
*Project Study Report (Project
Development Support)*

Drainage Report for US-50 Camino Corridor Safety Project

In El Dorado County Camino, California from PM 20.00 to 26.00

**EL Dorado-50-PM 20.00 to 26.00
EA 03-4E620K**

Prepared for
El Dorado County Transportation Commission

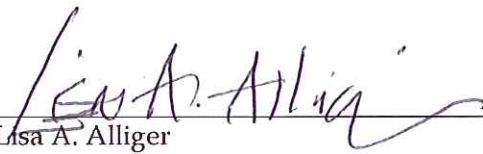
October 2009

CH2MHILL
2525 Airpark Drive
Redding, CA 96001

Engineer's Statement

This Project Study (Project Development Support) Drainage Report for US-50 in El Dorado County, California, has been prepared by the following registered Civil Engineer. The registered Civil Engineer has reviewed the technical information contained herein and has judged the engineering data upon which recommendations, conclusions, and decisions are based.





Lisa A. Alliger

Registered Civil Engineer

10/26/09

Date

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Acronyms and Abbreviations

Caltrans	California Department of Transportation
cfs	cubic feet per second
RCP	Reinforced Concrete Pipe
HDM	Highway Design Manual
in/hr	inches per hour
PM	Post Mile
EID	El Dorado Irrigation District
BMPs	Best Management Practices

Drainage Report for US-50 Camino Corridor Safety Project

Summary

This project is located along US-50 near Camino, California. There are two alternatives being developed for the Project Study Report-Project Development Support (PSR-PDS).

These alternatives consist of widening US-50 between Still Meadows Road and Upper Carson Road with a frontage road undercrossing from Pondorado Drive to Carson Road via a US-50 undercrossing near Lower Carson Road. The existing US-50 has two 12-foot lanes in each direction with a striped median and left turn lane. The proposed design consists of a new median barrier, two 12-foot lanes in each direction, 5-foot inside shoulders, 8 to 12-foot outside shoulders, 3-foot outside unpaved shoulder backing and 2Horizontal:1Vertical or flatter cut and fill slopes. Retaining walls in cut are proposed along both the westbound side of US-50 and retaining walls in fill are proposed along the eastbound side of US-50. Acceleration and deceleration lanes are proposed in both directions at the all intersecting roads.

Pondorado Drive will be widened and realigned and an undercrossing structure will be constructed to connect Pondorado Drive on the south side of US-50 to Carson Road on the north. Pondorado Drive and Carson Road will consist of two 12-foot lanes, 8-foot outside shoulders, curb and gutter, 6-foot wide sidewalk, 1-foot backing behind the sidewalk and 2Horizontal:1Vertical or flatter cut and fill slopes.

Alternative C1 will tie back into the existing US-50 approximately 400-feet to the west of the Upper Carson Road Connection. Alternative C2 will tie into existing US-50 approximately 1400-feet to the east of the Upper Carson Road Connection.

The existing alignment of US-50 is typically crowned with some sections of super elevation as the road curves. The existing storm drain system consists of drop inlets and cross culverts from one side of the highway to the other. Along the eastbound side of US-50 there are over side drains that drain through the AC dike to protect the embankment slope. Just east of the Camino Heights Drive intersection there is median barrier rail and a parallel storm drain system. There is an 18-inch storm drain that flows to the west and outfalls near Camino Heights Drive, to the south. A similar system begins near station 186+00 and flows to the east and ultimately outfalls southeast of Carson Road. There are numerous cross culverts along the project limits. Refer to Appendix A for a complete culvert inventory list within the project limits.

The EID (El Dorado Irrigation District) Main Ditch generally parallels US-50 between Pollock Pines and Placerville. The ditch crosses US-50 to the south in Camino near Pondorado Road. It then parallels Pondorado Road and splits at Golden Chain Drive to the west and north. The main ditch runs to the north across US-50 to Blakeley Reservoir. The other portion of the ditch runs to the northwest across Golden Chain Drive and Sierra Blanca Drive and then US-50 after which it generally follows toward Carson Road to the west. There is a 42-inch reinforced concrete pipe (RCP) culvert, a 48-inch RCP culvert and a 60-inch RCP culvert that cross US-50. The main use of this portion of the ditch is to convey storm water and to be used as a temporary by-pass in an event that the Pollock Pines Water Treatment Plant needs to be by-passed. In this event there is a potential for 40-cfs of flow that may or may not reach the ditch within the project limits. The runoff or by-pass water flows in the Lower Ditch to either Blakeley Reservoir or further downstream to Hangtown Creek.

There are two drop inlets on the south side of Pondorado Road that connect to 12-inch CSP that outlet into the EID Ditch. There are currently no improvements at the location of the proposed Camino Heights Drive off ramp. There is an 18-inch cross culvert at the Camino Heights Drive intersection with US-50 and runoff surface flows along US-50 to the west. Camino Heights Drive and Pondorado Road and the surrounding areas currently drain to the EID ditch by way of inlets and small culverts. Carson Road, north of US-50, also drains to the north through cross culverts with a few inlets on the road surface. The runoff ultimately flows to Blakeley Reservoir.

According to Caltrans District 3 Hydraulics staff there is no history of flooding within the project area. Refer to Appendix A for culvert inspection data and condition. Culvert conditions will need to be re-evaluated at the next phase of this project to determine how many of the existing culverts require rehabilitation. Visual inspection during the summer of 2009 indicated that the larger culverts (36-inch and greater diameter) are in good condition and will not need to be replaced.

At this time there are no negotiated agreements or understandings with the Central Valley Water Quality Control Board for this project.

Proposed drainage anticipated at this time is as follows:

US-50 - The proposed widening and concrete median barrier construction on US-50 will require additional storm drain facilities within the highway median, similar to the system near the existing concrete median barrier. Drop inlets will need to be located at the median face where the highway is super elevated to intercept surface flow. A 24-inch storm drain will need to be constructed under the concrete barrier to convey the captured flow. This proposed parallel pipe will tie in with the existing cross culverts to outfall the runoff.

EID Ditch - The proposed Pondorado Road undercrossing will impact the existing EID Ditch alignment. The undercrossing is located near the existing easterly 60-inch cross culvert. To maintain the general alignment of the main ditch, this culvert will be reconstructed perpendicular to US-50 just east of the undercrossing and structure. An additional culvert will be constructed through Pondorado Road, prior to the undercrossing, to tie to the existing open ditch. The south to north cross culvert will remain the same while the northwest culvert will need to be extended as necessary to cross Golden Chain Drive.

