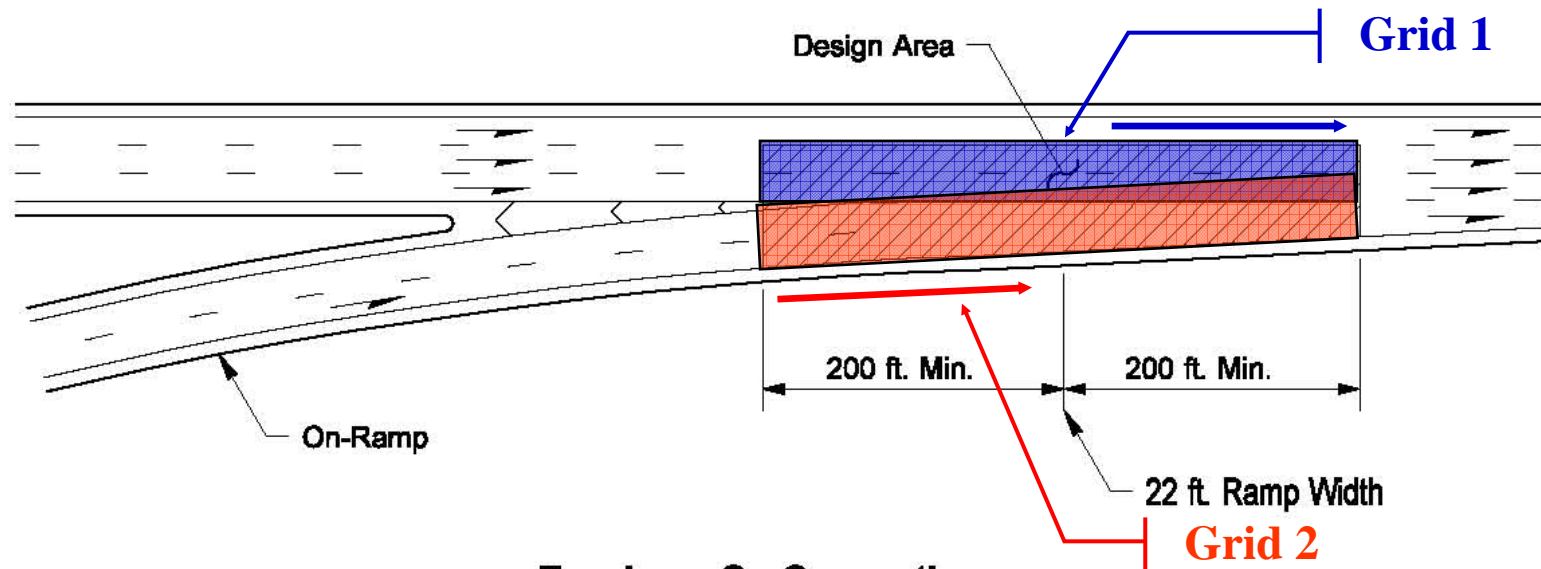


Two-Lane Off-Connection
(The Design Area Can Be Shifted up to 100 Feet From the Beginning of the Wide Line)

How to place Luminance & Veiling Luminance Grids

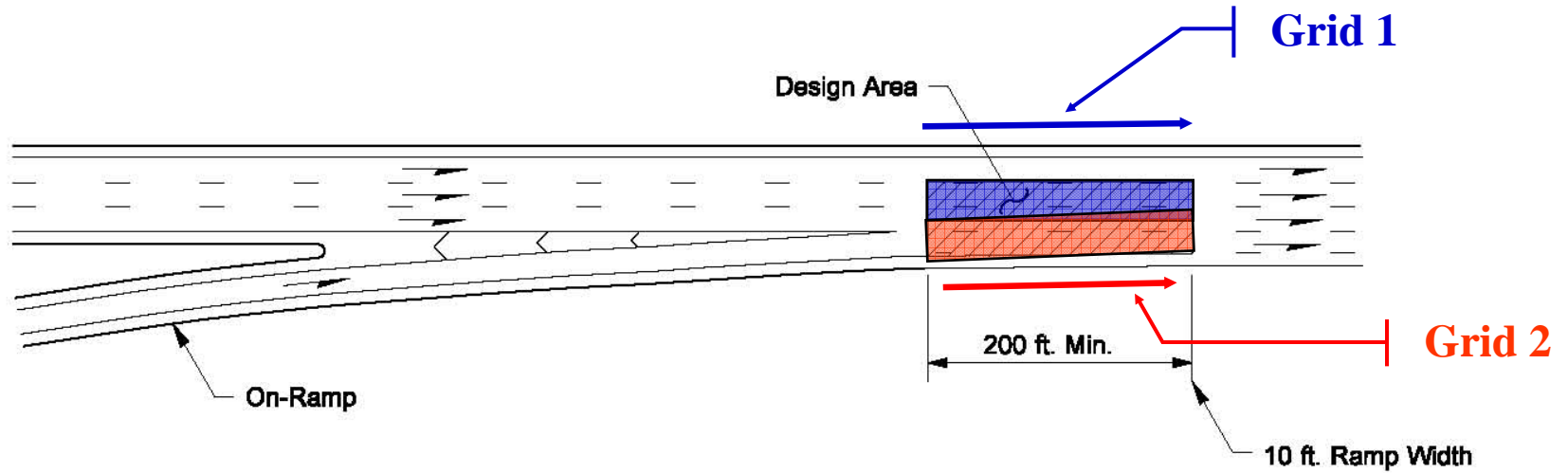


Single-Lane On-Connection
(The Design Area May Be Shifted up to 100 Feet From the 10-Foot-Wide Ramp Point)

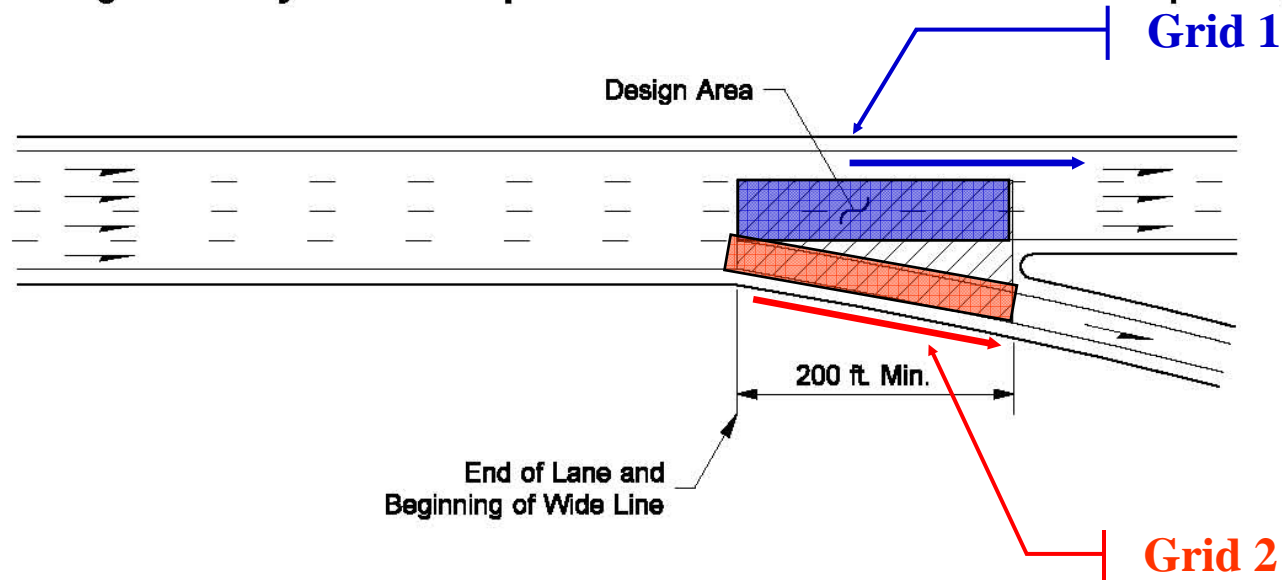


Two-Lane On-Connection
(The Design Area May Be Shifted up to 100 Feet From the 22-Foot-Wide Ramp Point)

How to place Luminance & Veiling Luminance Grids

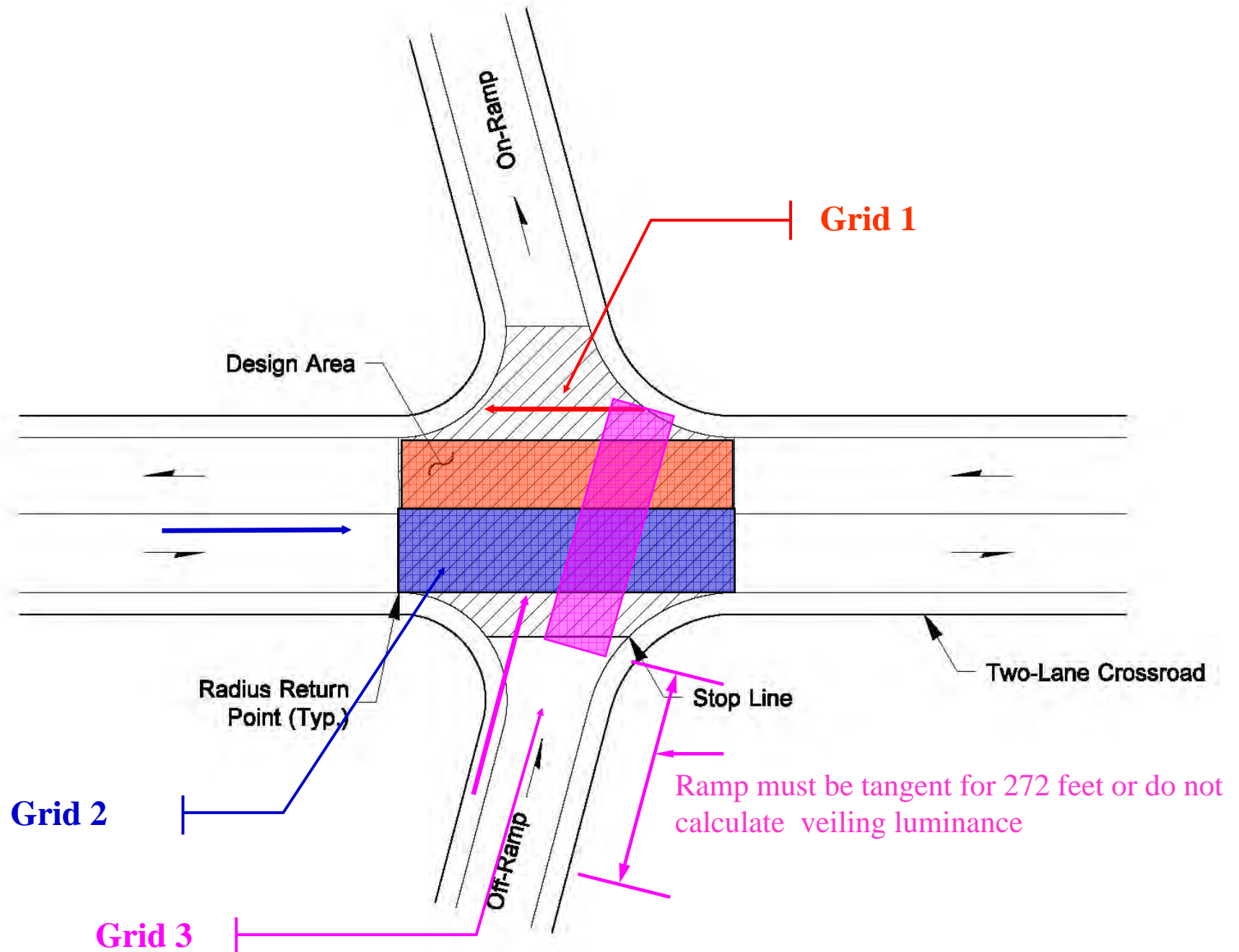


Auxiliary Lane at On-Connection
(The Design Area May Be Shifted up to 100 Feet From the 10-Foot-Wide Ramp Point)

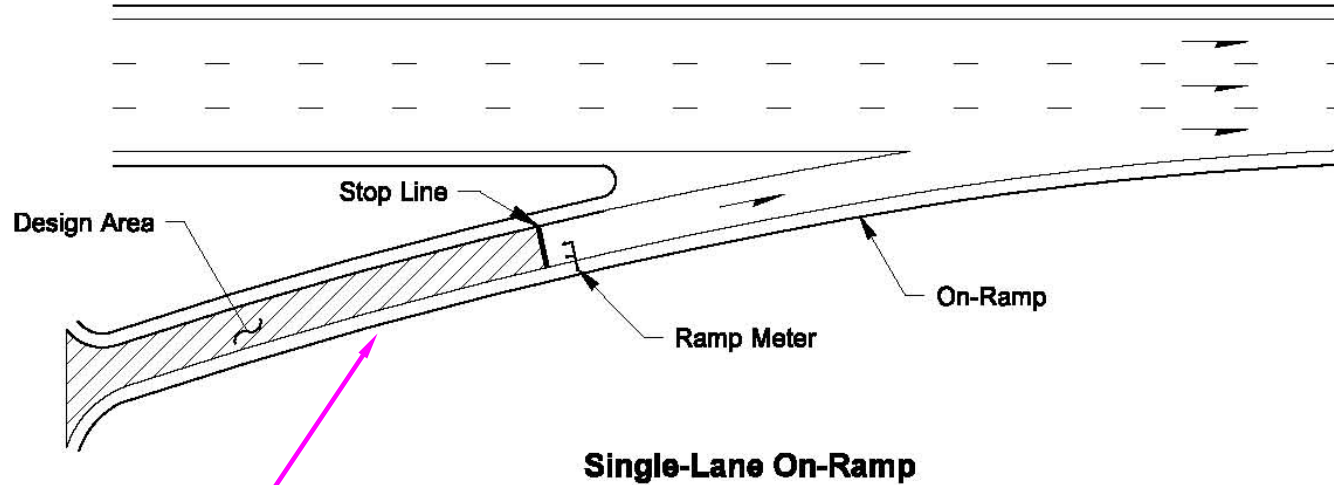


Exit-Only Lane
The Design Area May Be Shifted up to 100 Feet From the End of Lane and the Beginning of Wide Line