Local Roads – The reconstruction of Golden Chain Drive will require drop inlets at the low point, approximately 130-feet from the US-50 intersection. An 18-inch storm drain will convey the surface runoff to an outfall to the west, near the EID Ditch. The proposed extension of Vista Tierra Drive will drain to the west and may require additional improvements on the existing portion of Vista Tierra, such as curb and gutter, to direct the runoff to the existing storm drain system at Camino Heights Drive. Pondorado Road, to the east, will drain to the low point at the undercrossing of US-50. Inlets and a 24-inch storm drain will be constructed and run to the north to a manhole near Pondorado Road and Carson Road intersection. From here the collected runoff will flow west to additional inlets on Carson Road and then outfall to the north towards Blakeley Reservoir. Rock slope protection will be considered at the outlet of this system to minimize erosion. The Carson Road runoff beyond Pondorado will run to the east to inlets near the limits of the improved section and then outfall also to the north. All improvements to the local roads include construction of curb and gutter to contain and direct the additional runoff generated. Approximately 5 acres of impervious surface will be constructed. The additional impervious surfaces will flow from Golden Chain Drive to the EID Ditch, on Vista Tierra to the west, along Pondorado undercrossing to the west, and west on Carson Road.

This following is a summary of some possible drainage design elements. More analysis will need to be done at the next design phase. The purpose of this report is to identify cost intensive drainage features.

- Extend exiting culverts crossing US-50.
- Construct new drainage inlets along the eastbound side of the road to capture on-site runoff along the proposed retaining wall. Construct new culverts and energy dissipaters at the outfalls. Construct AC dikes along the portion of the eastbound side of US-50 that is in fill without a retaining wall and reconstruct existing over-side down drains.
- Construct new on-site median drainage along the median barrier consisting of drop inlets, collector pipe and culvert outlets along the portion of US-50 that currently does not have a median barrier.
- Construct curb and gutter and a new on-site drainage system along the new Carson Road and Pondorado Road consisting of drop inlets, manhole and collector pipes that will outlet on the north side of Carson Road.
- Relocate the existing east 60-inch RCP culvert that crosses US-50 and is part of the EID Main Lower ditch to the east. Construct a short portion of open channel between the south side of US-50 and the new Pondorado Road. Construct a new 60-inch culvert that crosses under Pondorado Road and ties into the existing irrigation ditch on the north side of Pondorado Road.
- Extend the existing culverts that cross all side streets.

Offsite

Hydrology

The Rational Formula will be used to calculate the design flows. This method is appropriate because the watersheds are relatively small, less than the maximum 320 acres that California Department of Transportation (Caltrans) allows when using the Rational Formula (Highway Design Manual [HDM] 819.2).

The runoff coefficient used in the Rational Formula will be determined using HDM Figure 819.2A, Runoff Coefficients for Undeveloped Areas, for offsite drainage basins.

Caltrans District 3 Hydraulics provided intensity-duration-frequency curves that will be used for the hydrologic analysis in later stages of the project. The rainfall intensities are 0.87 inch/hour (10 year 1 hour storm) and 1.23 inches/hour (100 year 1 hour storm). Refer to Appendix B for intensity-duration-frequency curve data.

The existing impervious surface area is 17.6 acres of pavement surfacing on US-50 and approximately 2.1 acres in the Golden Chain and Pondorado Road area. The proposed design will increase the impervious surface area to 25.9 acres (6.2 acre increase) with the additional pavement to widen US-50 as well as the widening and realignment of Camino Heights Drive, Pondorado Road and Carson Road.

Hydraulics

Caltrans design criteria (HDM 821.3(2)) requires that the 10-year storm be passed through the culvert without causing headwater elevations to rise above the top of the culvert. In addition, the culvert should have capacity to pass the 100-year storm without overtopping the roadway or causing objectionable headwater elevations.

Coordination with the EID is required for the design of the 42-inch to 60-inch culverts crossing US-50 and Pondorado Road to ensure that the culverts have sufficient capacity for storm drain runoff, but also possible 40-cfs flow in the event that the Pollock Pines Treatment Plant needs to be bypassed.

There is no sufficient soil data at this time to develop alternative pipe culvert materials recommendations. Plastic pipes and lining may not be appropriate due to fire hazards in the project area. Bituminous lining of inverts is no longer done due to water quality concerns. Soil testing will be required in the next phase of design in order to determine new culvert material and rehabilitation methods for existing culverts.

It is assumed at this time that all new culvert construction will be constructed by cut and cover across the roadway under phased traffic control.

Energy dissipation will be required and at this time it is anticipated that riprap energy dissipaters will be constructed at all culvert outlets.

Onsite

Roadway Drainage

The inlet structures will be analyzed using a 35-year recurrence interval design storm for new inlets along US-50. In accordance with Caltrans design criteria (HDM 837.4), the grate capacity was calculated assuming a 33 percent clogging factor. Spread and depth calculation will be performed at a later phase in the design and will be based on a 35-year recurrence interval design storm and will limit spread to only the shoulder. Inlets along Carson Road, Pondorado Road and Camino Heights Drive will be analyzed using a 10-year recurrence interval design storm in accordance with El Dorado County Drainage Manual.

Open Channels

A portion of the EID Main Ditch will need to be realigned. Design of the realigned channel will need to be coordinated with EID at the next phase of design.

Storm Water Quality

Both temporary and permanent Pollution Control BMPs (Best Management Practices) are considered for this project. These measures include but are not limited to hydro-seeding, fiber rolls, silt fences, stabilized construction entrances, inlet protectors, gravel berms, energy dissipaters at culvert outlets and concrete washouts.

This project requires consideration for treatment BMPs for general purpose pollutant removal BMPs. The project is within an area where traction sand is regularly applied, therefore traction sand traps have been considered for this project.

Refer to the SWDR (Storm Water Data Report) for more details on BMP considerations.

Floodplain Information

The project is within an unmapped FIRM area and it is unknown at this phase of the project whether there will be impacts or increases in floodwater elevations expected to result from this project. Refer to Appendix C for Firm Map Index.

Culvert Inventory PM 20.0 to 26.00 03-4E620K

CO	RTE	PM	Inspection Date	Inspectd by	Size	Culvert, Storm Drain, Downdrain	Remarks
ED	50	20.06	7/28/1999	HD/JS	24	CMP	HEADWALL INLET ON WB SHOULDER AS WELL AS TWO DI INLETS ON OR NEAR FREEWAY; OUTLET HIDDEN IN BERRY BUSHES
ED	50	20.2	7/29/1999	HD/JS	24	CMP	FOUR SURFACE DI'S, TWO ON EITHER SIDE OF WB ONRAMP, ONE IN CENTER AND ONE ON EB SIDE ROAD
ED	50	20.3	7/29/1999	HD/JS	18	CMP	8 DI'S IN A HUGE NETWORK; SOME OF THE CULVERTS ARE 18" & 24". SOME 24" CMP WITH SEVERE RUST PROBLEMS WHERE WATER SITS (LIFT UP DI'S)
ED	50	20.45	7/29/1999	HD/JS	18	CMP	MEDIAN RIGHT. DI IN MEDIAN, DI BY FENCE (ACADE WAY) AND BARREL NEAR PLACERVILLE CHIROPRACTIC.
ED	50	20.71	7/29/1999	HD/JS	24	CMP	HEADWALL INLET ON EB WITH THREE DI'S ACROSS ROAD TO BARREL OUTLET PAST SIDE STREET
ED	50	20.78	7/29/1999	HD/JS	18	CMP	3 SURFACE DI'S WITH BARREL OUTLET ON EB SIDE; BAD SHAPE OVERALL, NEEDS HELP
ED	50	20.95	7/29/1999	HD/JS	18	CMP	HEADWALL INLET OFF EB SIDE STREET WITH 3 DI'S ACROSS ROAD, BARREL OUTLET ON WB SIDE; 8 INCH DROP DOWN ON EB SIDE STREET THAT DROPS INTO 18 CUVERT; PIPE FROM EB SHOULDER TO WB OUTLET IS 24 INCH CULVERT
ED	50	20.99	7/29/1999	HD/JS			3" SLOTTED DRAIN NETWORK RUNS DOWN CENTER OF FREEWAY
ED	50	21.05	7/30/1999	HD/JS	18	CMP	HEADWALL INLET LOCATED EB (POLLOCK PINES, 8 MILES SIGN). WB BARREL OUTLET (BEGIN FREEWAY SIGN) HEAVY EROSION AT OUTLET (PM 21.03)
ED	50	21.21	7/30/1999	HD/JS	12	CMP	12" BARREL INLET OFF WB SIDE STREET SKEWS INTO DI ON WB SHOULDER THEN CROSSES STRAIGHT ACROSS FREEWAY TO EB SHOULDER DI AND ULTIMATELY OUTLETS OFF EB SHOULDER; OUTLET IS CLOGGED AND DAMAGED, WILL NOT CONVEY MUCH WATER; PIPE FROM WB SHOULDER DI TO OUTLET IS 18 INCHES; SHOULD
ED	50	21.3	7/30/1999	HD/JS	18	CMP	TWO INLETS; I) 18" BARREL INLET II) 12" FES WITH 30 DOWN PM SKEW THAT IS AN L-SHAPED CULVERT; THIS IS ALL ON SIDE ROAD WHERE OLD RR USED TO EXIST; PLANS SAY THE CULVERT SHOULD CROSS 50, BUT WE COULD NOT FIND THAT
ED	50	21.36	7/30/1999	HD/JS	24	CMP	CULVERT SHOULD HAVE ADDITIONAL INLET OFF WB SIDE STREET BUT UNABLE TO LOCATE; OFF EB SHOULDER, BARREL OUTLET FLOWS TO ANOTHER BARREL INLET OF CULVERT THAT PASSES UNDER OLD RR TRACKS; THIS PIPE IS SMOOTH AND MAY SKEW OR HAVE GRADE BREAKS
ED	50	21.42	7/30/1999	HD/JS	24	CMP	FES INLET (WB BEFORE SMITH FLAT SIGN), OUTLET SHOULD PAST PARKWAY RD BUT UNABLE TO LOCATE, MAY BE BURIED; ADDITIONAL 12" CMP STARTS WHERE UNLOCATED CULVERT SHOULD OUTLET, IT CROSSES THE ABANDONED RR TRACKS
ED	50	21.46	7/30/1999	HD/JS	24	CMP	L-SHAPED HEADWALL INLET ON WB SHOULDER CROSSES 50 WITH NO SKEW, OUTLETS OFF EB SIDE; WATER THEN FLOWS SOUTHEAST TO BARREL INLET OF 24 INCH CULVERT THAT CROSSES ABANDONED RR TRACKS; BARREL OUTLET SOUTH OF RR TRACKS
ED	50	21.52	7/30/1999	HD/JS	24	CMP	L-SHAPED INLET HEADWALL ON WB (100' B4 RD X-ING SIGN, PM 21.46).
ED	50	21.6	8/2/1999	HD/JS	18	CMP	FES INLET (500' B4 SMITH FLAT SIGN) ON WB SHOULDER NEEDS TO BE REPLACED, HEAVILY RUSTED; REST OF CULVERT IN DECENT SHAPE. BARREL OUTLET LOCATED B4 HOUSE.
ED	50	21.67	8/2/1999	HD/JS	18	CMP	FES INLET ON WB SHOULDER HAS SEVERE RUST AND BARREL OUTLET OFF EB SHOULDER IS MODERATE RUST.
ED	50	21.69	8/2/1999	HD/JS	8	CMP	WE BELIEVE CULVERT TIES WITH SLOTTED DRAINS NETWORK IN CENTER OF FREEWAY; MEDIAN RIGHT; 3 INCH METAL PIPE STARTS SOMEWHERE INSIDE 8 INCH CULVERT AND COMES OUT AT OUTLET
ED	50	21.76	8/3/1999	HD/JS	18	CMP	L-SHAPED HEADWALL ON WB (100' B4 DRIVEWAY) SHOULDER CROSSES 50 TO DISTRIBUTION BOX OFF OF R/W; DISTRIBUTION BOX HAS HEAVY DEBRIS AND IS RUSTED, GRATING IS RUSTED AND HEAVILY DAMAGED; BOX SENDS WATER SOUTH AND WEST.
ED	50	21.82	8/2/1999	HD/JS	24	CMP	L-SHAPED HEADWALL INLET ON WB SHOULDER WITH 2 PARALLEL 8" CULVERT RUNNING ALONG FREEWAY THAT OUTLET INTO THE HEADWALL.
ED	50	21.88	8/3/1999	HD/JS	8	CMP	NO SURFACE INLET, MAY TIE WITH PARALLEL 8" PIPES RUNNING ALONG 50 TO HEADWALL AT PM 21.82
ED	50	21.93	8/3/1999	HD/JS	30	CMP	WB HEADWALL INLET (30' B4 "NO TRESPASSING"). OUTLET FAR DOWN THE HILL OFF THE EB SIDE(IN FRONT "ONE WAY"), RUNS PARALLEL TO A 12" CULVERT DROP DOWN FROM THE EB SHOULDER
ED	50	22.18	8/2/1999	HD/JS	24	CMP	FES INLET OFF WB SIDE STREET COUNTY ROAD 1022; FALLS TO 36 CMP DI WITH SEVERE RUST OFF WB SHOULDER; CROSSES 50 AND PICKS UP 8 INCH DROP DOWN; AT OUTLET, PIPE HAS DISSIPATOR THAT IS VERY FULL; OUTLET SHOULD HAVE T-SHAPED DISSIPATOR BUT COULD ONLY FIND ONE SIDE