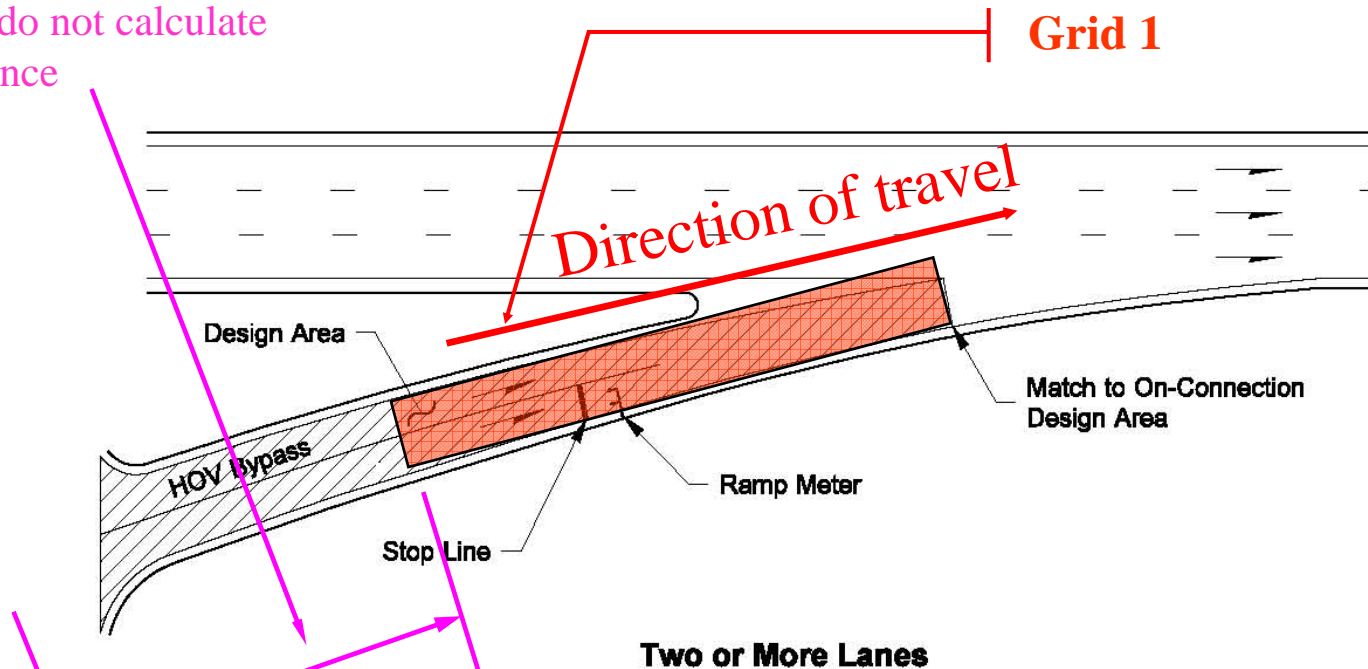
How to place Luminance & Veiling Luminance Grids



How to place Luminance & Veiling Luminance Grids

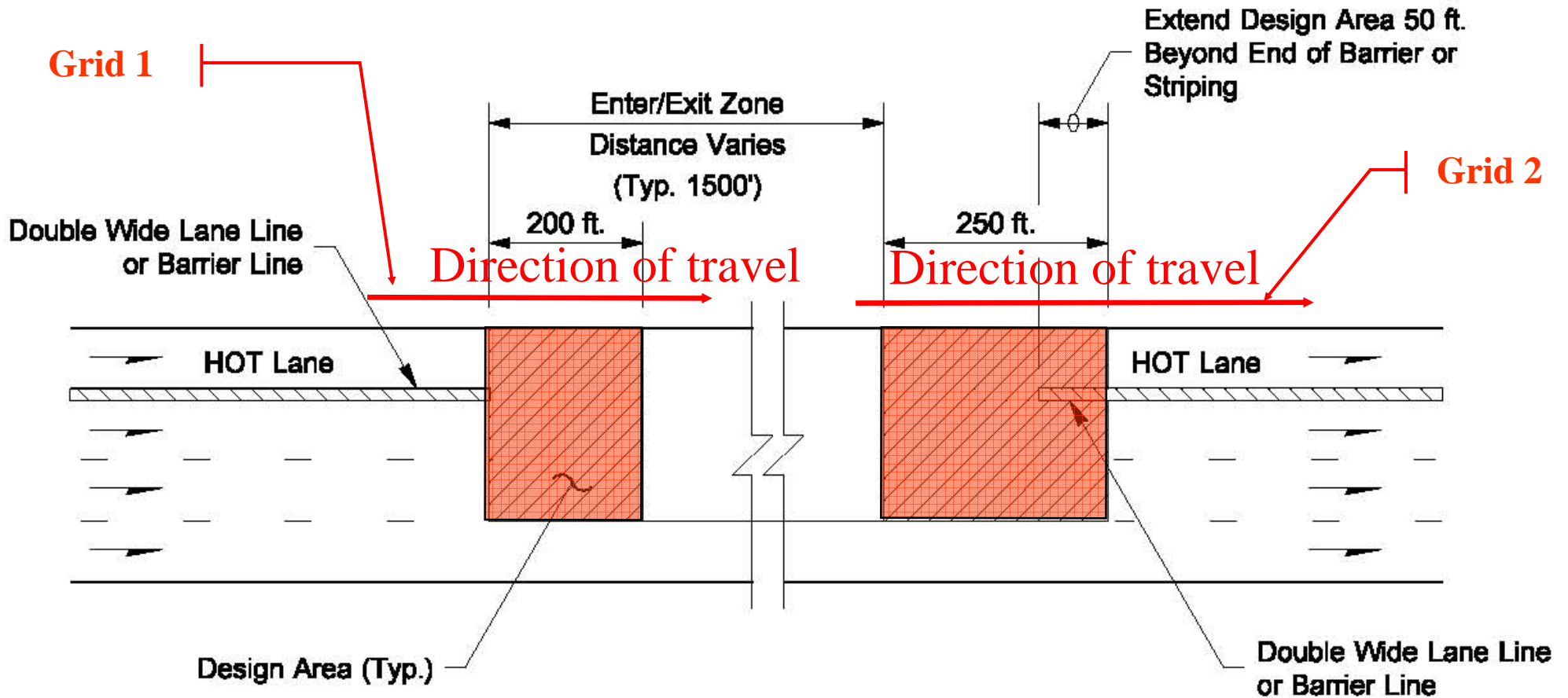


Approach roadway must be tangent for 272 feet or do not calculate veiling luminance



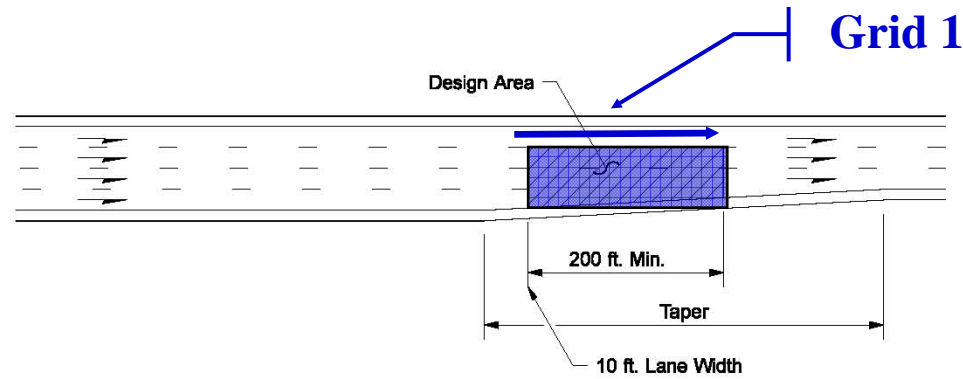
For concept only - see DM Exhibit 1040-3