Culvert Inventory PM 20.0 to 26.00 03-4E620K

ED	50	22.28	8/2/1999	HD/JS	24	CMP	HEAVY DEBRIS AND BEDLOAD AT INLET ON WB SHOULDER (50' AFTER YELLOW "CROSS TRAFFIC AHEAD") BUT CAN STILL TAKE WATER; BARREL OUTLET HAS SEPARATED JOINTS AND NEEDS WORK (VERY HIDDEN IN BERRY BUSHES).
ED	50	22.37	8/2/1999	HD/JS	18	CMP	FES INLET WB (APPLE HILL) IS BENT AND THERE IS HEAVY EROSION LEADING TO INLET
ED	50	22.52	8/2/1999	HD/JS	24	CMP	FES INLET ON WB SHOULDER IS HEAVILY RUSTED
ED	50	22.62	8/3/1999	HD/JS	18	CMP	WB INLET IS DIRTY AND HAS MODERATE RUST BUT STILL TAKES WATER
ED	50	22.74	11/8/1999	JP/SR	18	CMP	110 feet of culvert is over 50 years old. Recommend replacement of entire pipe.
ED	50	22.75	11/8/1999	JP/SR	18	CMP	110' of 134' of culvert is over 50 years old. Replace entire culvert.
ED	50	22.83	11/8/1999	JP/SR			5 Mile Road (Left) and Paul Bunyan Road (Right)
ED	50	22.84	11/8/1999	JP/SR	12	CMP	Culvert under Paul Bunyan Road (Right) is one-third full of dirt.
ED	50	22.85	11/8/1999	JP/SR	24	CMP	Culvert under 5 Mile Road is perforated. Replace entire culvert.
ED	50	22.93	11/8/1999	JP/SR	18	CMP	Inlet in median (R) is full of rocks and needs cleaning. Pipe one-third full of dirt.
ED	50	23.01	11/8/1999	JP/SR	24	CMP	24" CMP is part of system that is connected to cross culvert at PM 23.12
ED	50	23.12	11/8/1999	JP/SR	24	CMP	24" CMP is part of system that is connected to cross culvert at PM 23.01
ED	50	23.24	11/8/1999	JP/SR	18	CMP	Culvert under Camino Heights Drive is in moderate condition
ED	50	23.25	11/8/1999	JP/SR			Camino Heights Drive (right)
ED	50	23.28	11/8/1999	JP/SR	42	RCP	42" RCP El Dorado Irrigation District. Info from 1956 plans.
ED	50	23.4	11/8/1999	JP/SR			Carson Road (left) and Sierra Blanca Road (right)
ED	50	23.42	11/8/1999	JP/SR	48	RCP	48" RCP belongs to El Dorado Irrigation District. Information from 1956 plans.
ED	50	23.44	11/8/1999	JP/SR	24	CMP	Paddle Marker = 23.48 but using 1956 plans PM = 23.44
ED	50	23.51	11/8/1999	JP/SR	60	RCP	60" RCP El Dorado Irrigation District. Info from 1956 plans. needs cleaned.
ED	50	23.55	11/8/1999	JP/SR	18	CMP	Median DI drains right. Recommend retrofitting Median DI to be flush with grade.
ED	50	23.74	11/8/1999	JP/SR	18	CMP	Median DI drains left. Recommend retrofitting Median DI to be flush with grade.
ED	50	23.76	11/8/1999	JP/SR	24	CMP	Paddle Marker = 23.81 but using 1956 plans PM = 23.76
ED	50	23.8	11/8/1999	JP/SR			Private road (right). Post mile = 23.80 calculated from 1956 plans.
ED	50	24.03	11/8/1999	JP/SR	18	CMP	Median DI drains right. 18" CMP top of pipe at outlet is badly dented.
ED	50	24.05	11/8/1999	JP/SR			Carson Road (left)
ED	50	24.08	11/8/1999	JP/SR	24	CMP	24" CMP cross culvert.
ED	50	24.11	11/8/1999	JP/SR	18	CMP	Median DI drains right. Median has Type 50 Concrete Barrier.
ED	50	24.23	11/8/1999	JP/SR	24	CMP	No inspection made because metal lids were bolted to top of DI's.
ED	50	24.25	11/8/1999	JP/SR			Private road (right). Post mile = 24.25 calculated from 1956 plans.
ED	50	24.33	11/8/1999	JP/SR	24	CMP	24" CMP cross culvert.
ED	50	24.36	11/8/1999	JP/SR	24	CMP	24" CMP cross culvert
ED	50	24.39	11/8/1999	JP/SR	24	CMP	24" CMP cross culvert
ED	50	24.59	11/8/1999	JP/SR	30	CMP	30" CMP cross culvert
ED	50	24.81	11/8/1999	JP/SR	24	CMP	No inspection due to density of berry vines. Information taken from 1956 plans.
ED	50	24.88	11/8/1999	JP/SR	42	CMP	Invert completely disintegrated. Culvert needs immediate replacement.
ED	50	25.25	11/8/1999	JP/SR	36	CMP	36" CMP inlet at DI right of centerline and outlet left of centerline.
ED	50	25.26	11/8/1999	JP/SR			SNOW ROAD UNDERCROSSING - Br. No. 25-56
ED	50	25.27	11/8/1999	JP/SR	30	CMP	30" CMP perforated with miner's pick. Culvert parallel to mainline across Snow Rd
ED	50	25.38	11/8/1999	JP/SR			Private Road (right). Post Mile calculated from 1956 plans.
ED	50	25.39	11/8/1999	JP/SR	18	CMP	18" CMP under the private drive is parallel to mainline.
ED	50	25.45	11/8/1999	JP/SR	24	RCP	Median DI (left) with slotted drain outlet and concrete barrier
ED	50	25.56	11/8/1999	JP/SR			Private road (right). Post Mile calculated from 1956 plans.
ED	50	25.58	11/8/1999	JP/SR	24	CMP	18" slotted drain parallel to concrete barrier, passes over cross culvert.
ED	50	25.69	11/8/1999	JP/SR	18	CMP	Median DI (left) with concrete barrier adjacent to DI.
ED	50	25.86	11/8/1999	JP/SR	18	CMP	Based on inspection of drainage system at PM 25.88, replace entire system.
ED	50	25.88	11/8/1999	JP/SR	18	CMP	Culvert has severe corrosion. Perforated pipe with minor's pick.
ED	50	25.95	11/8/1999	JP/SR	18	CMP	Interchange consists of network of 18"& 24" culverts. Replace entire system.
ED	50	25.96	11/8/1999	JP/SR			EAST CAMINO UNDERCROSSING - Br. No. 25-40
ED	50	25.97	11/8/1999	JP/SR	18	CMP	Interchange drainage system has severe corrosion. Replace entire system.