How to place Luminance & Veiling Luminance Grids



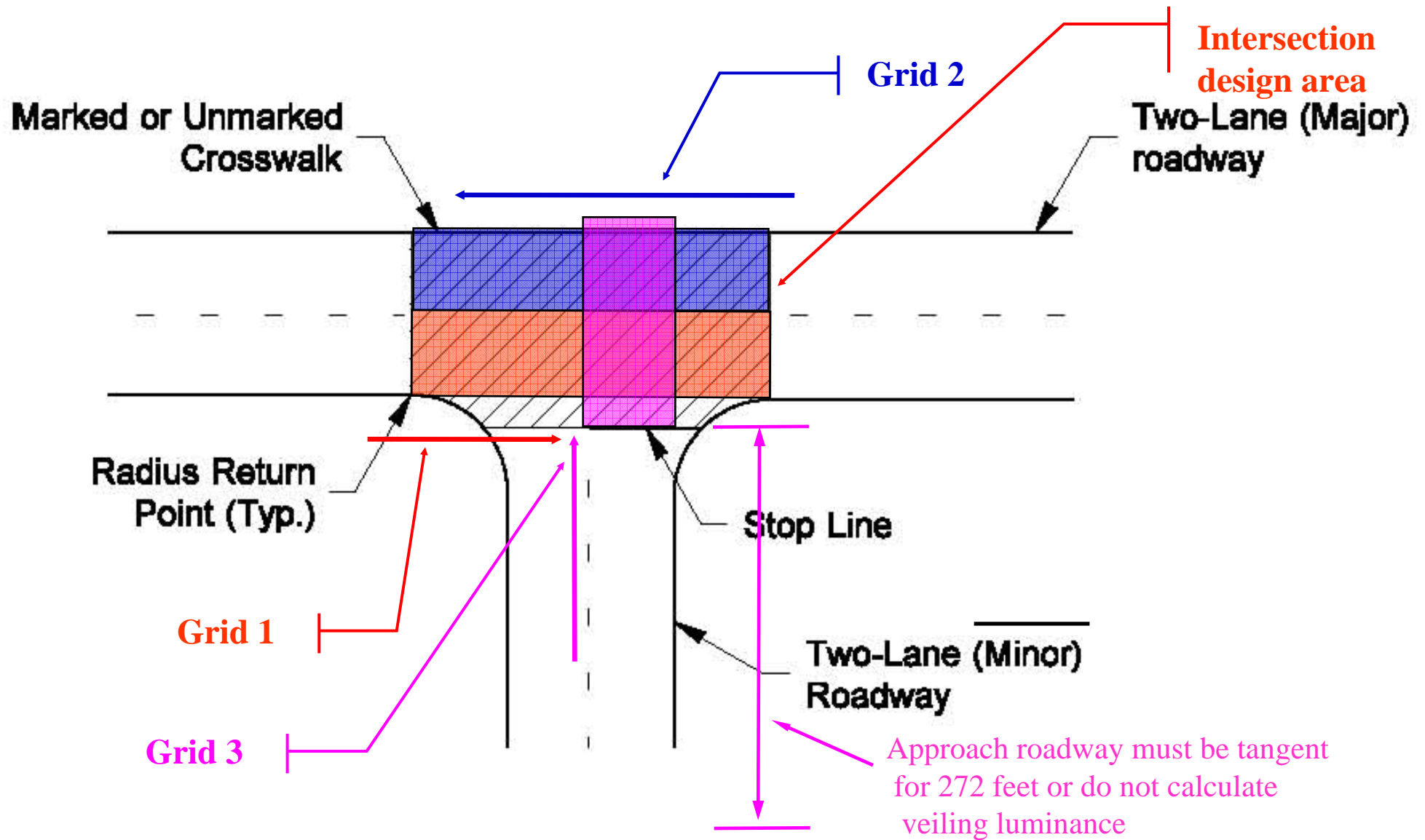
DM Exhibit 1040-4a

How to place Luminance & Veiling Luminance Grids

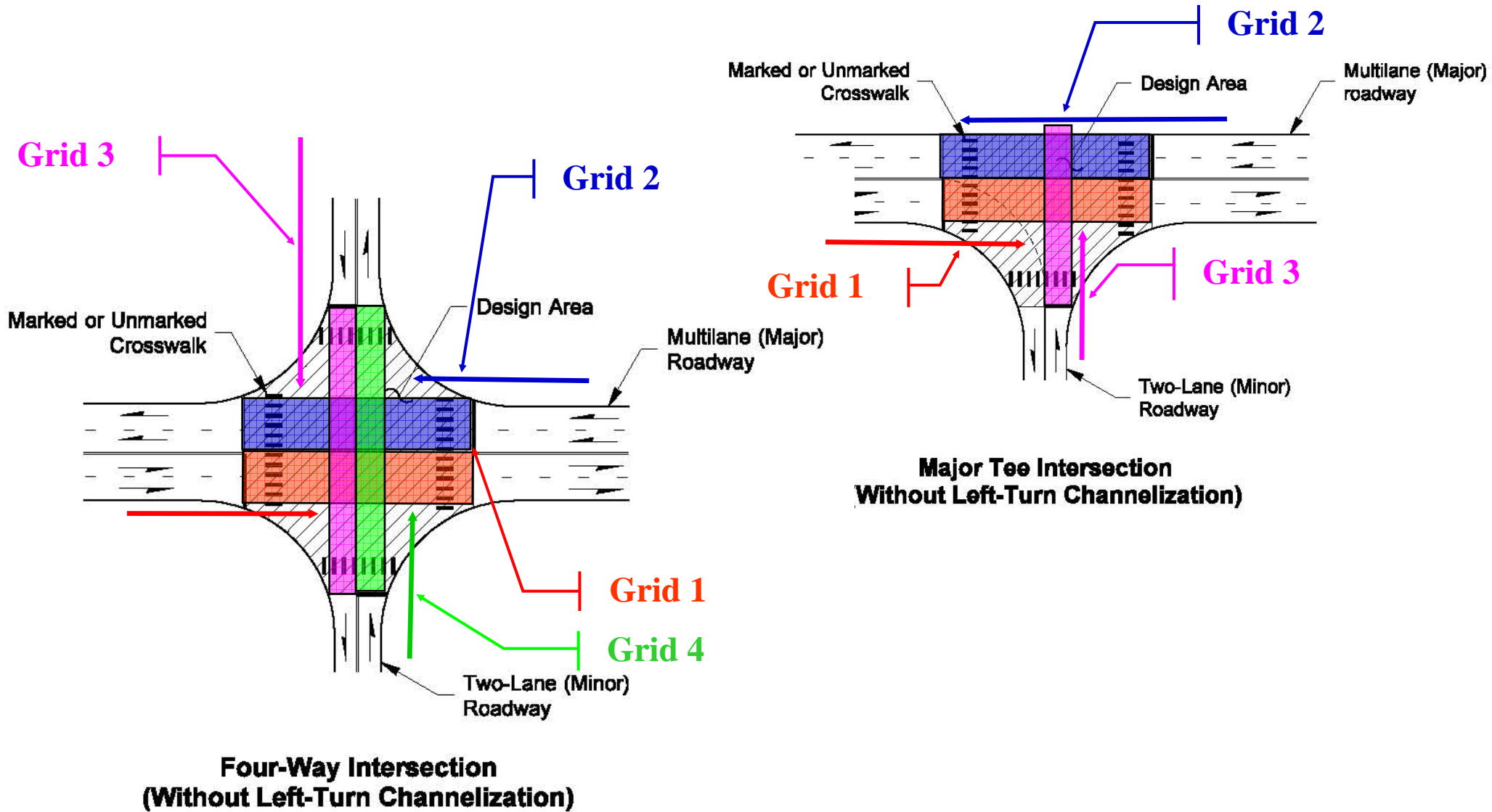


Lane Reduction

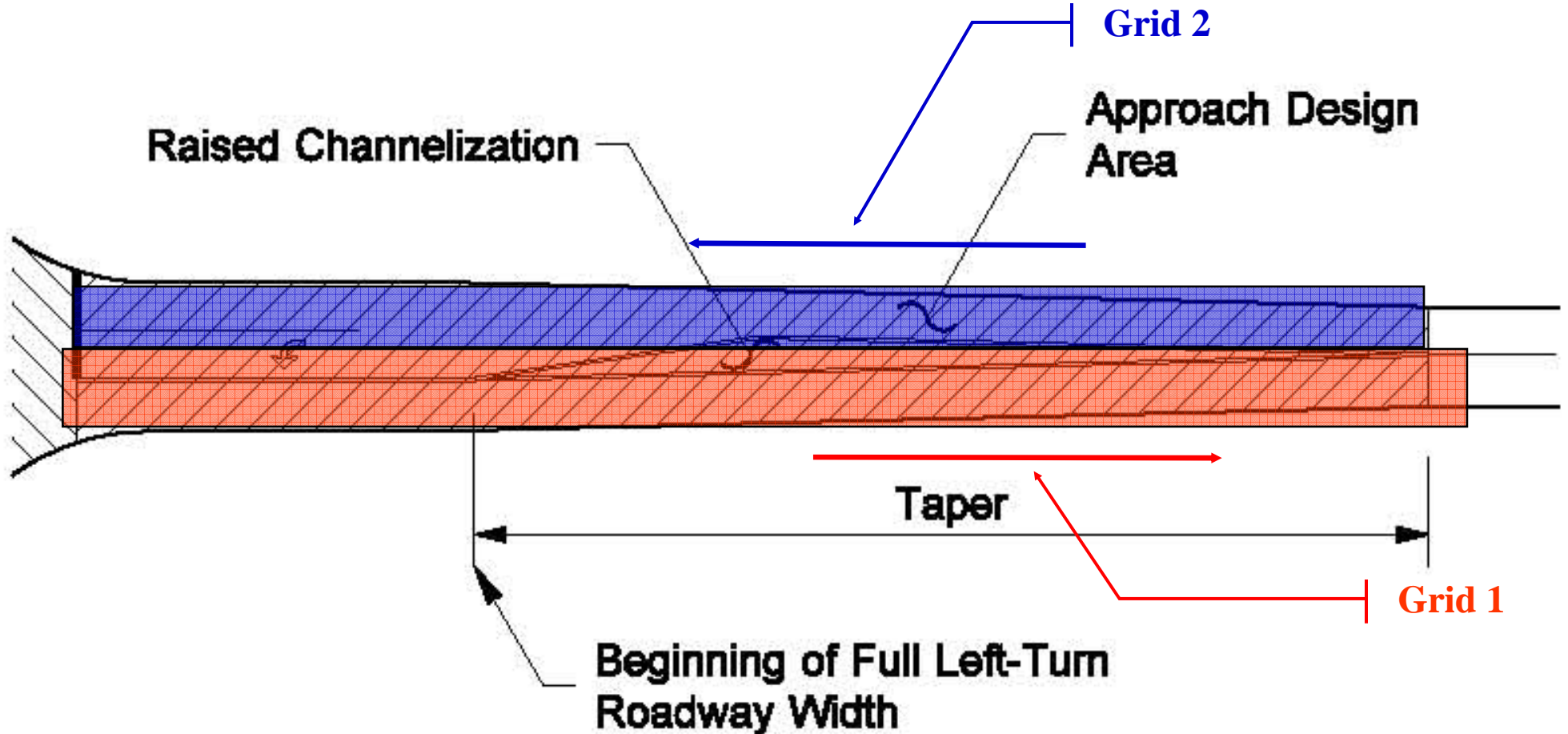
How to place Luminance & Veiling Luminance Grids



How to place Luminance & Veiling Luminance Grids

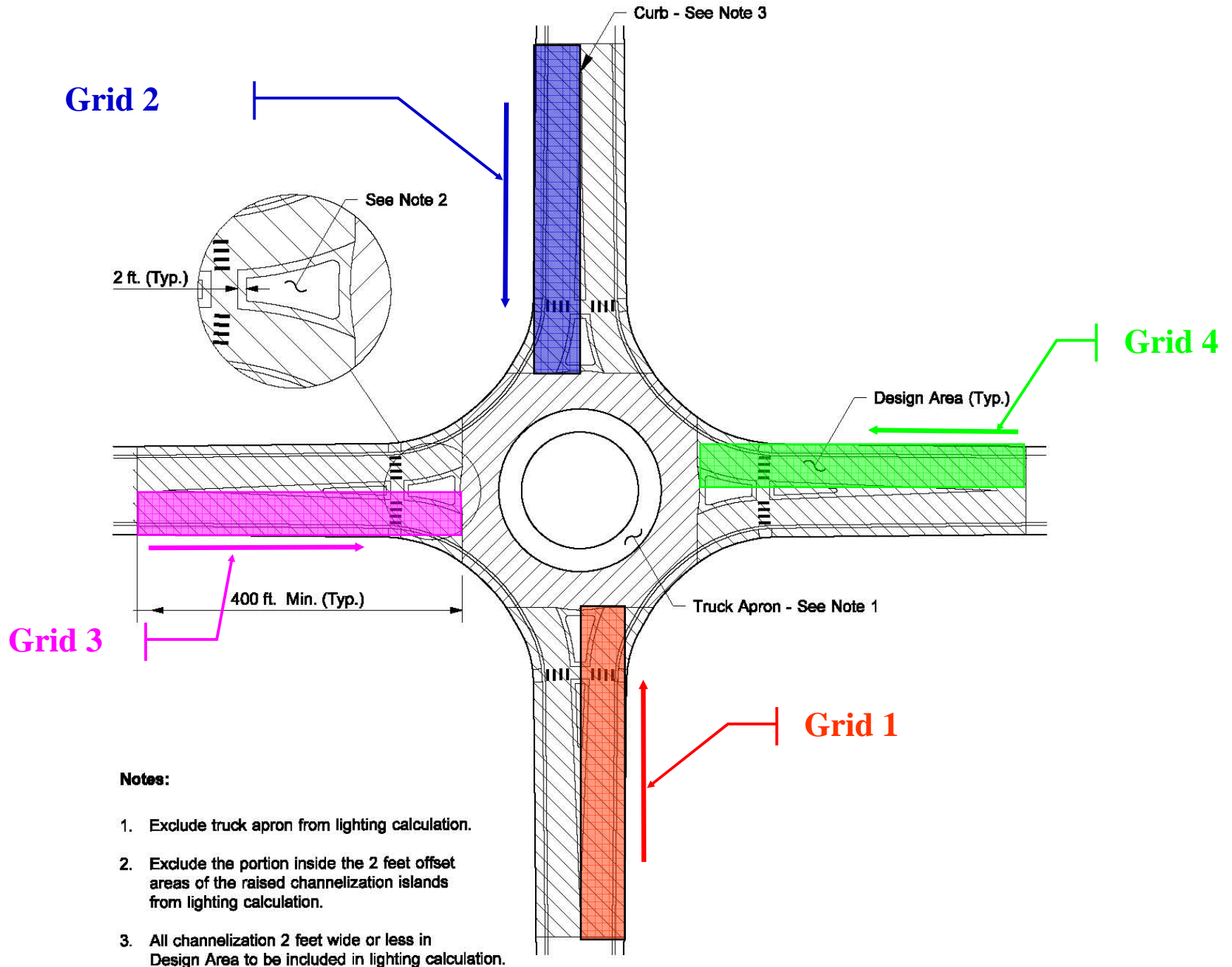


How to place Luminance & Veiling Luminance Grids



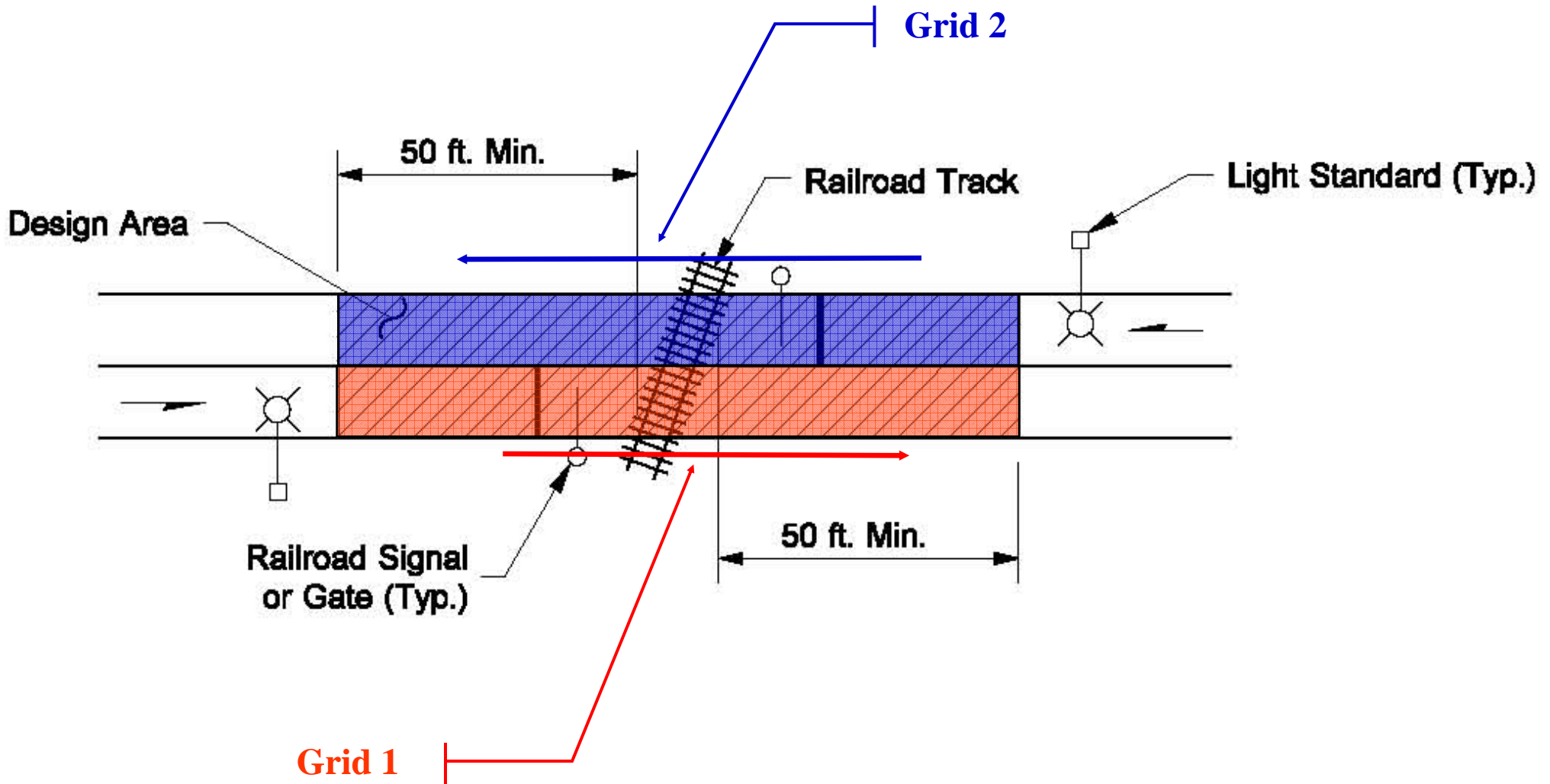
Alternate for Raised Channelization

How to place Luminance & Veiling Luminance Grids

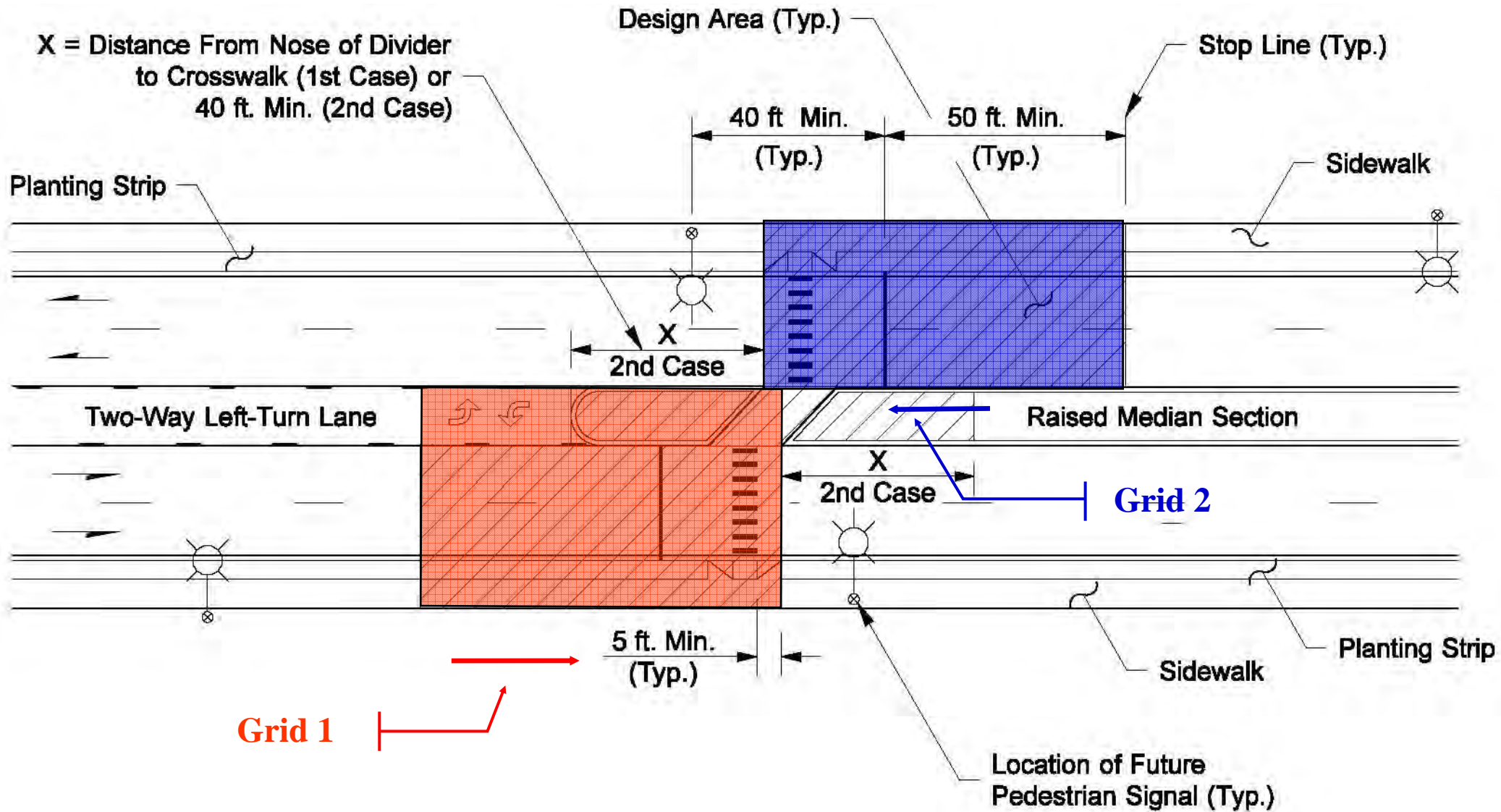


For concept only - see DM Exhibit 1040-9

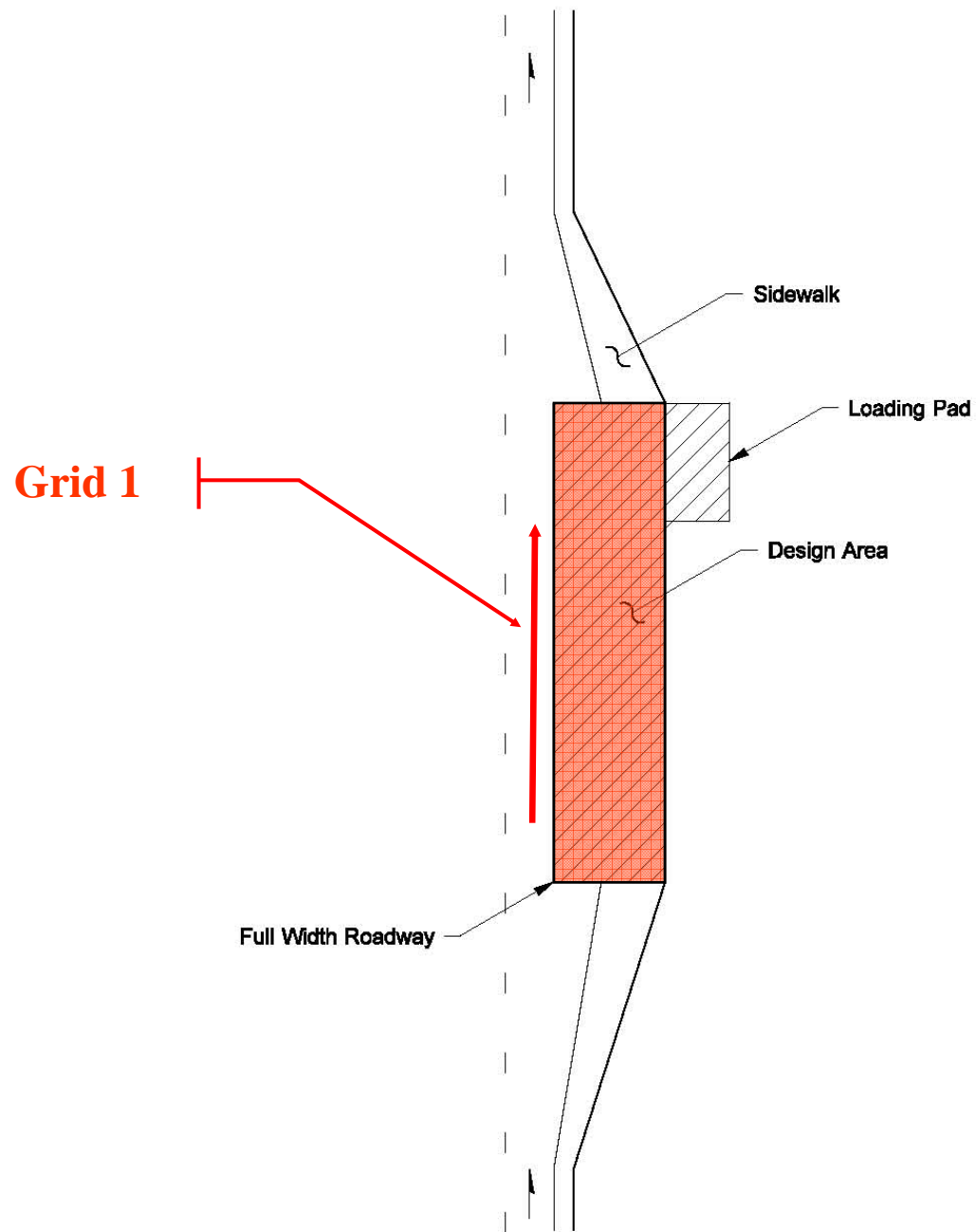
How to place Luminance & Veiling Luminance Grids



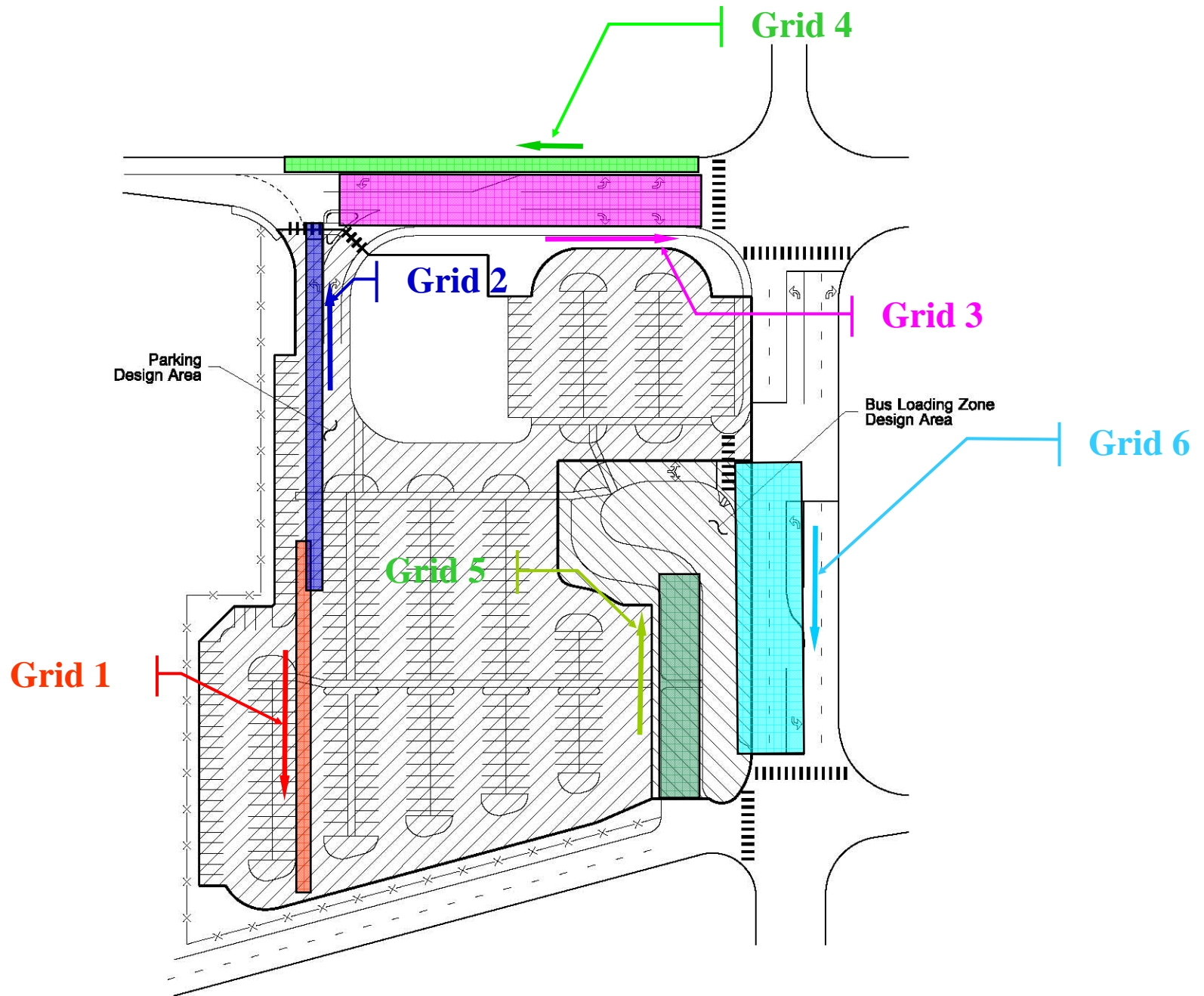
How to place Luminance & Veiling Luminance Grids



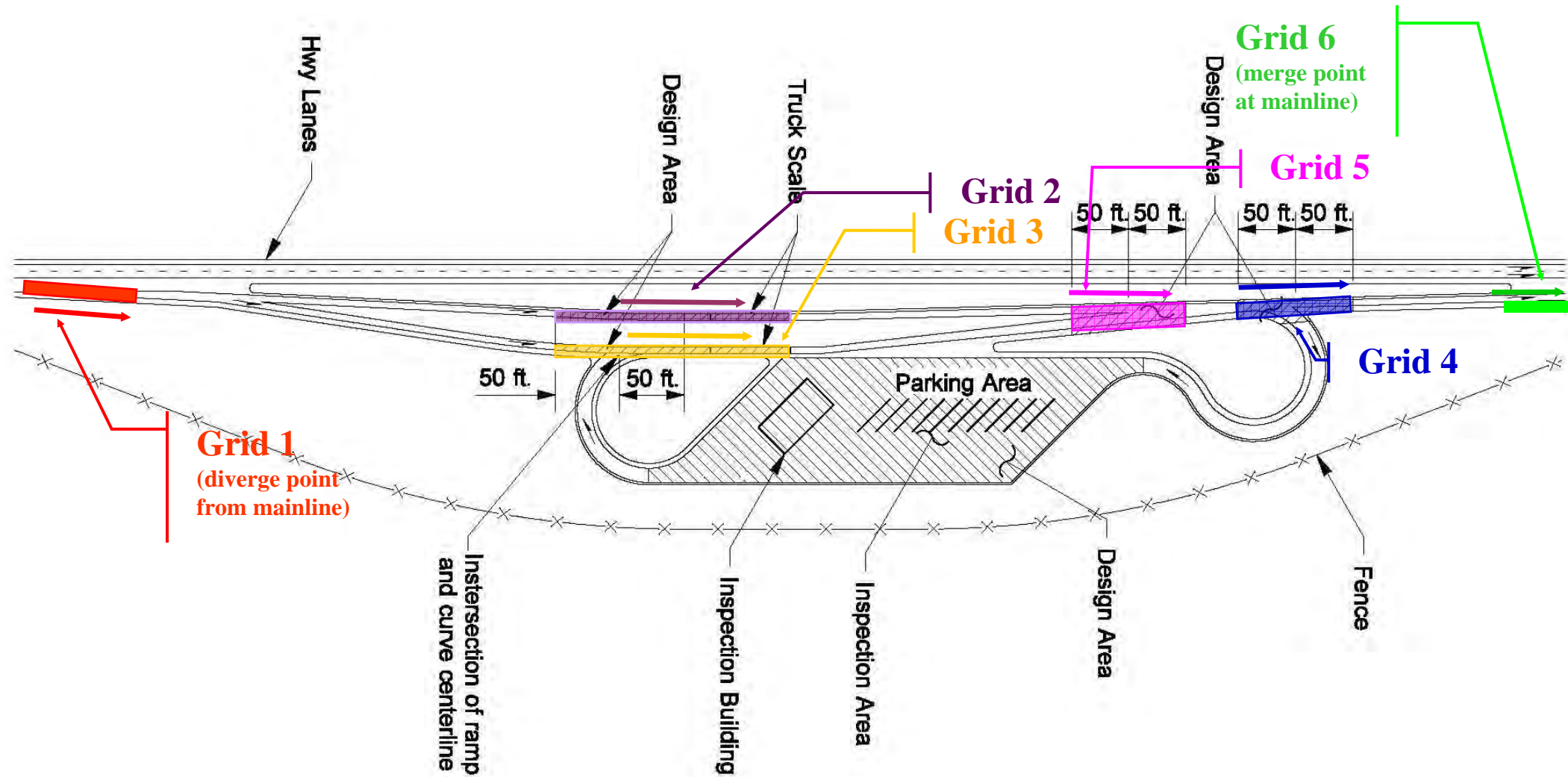
How to place Luminance & Veiling Luminance Grids



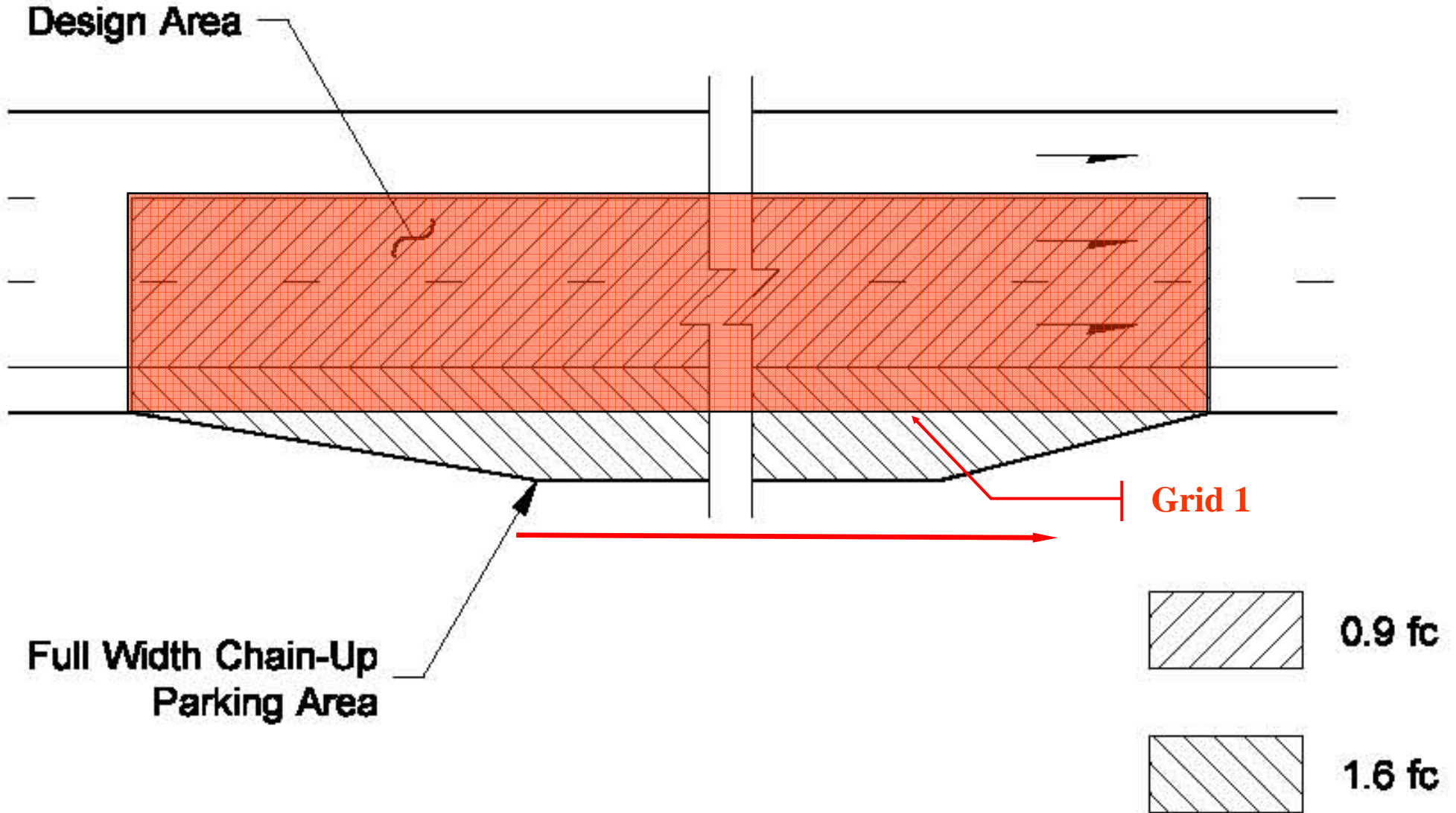
How to place Luminance & Veiling Luminance Grids