Rainfall intensity may be calculated from Caltrans IDF equation $I = A_j t^n$, where,

I Rainfall intensity (inches/hour)

A_j One-hour rainfall intensity (inches/hour) of return period j years

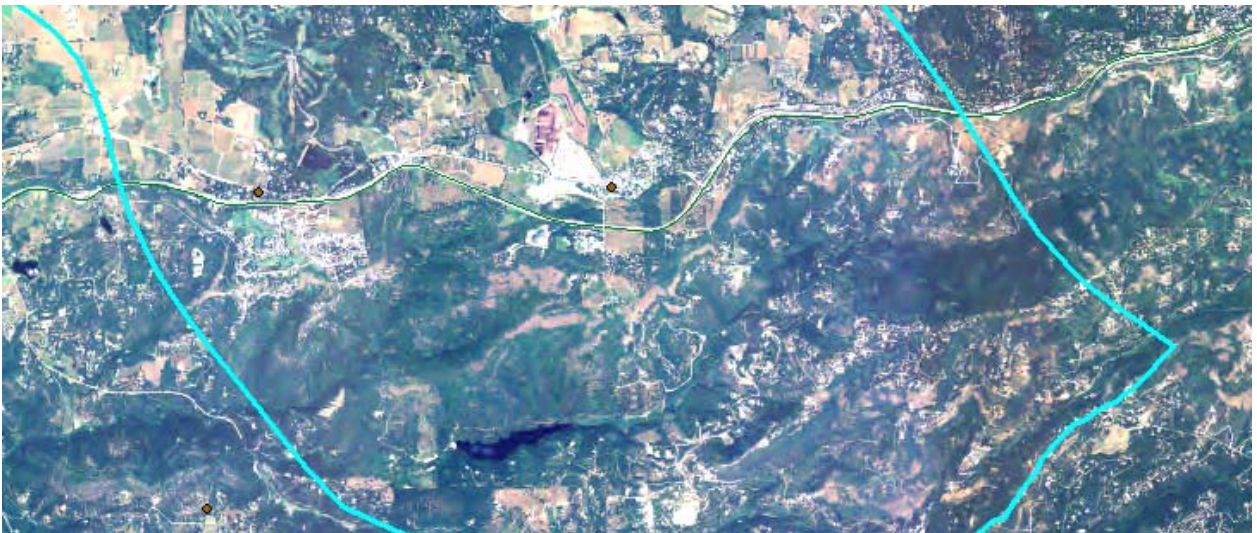
t time of concentration (hours)

n slope of the log-intensity/log-line plot.

PM 22.0 to 22.30, n = -0.450
A = 0.87 for 10-year event
A = 1.02 for 25-year event
A = 1.23 for 100-year event

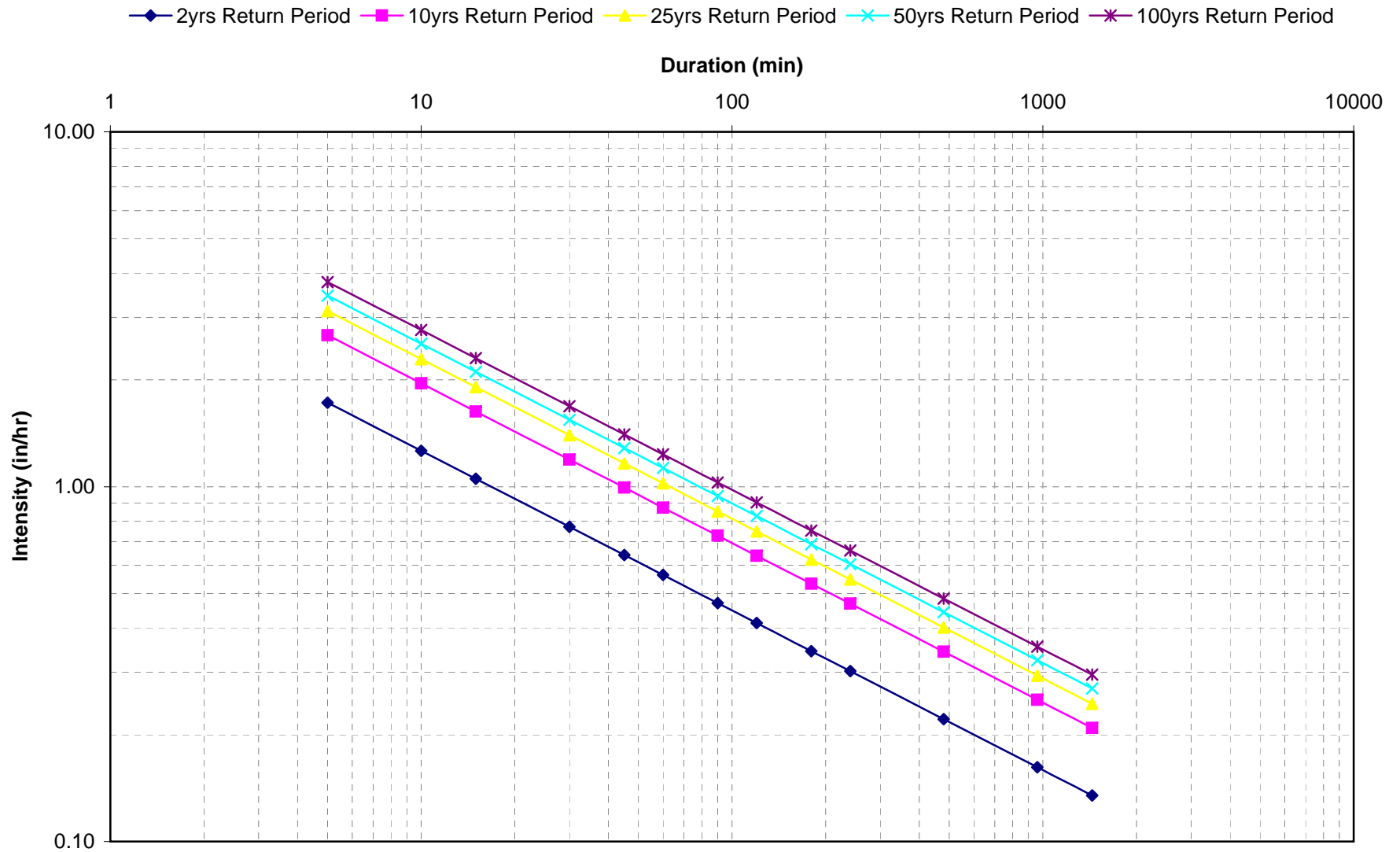


PM 22.3 to PM 24.0, n = -0.450
A = 0.96 for 10-year event
A = 1.12 for 25-year event
A = 1.36 for 100-year event