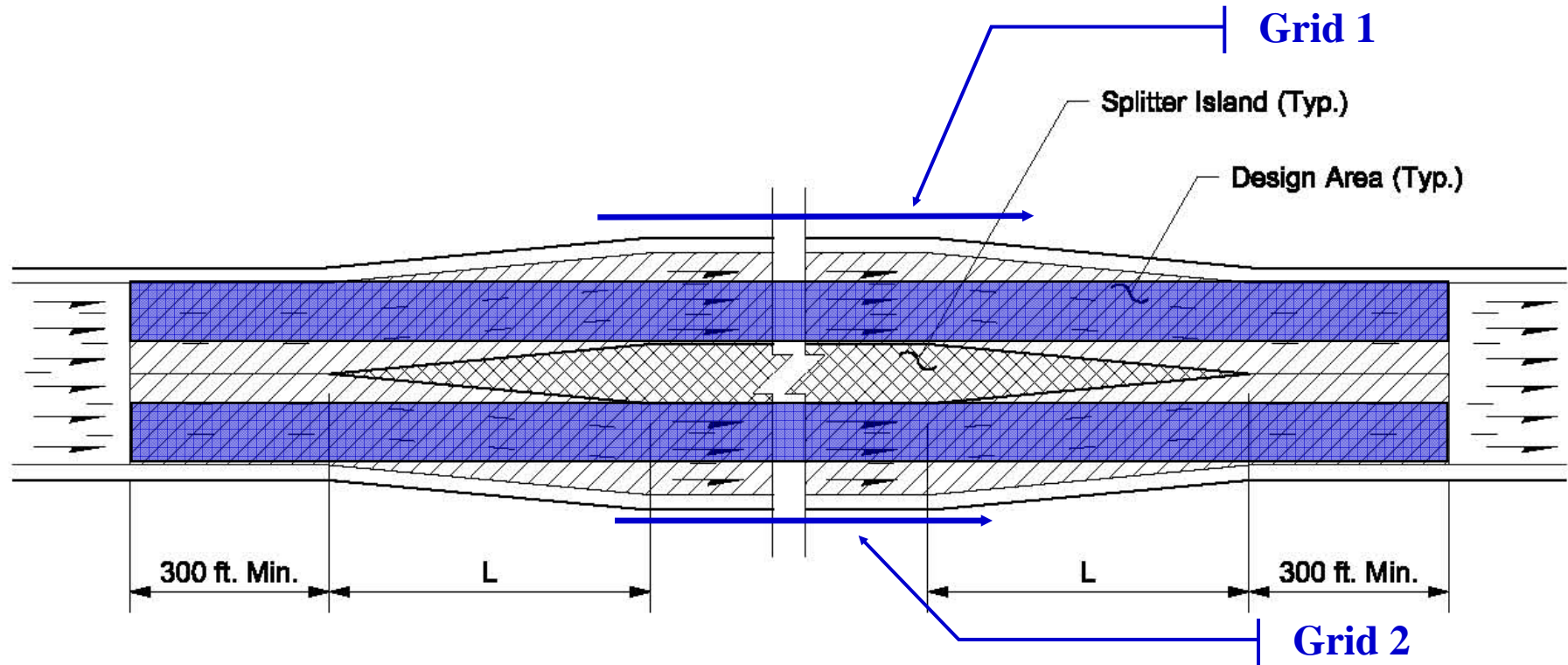
How to place Luminance & Veiling Luminance Grids



How to place Luminance & Veiling Luminance Grids



How to place Luminance & Veiling Luminance Grids



For speeds 45 mph or more: $L = WS$

For speeds less than 45 mph: $L = WS/60$

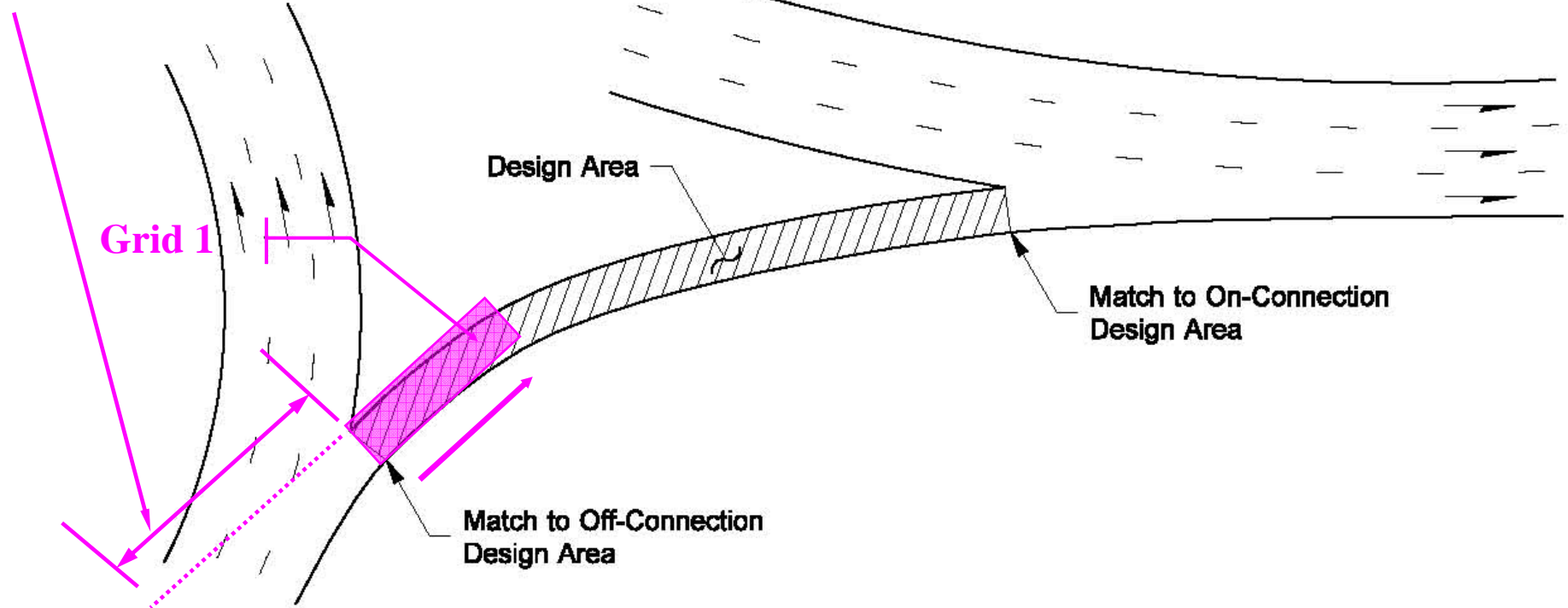
L = Taper length in feet

W = Width of offset in feet

S = Posted speed

How to place Luminance & Veiling Luminance Grids

Ramp must be tangent for 272 feet or do not calculate veiling luminance.

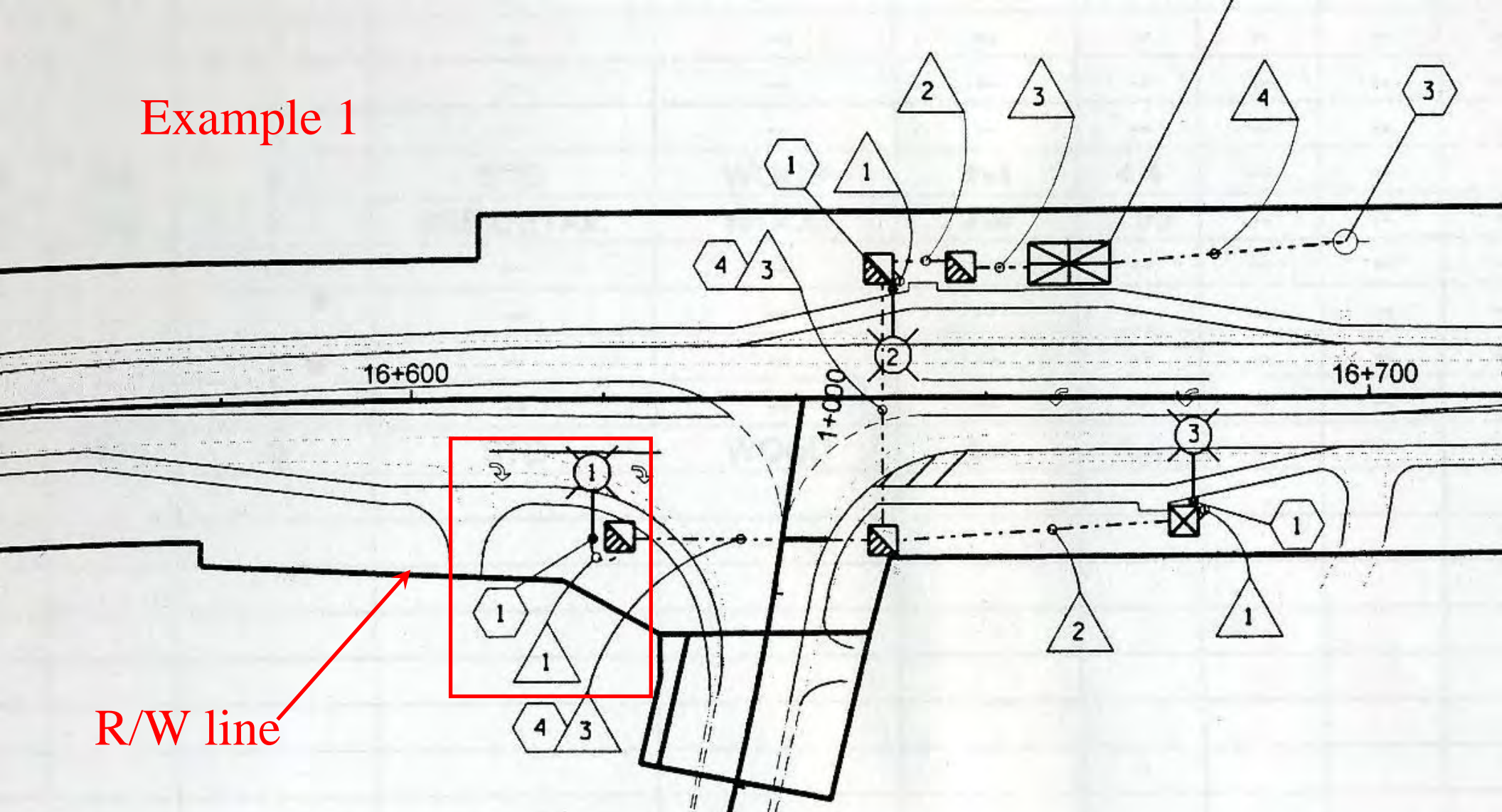


Use only where continuous illumination has been approved.

What's new in illumination design (or not so new) - continued

- Placement of Light Standards.
 - Luminaires should be placed as far back from the traveled way as is practical, generally 16' from the fog stripe. Luminaires should not be placed; in ditches, in ecology embankments, on steep cut slopes, above buried utilities, below overhead utilities, or within 10' (measured circumferentially) of power wires - including the neutral (depending on the voltage of the line the distance may be greater than 10 feet).
 - Watch your wetlands!

Example 1

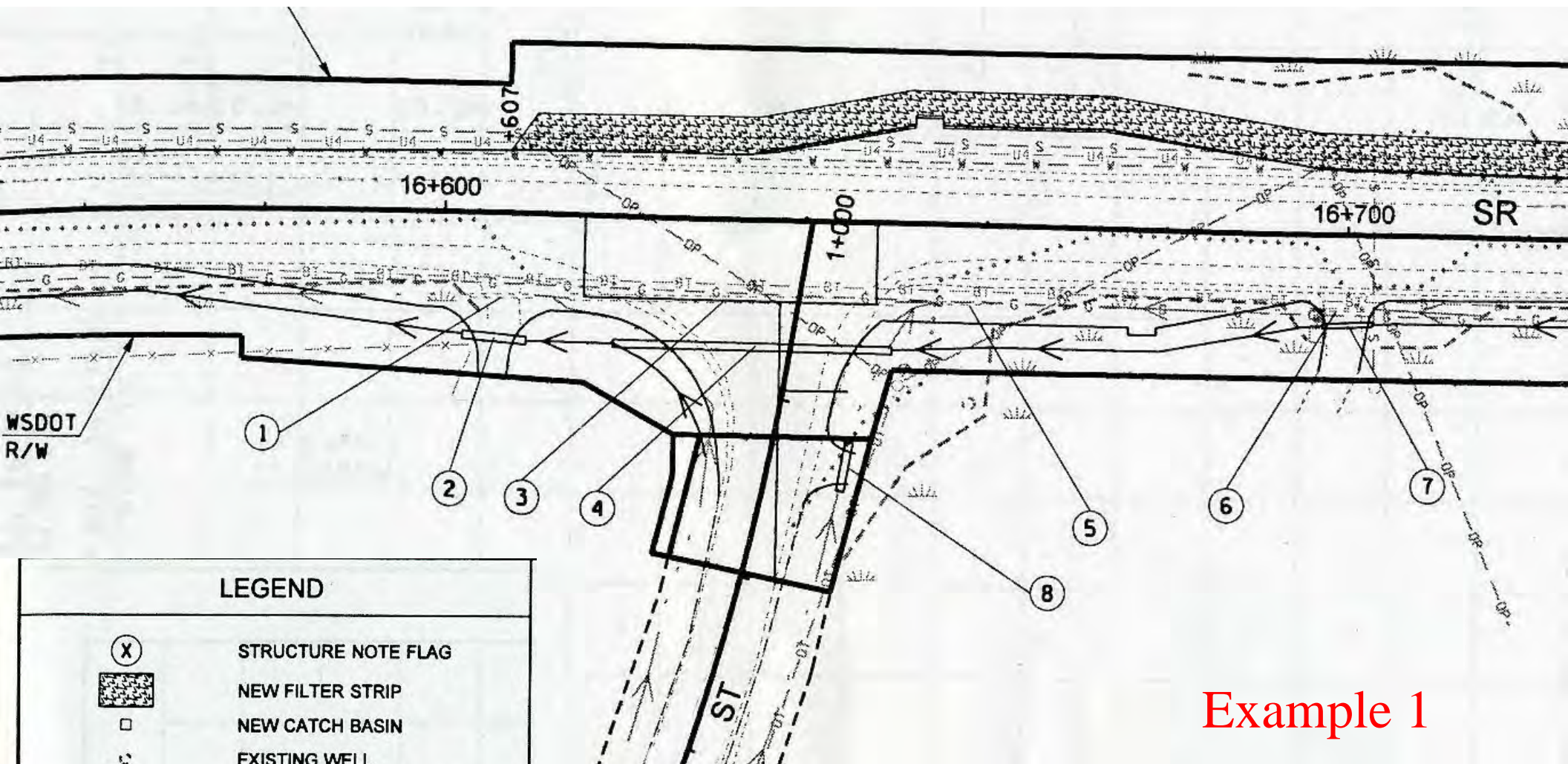


R/W line

LUMINAIRE SCHEDULE







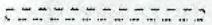




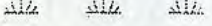
SERVICE NO.