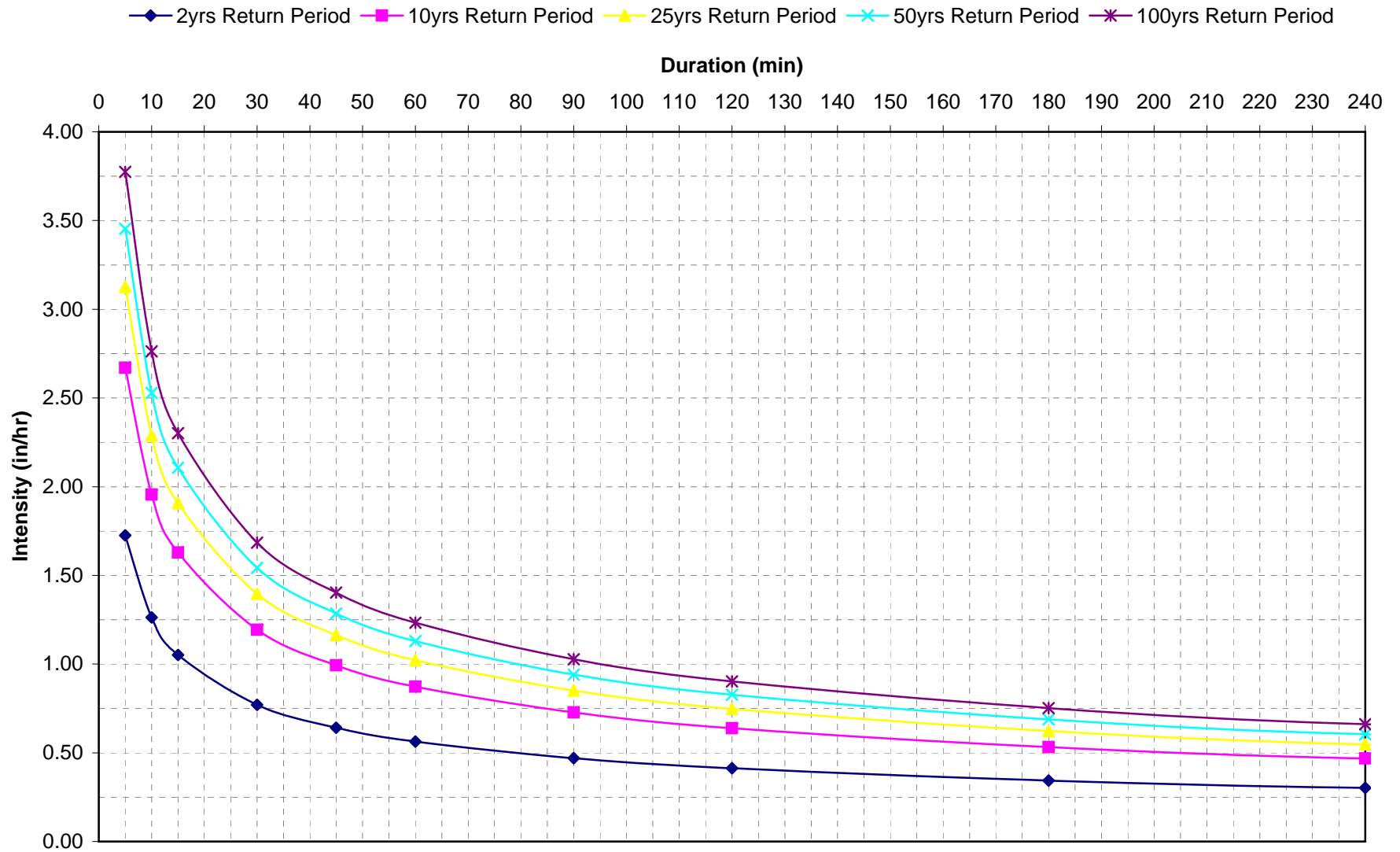
IDF-2000 ED-50 PM 22.0 to 22.3

Rainfall Intensity vs Duration



IDF-2000 ED-50 PM 22.0 to 22.30

Rainfall Intensity vs Duration



IDF-2000 ED-50 PM 22.0 to 22.3

Duration (n Intensity (ir Depth (in)

5	1.72	0.14
10	1.26	0.21
15	1.05	0.26
30	0.77	0.39
45	0.64	0.48
60	0.56	0.56
90	0.47	0.70
120	0.41	0.83
180	0.34	1.03
240	0.30	1.21
480	0.22	1.77
960	0.16	2.59
1440	0.13	3.24

Cs = 1.1
 MAP = 40
 P = 0.015
 Cv = 0.341
 n = -0.450

5	2.67	0.22
10	1.96	0.33
15	1.63	0.41
30	1.19	0.60
45	0.99	0.75
60	0.87	0.87
90	0.73	1.09
120	0.64	1.28
180	0.53	1.60
240	0.47	1.87
480	0.34	2.74
960	0.25	4.01
1440	0.21	5.01

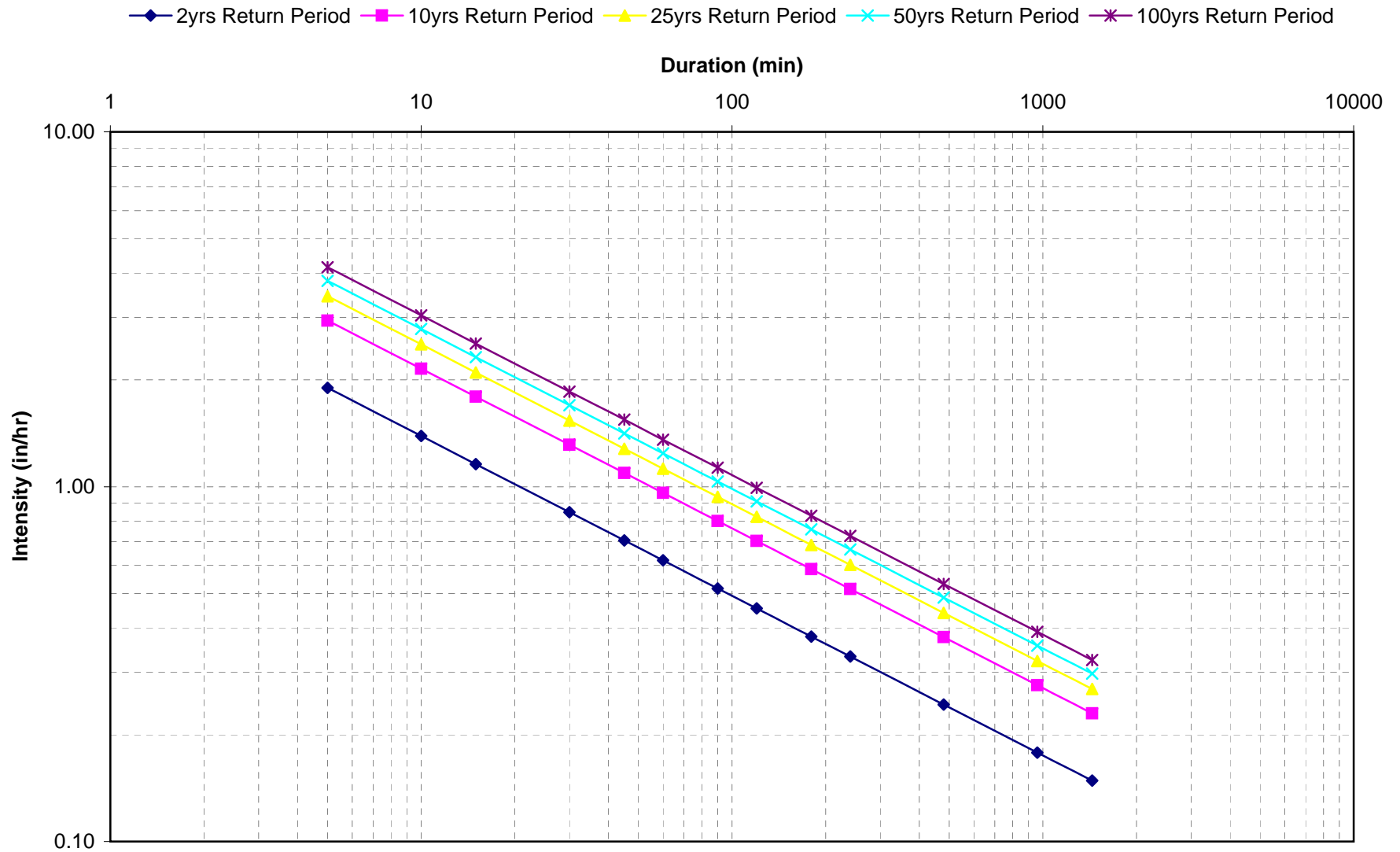
5	3.13	0.26
10	2.29	0.38
15	1.91	0.48
30	1.40	0.70
45	1.16	0.87
60	1.02	1.02
90	0.85	1.28
120	0.75	1.50
180	0.62	1.87
240	0.55	2.19
480	0.40	3.21
960	0.29	4.70
1440	0.24	5.87

5	3.45	0.29
10	2.53	0.42
15	2.11	0.53
30	1.54	0.77
45	1.29	0.96
60	1.13	1.13
90	0.94	1.41
120	0.83	1.65
180	0.69	2.07
240	0.61	2.42
480	0.44	3.54
960	0.32	5.19
1440	0.27	6.48

5	3.77	0.31
10	2.76	0.46
15	2.30	0.58
30	1.68	0.84
45	1.40	1.05
60	1.23	1.23
90	1.03	1.54
120	0.90	1.81
180	0.75	2.26
240	0.66	2.64
480	0.48	3.87
960	0.35	5.67
1440	0.30	7.08

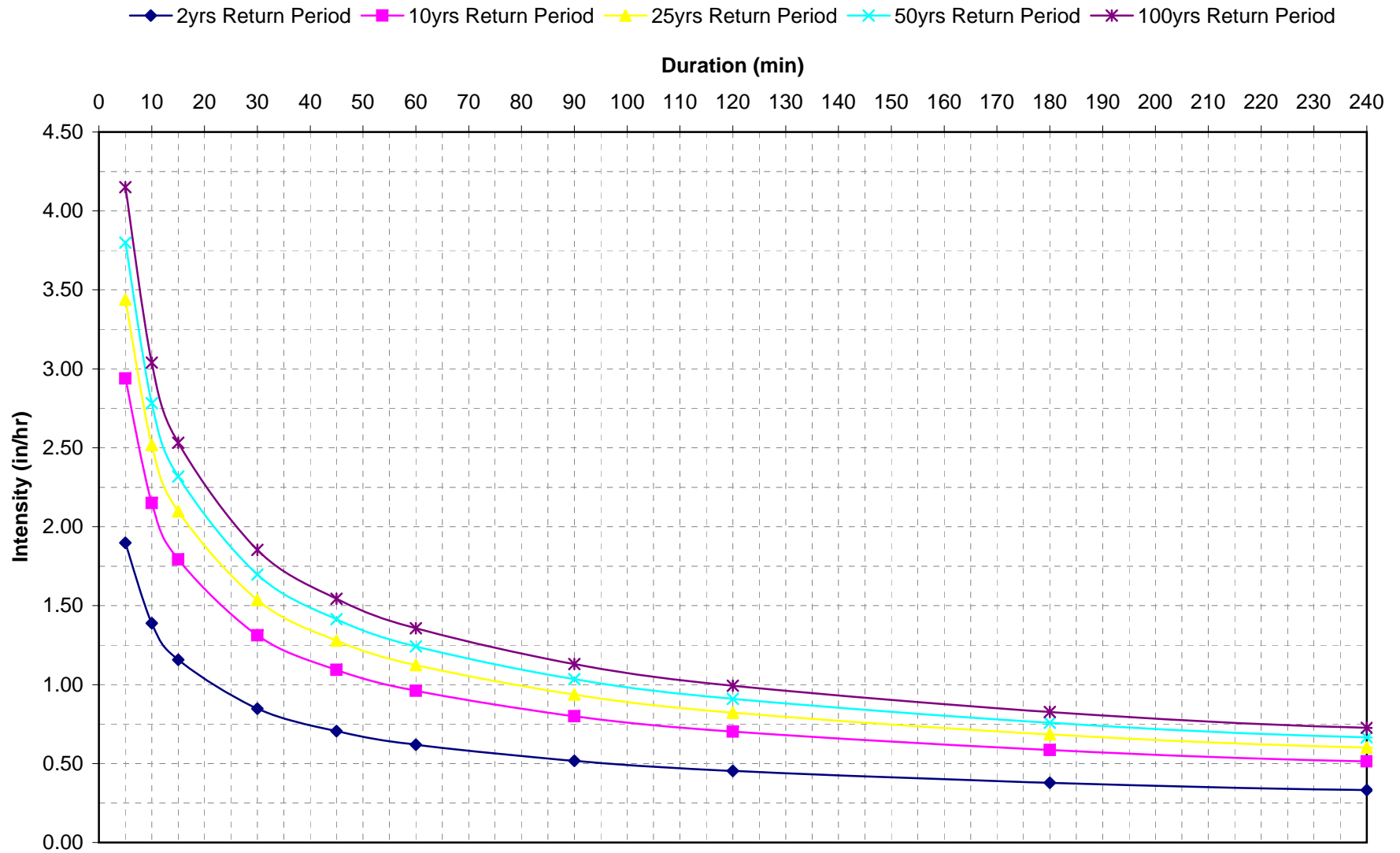
IDF-2000 ED-50 PM 22.3 to 24.0

Rainfall Intensity vs Duration



IDF-2000 ED-50 PM 22.3 to 24.0

Rainfall Intensity vs Duration



IDF-2000 ED-50 PM 22.3 to 24.0

Duration (hr) Intensity (in) Depth (in)