LUMINAIRE NUMBER	CIRCUIT	LOCATION		TYPE-DISTRIBUTION-WATTAGE	MAST ARM	Hi	BASE TYPE	COMMENTS
		STATION	OFFSET					
1	A	SR	STA 16+618.74	14.06m RT	III-MED CUTOFF-400 HPS	4.88m	15.2m	SLIP
2	A	SR	STA 16+650.22	11.01m LT	III-MED CUTOFF-400 HPS	4.88m	15.2m	SLIP
3	A	SR	STA 16+681.56	10.54m RT	III-MED CUTOFF-400 HPS	4.88m	15.2m	SLIP



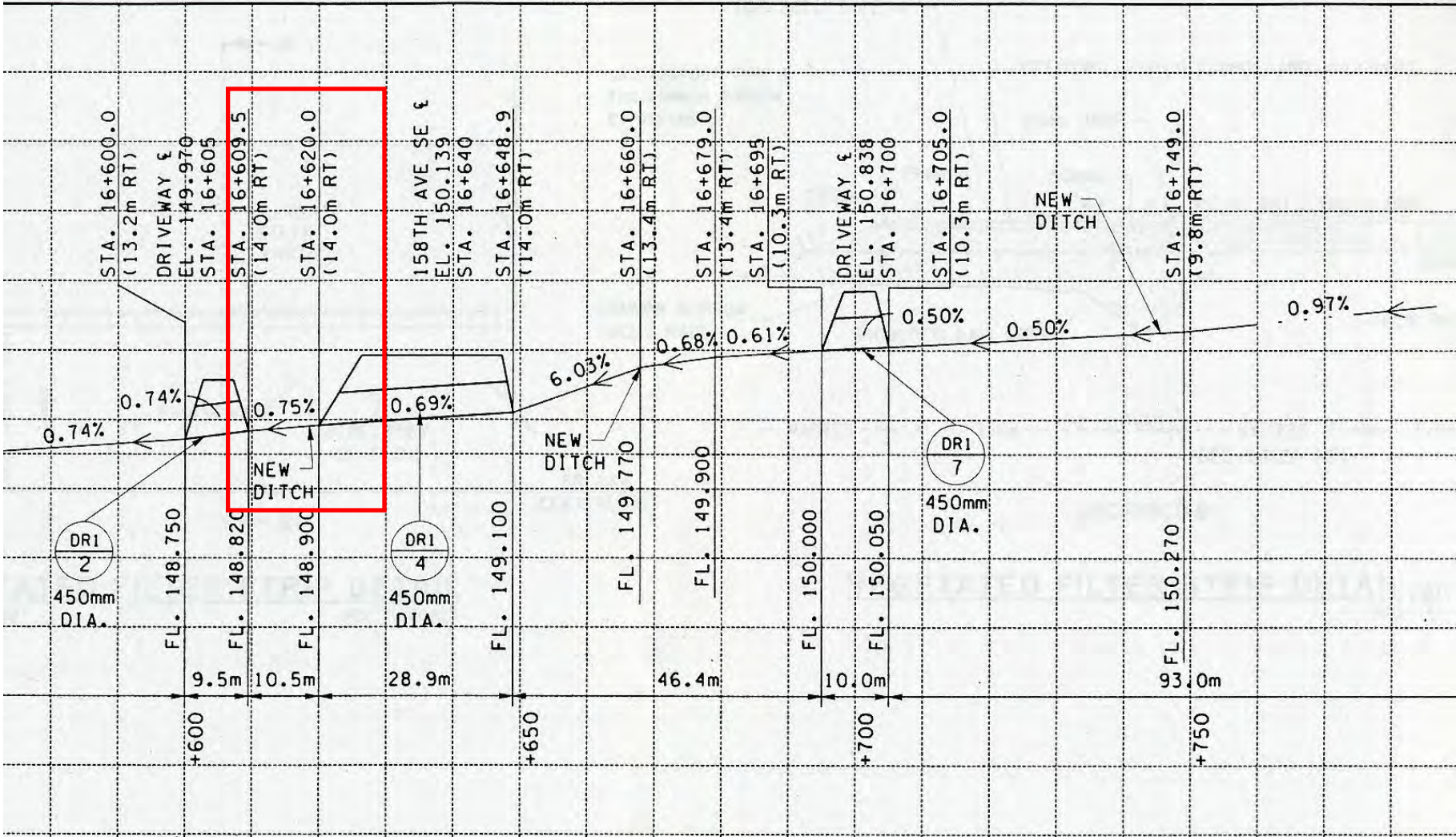
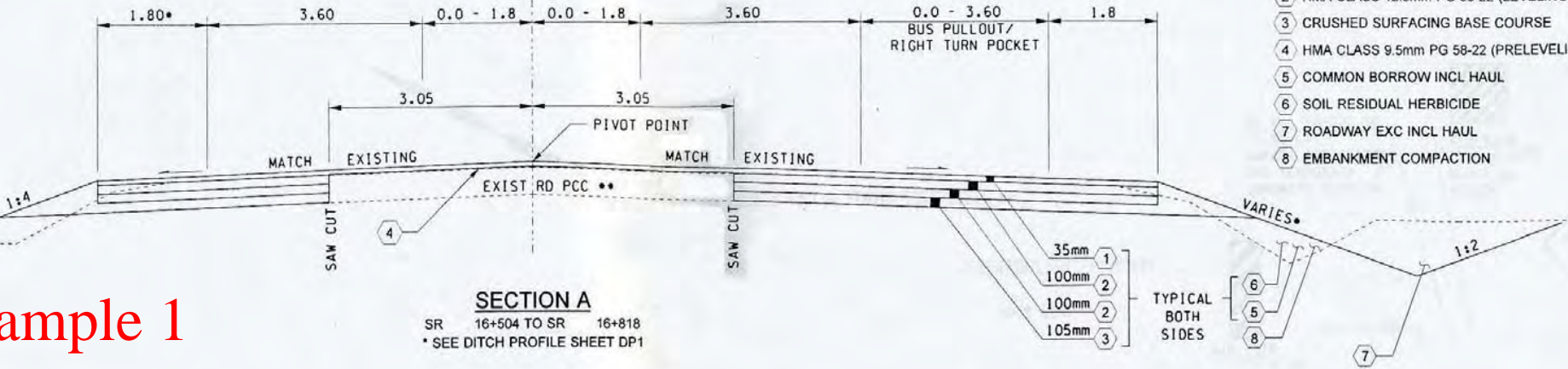
Example 1

LEGEND

-  STRUCTURE NOTE FLAG
-  NEW FILTER STRIP
-  NEW CATCH BASIN
-  EXISTING WELL
-  EXISTING CATCH BASIN
-  NEW PIPE
-  EXISTING CULVERT
-  NEW DRAINAGE DITCH
-  EXISTING DRAINAGE DITCH
-  EXISTING WETLAND BOUNDARY
-  EXISTING WETLAND BUFFER
-  WETLAND SYMBOL

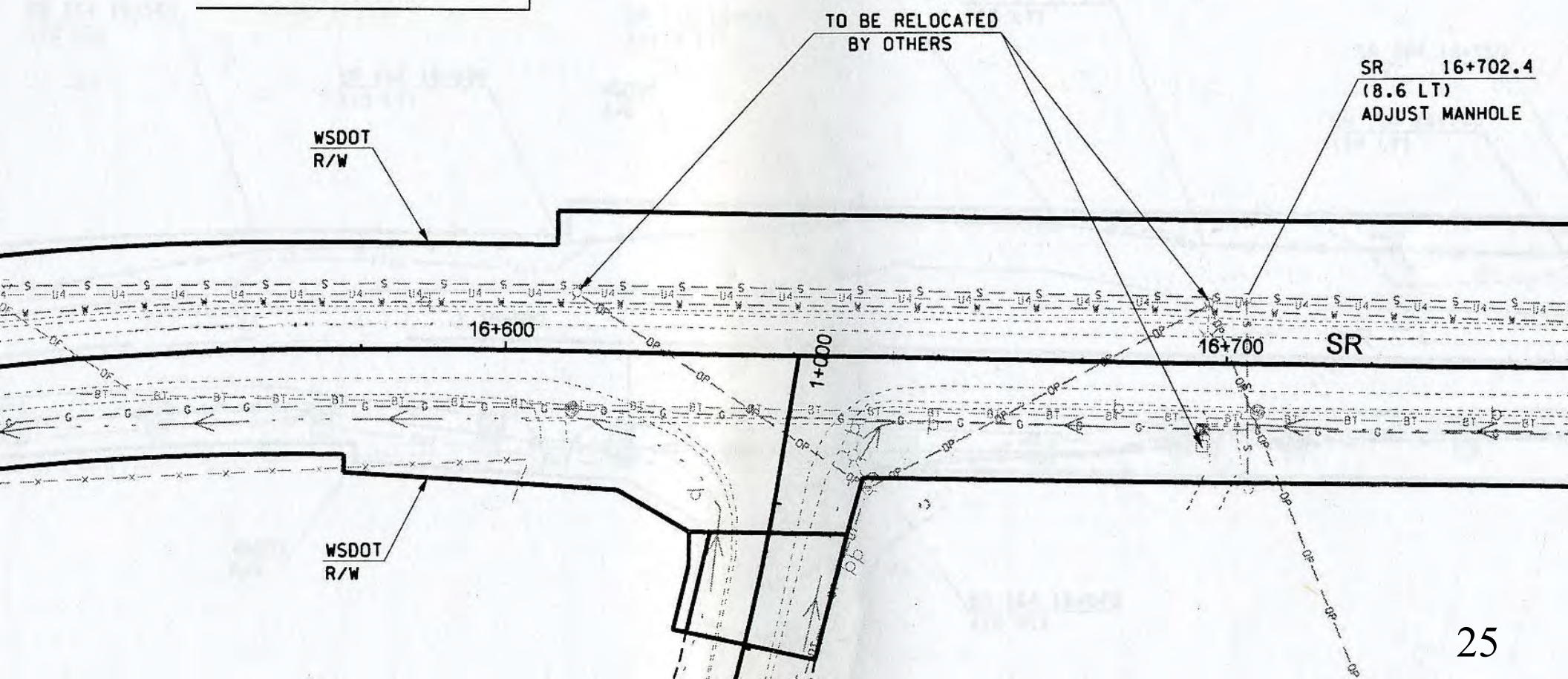
Example 1

- LEGEND**
- ① HMA CLASS 12.5mm PG 58-22 (WEARING COURSE)
 - ② HMA CLASS 12.5mm PG 58-22 (LEVELING COURSE)
 - ③ CRUSHED SURFACING BASE COURSE
 - ④ HMA CLASS 9.5mm PG 58-22 (PRELEVELING COURSE)
 - ⑤ COMMON BORROW INCL HAUL
 - ⑥ SOIL RESIDUAL HERBICIDE
 - ⑦ ROADWAY EXC INCL HAUL
 - ⑧ EMBANKMENT COMPACTION



EXISTING LEGENDS	
	POWER POLE
	WELL
	WATER OR GAS VALVE
	JUNCTION BOX
	LUMINAIRE
	TELEPHONE BOX
	GAS LINE
	SEWER LINE
	WATER LINE
	BURIED TELEPHONE
	OVERHEAD FIBER OPTIC
	OVERHEAD POWER
	OVERHEAD FIBER OPTIC, POWER, TELEPHONE, & TELEVISION
	WETLAND BOUNDARY
	WETLAND BUFFER
	WETLAND SYMBOL

Example 1





Example 1

JUL 6 2005

Example 1



JUL 6 2005

Example 1



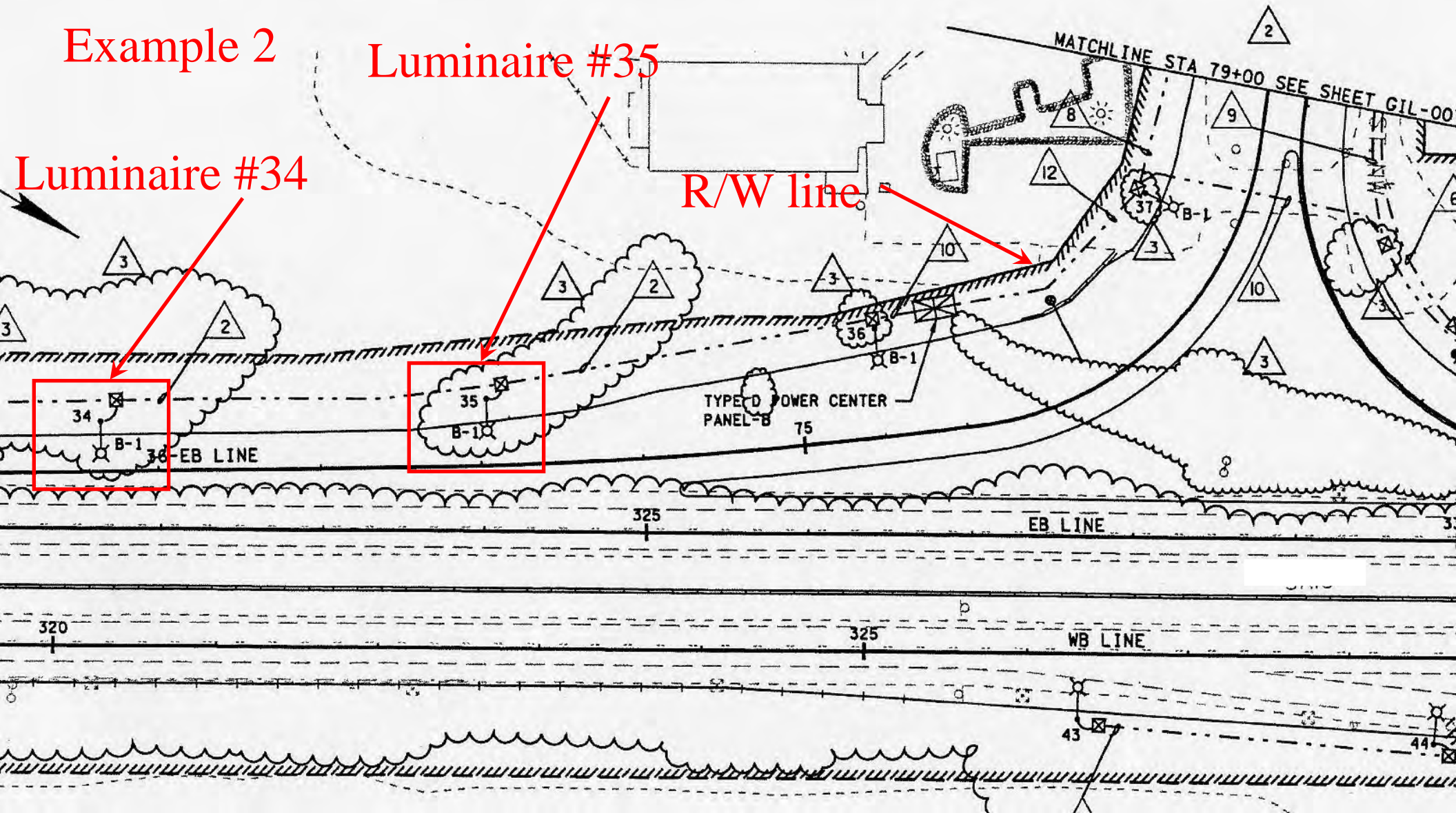
JUL 6 2005

Example 2

Luminaire #35

Luminaire #34

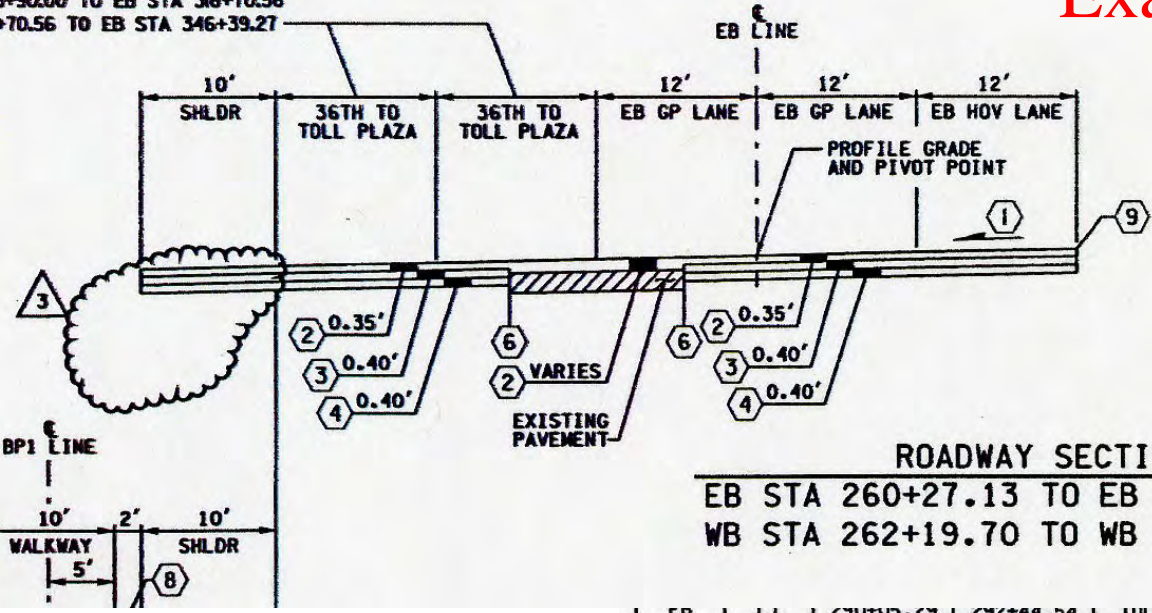
R/W line



POLE AND LUMINAIRE SCHEDULE									
POLE NO.	DIST. TYPE	LOCATION		LUMINAIRE TYPE	MAST ARM	HT	POLE BASE TYPE	DESCRIPTION	
		STATION	OFFSET						
34	III	36-EB STA 70+65.00	30.00' LT	400 HPS	14'	40'	BREAKAWAY	PROVIDE MULTIVOLTAGE BALLAST	
35	III	36-EB STA 73+04.00	40.00' LT	400 HPS	14'	40'	BREAKAWAY	PROVIDE MULTIVOLTAGE BALLAST	
36	III	36-EB STA 75+50.00	65.00' LT	400 HPS	14'	40'	BREAKAWAY	MULTIVOLTAGE BALLAST	
37	III	36-EB STA 78+10.00	60.00' LT	400 HPS	14'	40'	BREAKAWAY	MULTIVOLTAGE BALLAST	
43	III	WB STA 326+32.00	43.00' RT	400 HPS	16'	40'	BREAKAWAY	PROVIDE MULTIVOLT BALLAST & INDIVIDUAL PHOTOCCELL	
44	III	WB STA 328+52.00	60.00' RT	400 HPS	16'	40'	BREAKAWAY	PROVIDE MULTIVOLT BALLAST & INDIVIDUAL PHOTOCCELL	

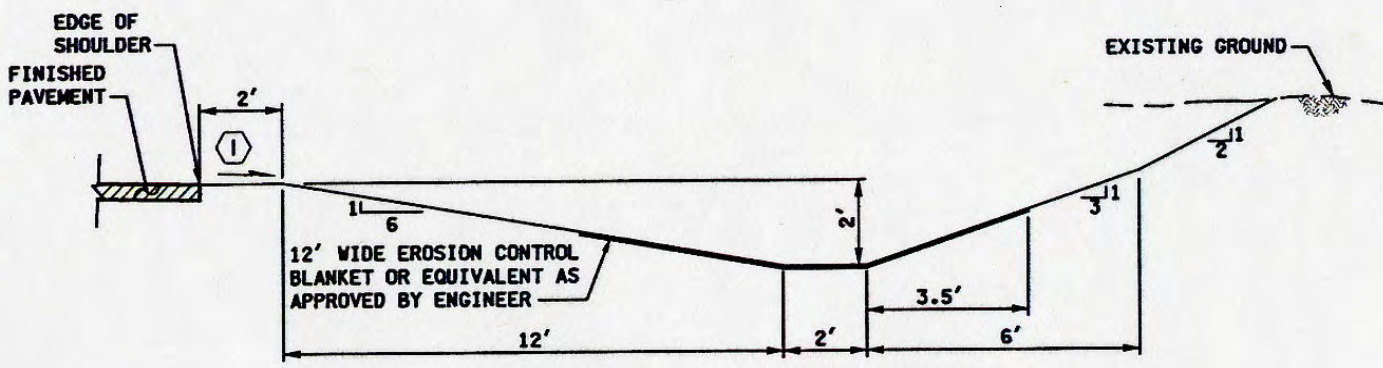
Example 2

0' EB STA 260+27.13 TO EB STA 305+90.00
 12' EB STA 305+90.00 TO EB STA 316+70.56
 0' EB STA 316+70.56 TO EB STA 346+39.27

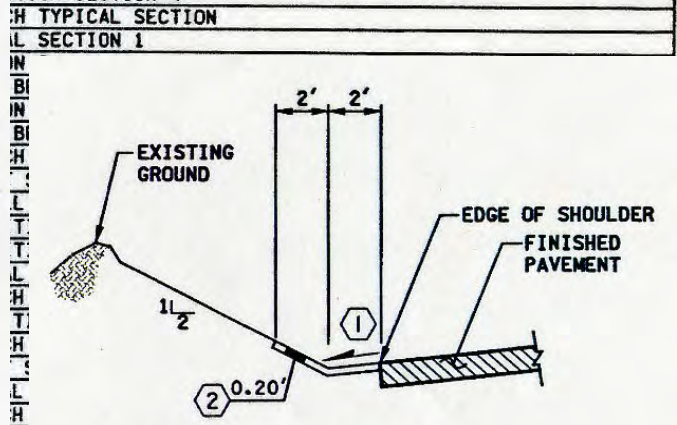


ROADWAY SECTION F
 EB STA 260+27.13 TO EB STA 346+39.27
 WB STA 262+19.70 TO WB STA 345+05.00

EB	LT	292+44.54	294+30.00	TOLL PLAZA MEDIAN SECTION 4
EB	LT	294+30.00	297+80.00	TOLL PLAZA MEDIAN SECTION 5
EB	LT	297+80.00	298+30.64	TOLL PLAZA MEDIAN SECTION 3
EB	LT	298+30.64	306+00.00	TOLL PLAZA MEDIAN SECTION 6
EB	LT	306+00.00	307+99.00	SPECIAL CUT SECTION 4
EB	LT	307+99.00	308+22.00	SPECIAL CUT SECTION 5
EB	LT	308+22.00	312+73.00	TRANSITION SPECIAL CUT SECTION 5 TO TYPE 1 DITCH TYPICAL SECTION
EB	LT	312+73.00	313+58.00	TYPE 1 DITCH TYPICAL SECTION
EB	LT	313+58.00	317+54.00	TRANSITION TYPE 1 DITCH TYPICAL SECTION TO SPECIAL CUT SECTION 4
EB	LT	317+54.00	317+84.00	SPECIAL CUT SECTION 4
EB	LT	317+84.00	320+55.00	TRANSITION SPECIAL CUT SECTION 4 TO TYPE 1 DITCH TYPICAL SECTION
EB	LT	320+55.00	320+87.00	TYPE 1 DITCH TYPICAL SECTION
EB	LT	320+87.00	323+59.61	TRANSITION TYPE 1 DITCH TYPICAL SECTION TO SPECIAL CUT SECTION 4
EB	LT	323+59.61	325+24.53	SPECIAL CUT SECTION 4
EB	LT	325+24.53	327+80.00	TURF REINFORCEMENT MAT SLOPE
EB	LT	327+80.00	327+80.00	DAMP TRANSITION SECTION 4



TYPE 1 DITCH TYPICAL SECTION
 NTS



SPECIAL CUT SECTION 4
 NTS



Example 2



Example 2

Is the signpost plumb or is
the luminaire plumb?



Example 3



Example 3



Example 3



Example 4



Example 4

I met with [redacted] and we probed and took measurements of several foundation where the ecology embankment has been installed behind the foundation.

These are on the off ramp from SR [redacted] to 244 Ave. SE. The measurements are taken from top of foundation to the depth that we could push the bar down into the material. We probed the sides also and they stayed fairly consistent at 8 inches of unstable material on the surface.

Pole base number Depth of unstable material at **2-ft. 4-inches** back of foundation and **1-foot back** of foundation

# 12	4'5"	2'
# 11	2'	1'
# 10	3'1"	3'8"
# 9	3'6"	3'
# 8	3'	3'

The last pole we checked was on SE 200 Street at SE 257 St. This is [redacted] pole base number K 31.

K 31 20-inches back: 3'4" of unstable material and at 36-inches back: 3' of unstable material.

I have attached 2 pictures of the foundation number 12 with the bar pushed into the ground at 2 foot 4 inches back of the foundation and a straight edge laying across the top of the foundation. The red mark on the bar is at 4-foot. This is how we took the measurements listed above.

Example 5



Example 5

AUG 8 2005

Example 6

This person is standing on the grated inlet that was constructed (by change order) to drain the water away from the hole this traffic signal pole was built into.



The guardrail was also constructed (by change order) to keep vehicles away from the hole this traffic signal pole was built into.