Duration (hr)	Intensity (in)	Depth (in)
5	1.90	0.16
10	1.39	0.23
15	1.16	0.29
30	0.85	0.42
45	0.71	0.53
60	0.62	0.62
90	0.52	0.78
120	0.45	0.91
180	0.38	1.13
240	0.33	1.33
480	0.24	1.95
960	0.18	2.85
1440	0.15	3.56

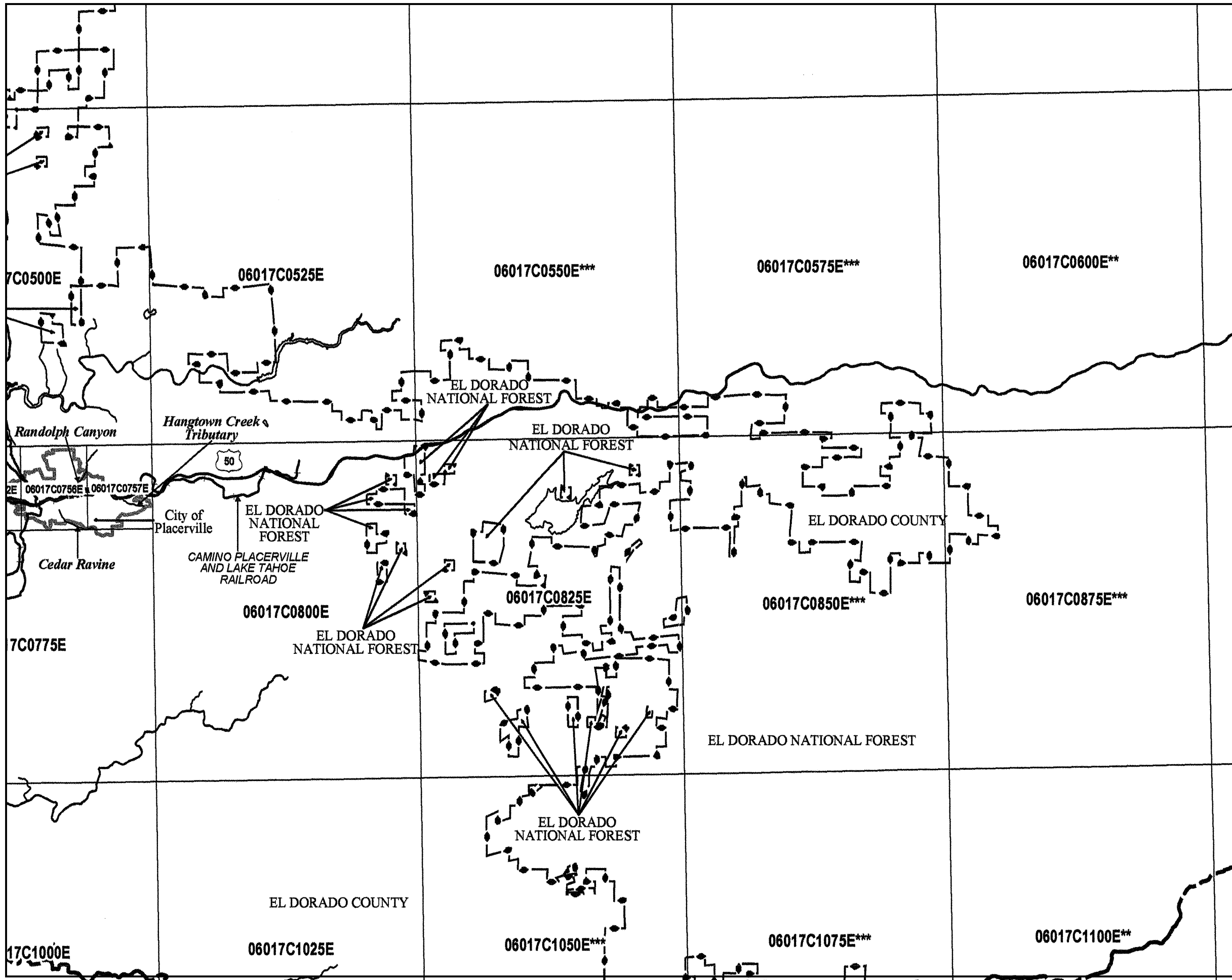
Cs = 1.1
 MAP = 44
 P = 0.015
 Cv = 0.341
 n = -0.450

Duration (hr)	Intensity (in)	Depth (in)
5	2.94	0.24
10	2.15	0.36
15	1.79	0.45
30	1.31	0.66
45	1.09	0.82
60	0.96	0.96
90	0.80	1.20
120	0.70	1.41
180	0.59	1.76
240	0.51	2.06
480	0.38	3.01
960	0.28	4.41
1440	0.23	5.52

Duration (hr)	Intensity (in)	Depth (in)
5	3.44	0.29
10	2.52	0.42
15	2.10	0.52
30	1.54	0.77
45	1.28	0.96
60	1.12	1.12
90	0.94	1.40
120	0.82	1.65
180	0.69	2.06
240	0.60	2.41
480	0.44	3.53
960	0.32	5.16
1440	0.27	6.45

Duration (hr)	Intensity (in)	Depth (in)
5	3.80	0.32
10	2.78	0.46
15	2.32	0.58
30	1.70	0.85
45	1.41	1.06
60	1.24	1.24
90	1.03	1.55
120	0.91	1.82
180	0.76	2.27
240	0.67	2.66
480	0.49	3.90
960	0.36	5.71
1440	0.30	7.13

Duration (hr)	Intensity (in)	Depth (in)
5	4.15	0.35
10	3.04	0.51
15	2.53	0.63
30	1.85	0.93
45	1.54	1.16
60	1.36	1.36
90	1.13	1.70
120	0.99	1.99
180	0.83	2.48
240	0.73	2.91
480	0.53	4.26
960	0.39	6.23
1440	0.32	7.79



*PANEL NOT PRINTED - NO SPECIAL FLOOD HAZAR
 **PANEL NOT PRINTED - AREA IN ZONE D
 ***PANEL NOT PRINTED - EL DORADO NATIONAL FC

NATIONAL FLOOD INSURANCE PROGRAM


MAP INDEX

FIRM
FLOOD INSURANCE RATE MAP

EL DORADO COUNTY, CALIFORNIA
 AND INCORPORATED AREAS
 (SEE LISTING OF COMMUNITIES TABLE)

MAP INDEX

PANELS PRINTED: 125, 150, 175, 200, 355, 360, 366, 367, 368, 369, 380, 386, 387, 388, 389, 450, 475, 500, 525, 632, 634, 642, 675, 704, 712, 725, 750, 752, 756, 757, 775, 800, 825, 950, 975, 1000, 1025

 **MAP NUMBER**
06017CIND0A

EFFECTIVE DATE
SEPTEMBER 26, 2008

Federal Emergency Management Agency

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