Example 6

Grade line

Example 7

JUL 1 2004



**Roughly 5' 3"
Existing grade**

JUL 1 2004





Example 7

Back fill est. line

JUL 1 2004

WARNING
HIGH VOLTAGE
DANGER
DO NOT TOUCH
UNLESS QUALIFIED

Example 8



Example 8



Example 8



Example 9

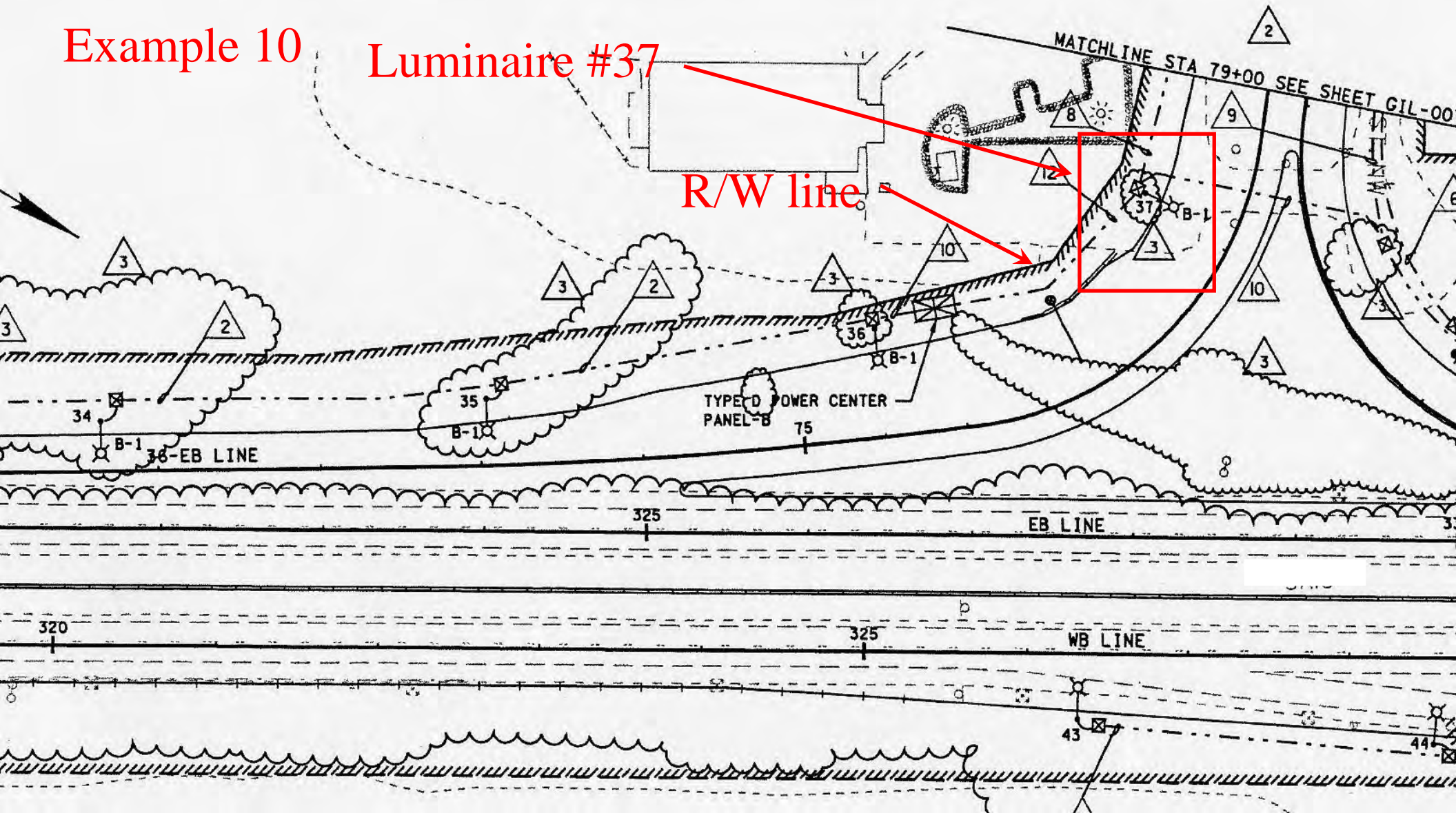




Example 9

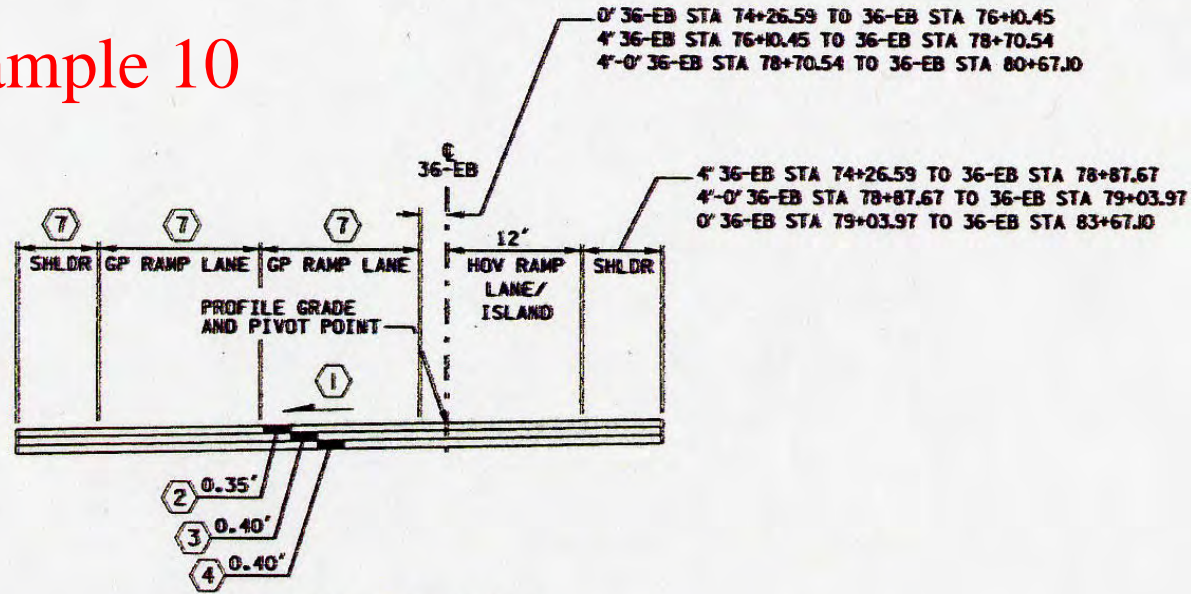
Example 10

Luminaire #37



POLE AND LUMINAIRE SCHEDULE									
POLE NO.	DIST. TYPE	LOCATION		LUMINAIRE TYPE	MAST ARM	HT	POLE BASE TYPE	DESCRIPTION	
		STATION	OFFSET						
34	III	36-EB STA 70+65.00	30.00' LT	400 HPS	14'	40'	BREAKAWAY	PROVIDE MULTIVOLTAGE BALLAST	
35	III	36-EB STA 73+04.00	40.00' LT	400 HPS	14'	40'	BREAKAWAY	PROVIDE MULTIVOLTAGE BALLAST	
36	III	36-EB STA 75+50.00	85.00' LT	400 HPS	14'	40'	BREAKAWAY	MULTIVOLTAGE BALLAST	
37	III	36-EB STA 78+10.00	60.00' LT	400 HPS	14'	40'	BREAKAWAY	MULTIVOLTAGE BALLAST	
43	III	WB STA 328+32.00	45.00' RT	400 HPS	16'	40'	BREAKAWAY	PROVIDE MULTIVOLT BALLAST & INDIVIDUAL PHOTOCCELL	
44	III	WB STA 328+52.00	60.00' RT	400 HPS	16'	40'	BREAKAWAY	PROVIDE MULTIVOLT BALLAST & INDIVIDUAL PHOTOCCELL	

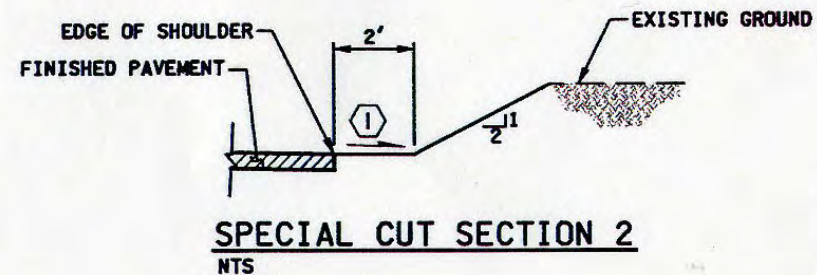
Example 10



ROADWAY SECTION I
36-EB STA 74+26.59 TO 36-EB STA 80+67.10

SHOULDER SLOPE TABLE

LINE	SIDE	LIMITS		SHOULDER SECTION
		STA	STA	
36-EB	RT	74+26.59	76+87.84	RAMP TRANSITION SECTION 4
36-EB	RT	76+87.84	77+15.00	TYPE 1 DITCH TYPICAL SECTION
36-EB	RT	77+15.00	78+60.00	FILL TYPICAL SECTION 1
36-EB	RT	78+60.00	81+00.00	FILL TYPICAL SECTION 1 AND TYPE 2 DITCH TYPICAL SECTION
36-EB	RT	81+00.00	81+90.85	FILL TYPICAL SECTION 1
36-EB	RT	81+90.85	82+64.00	BARRIER CURB SECTION 2 2
36-EB	RT	82+64.00	84+04.00	BARRIER CURB SECTION 1
36-EB	RT	84+04.00	85+91.00	BARRIER CURB SECTION 2
36-EB	RT	85+91.00	86+60.00	BARRIER CURB SECTION 1
36-EB	RT	86+60.00	87+03.00	BARRIER CURB SECTION 3
36-EB	RT	87+03.00	87+16.97	BARRIER CURB SECTION 1
36-EB	LT	74+26.59	76+33.52	TURF REINFORCEMENT MAT SLOPE
36-EB	LT	76+33.52	77+55.00	SPECIAL CUT SECTION 1
36-EB	LT	77+55.00	79+50.00	SPECIAL CUT SECTION 2
36-EB	LT	79+50.00	80+15.00	FILL TYPICAL SECTION 1 AND TYPE 2 DITCH TYPICAL SECTION
36-EB	LT	80+15.00	80+95.00	GA LINE DITCH
36-EB	LT	80+85.00	81+90.85	BARRIER CURB SECTION 1
36-EB	LT	81+90.85	82+45.00	BARRIER CURB SECTION 1
36-EB	LT	82+45.00	84+15.00	FILL TYPICAL SECTION 1
36-EB	LT	84+15.00	85+60.00	SPECIAL CUT SECTION 2
36-EB	LT	85+60.00	87+16.97	BARRIER CURB SECTION 1 2
EB-36	RT	52+30.00	56+73.39	FILL TYPICAL SECTION 1
EB-36	LT	50+27.04	51+77.00	FILL TYPICAL SECTION 1 AND TYPE 2 DITCH TYPICAL SECTION
EB-36	LT	51+77.00	52+00.00	TRANSITION TO BERM SECTION 1
EB-36	LT	52+00.00	53+83.00	BERM SECTION 1
EB-36	LT	53+83.00	54+06.00	TRANSITION BERM SECTION 1 TO BERM SECTION 2
EB-36	LT	54+06.00	54+35.00	BERM SECTION 2
EB-36	LT	54+35.00	54+94.00	TRANSITION BERM SECTION 2 TO BERM SECTION 1
EB-36	LT	54+94.00	56+73.39	BERM SECTION 1





Example 10



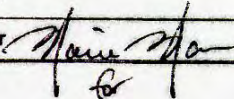
Example 10

Request for Information

RFI-869

Page 1 of 1

(Number is assigned by TNC Construction)

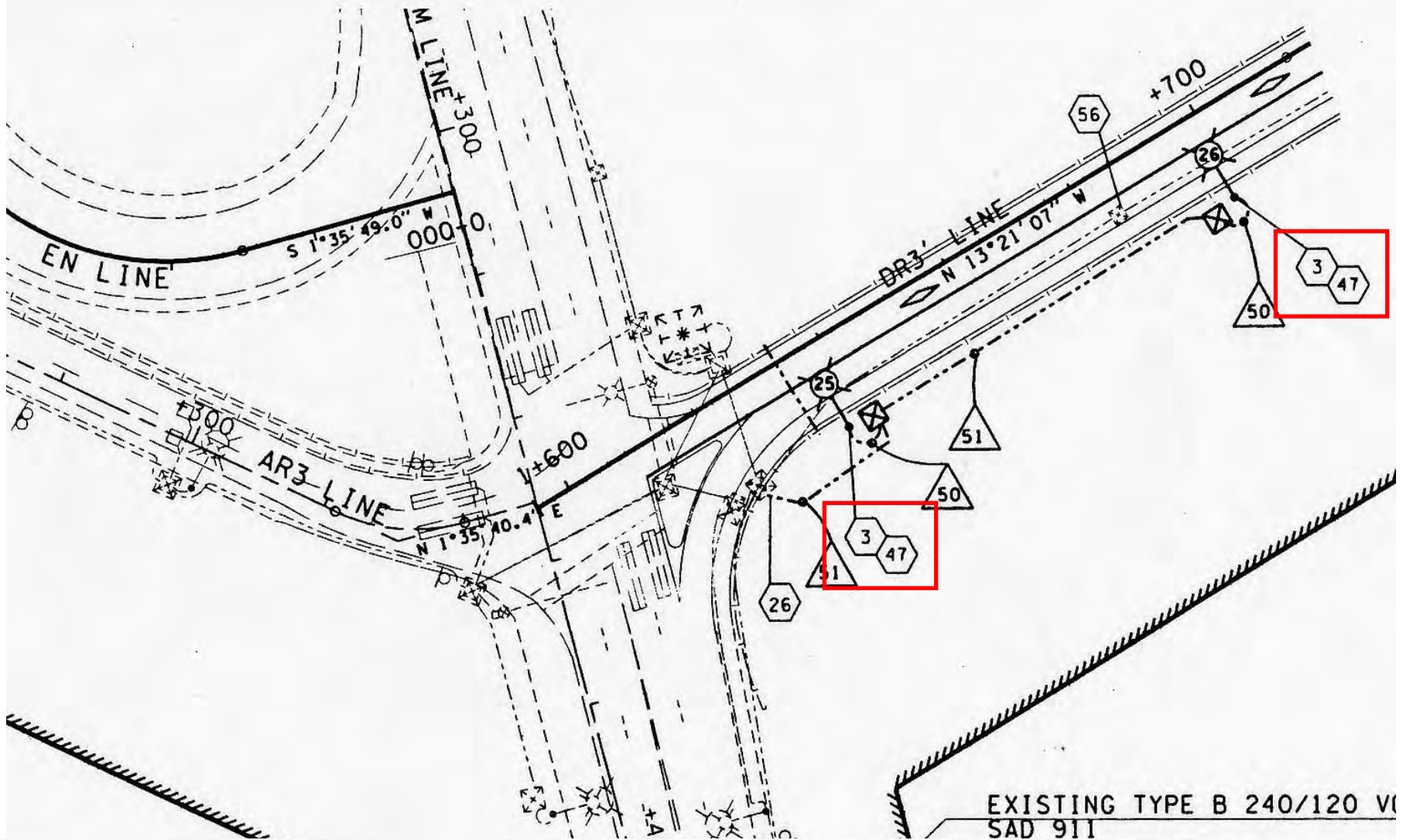
Part 1: Request (from TNC construction, subcontractors or quality control)			
1. Originator: JJ Jacoby		Company: TNC	
Ph #: 853-9715			
2. Project Area:	<input checked="" type="checkbox"/> Gig Harbor	<input type="checkbox"/> NB Substructure	<input type="checkbox"/> NB Superstructure
	<input type="checkbox"/> Existing Bridge	<input type="checkbox"/> Tacoma	
3. Reference Drawing(s) or Specification(s):		Rev No:	Title of Document
GIL-005		3	Gig Harbor Mainline Illumination Plan EB Sta 320+00 to EB Sta 335+00
4. Reason for the request and potential solution: (include potential cost or schedule impact)			
The luminaire pole # 37 is located at the top of a cut slope at 18' behind the fog line. The slope of the cut is approximately 1-1/2 to 1. The luminaire pole base is 3-0' diameter by 4-1/2', deep per the standard plans. This would leave the leading edge of the pole with only 2-1/2' below grade. This does not appear to be an optimal depth for the pole base.			
We suggest that the pole depth be increased to 6-1/2', to compensate for the placement in the slope.			
We also suggest that the pole center be relocated 2' closer to the fog line so that the luminaire avoids interferences with existing utilities at the top of the slope.			
5. Requested Response Date:		9/March/2005	Date Sent: 7/Mar/2005
6. Send to TNC:	E-Mail:	pcwheato@bechtel.com	Fax: 253-858-1816
Part 2: TNC Review / Response (by TNC Construction)			
7. TNC Response:			
8. TNC Reviewer:		Date of Review:	
Part 3: Design Response			
9. Design Responder: Guillermo Sanchez		Company: PTG/HNTB	Ph#: 425.450.2543
10. Design Response or Comments:			
As coordinated with Joe Jacoby on 3/09/05.			
Per the design the cut slope should have been a 2:1 slope at the location where the pole is to be installed. It is acceptable to install the luminaire pole 2 ft closer to the edge stripe. It is acceptable to increase the luminaire pole foundation depth to 6½'.			
DCN GIL-005-03-01 will be issued concurrently with this response to revise the pole location and depth of foundation.			
11. Design Reviewer Approval:		Ray Wright	Date: 3/09/05
12. Design Supervisor Approval:		Ben Whisler 	Date: 3/14/05

"RFIs are not authorized change documents and cannot be used to direct a change in (sub) contract requirements. If the response has a cost or schedule impact, it is the (sub)contractor's responsibility to immediately advise TNC's Authorized Representative and follow up the notice in a "pre determined" number of days with a (sub)contractor change proposal. Work undertaken without this approval is at the (sub) contractor's risk and expense."

CONSTRUCTION NOTES:

Example 11

- 3 CONSTRUCT FOUNDATION AND INSTALL LUMINAIRE STANDARD PER LUMINAIRE SCHEDULE.
- 26 INSTALL CONDUIT INTO EXISTING JUNCTION BOX. SPLICE NEW CIRCUIT WIRES TO EXISTING CIRCUIT "A" ILLUMINATION CONDUCTORS.
- 47 EXTEND FOUNDATION DEPTH 4FT. VERIFY ADDITIONAL DEPTH WITH THE ENGINEER.



LUMINAIRE SCHEDULE SERVICE NO. SAD 911

LUMINAIRE NUMBER	CIRCUIT	LOCATION		LUMINAIRE ELEVATION	TYPE-DISTRIBUTION-WATTAGE	MAST ARM	HI	BASE TYPE	COMMENTS
		STATION	OFFSET						
25	A	DR3' 1+637.60	12.17 RT	N/A	TYPE III-MEDIUM CUTOFF-400W HPS	4.9M	15.24M	FIXED	IN GRADE
26	A	DR3' 1+699.07	12.66 RT	N/A	TYPE III-MEDIUM CUTOFF-400W HPS	4.9M	15.24M	FIXED	IN GRADE

What's new in illumination design (or not so new) - continued

- Cross-sections
- At every location you are installing a luminaire you need to check the roadway sections for the slope in that area. You need this information to input the mounting height of the luminaire in AGI and to know how big to make the foundation.

What's new in illumination design (or not so new) - continued

- Reviewing luminaire locations
 - After initial luminaire locations are identified the designer needs to check to make the location will work with other design features. The designer should review the approved channelization plan, existing and proposed utility plans, existing and proposed drainage plans, existing and proposed ITS plans, existing and proposed signing plans, last minute changes / addendums and all those other items that caught you in the past. (let us know what they are and we will add them here)

Reference Materials

- Roadway Lighting Design Guide – AASHTO Oct. 2005
- ANSI/IES RP-8-14 (2014), Roadway Lighting
(Illuminating Engineering Society)
- ANSI/IES RP-22-11 (2011), Tunnel Lighting
(Illuminating Engineering Society)
- FHWA-SA-11-22 FHWA Lighting Handbook,
August, 2012
- International Commission on Illumination (ISO/CIE)
- WSDOT Design Manual (DM) Chapter 1040

Contacts

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