"Related Electrical Policies"
INDEX

SUBJECT	DATE	ITEM	PAGES
Related Electrical Policies Index Pages	10/27/03	1	1,2
Use of 150 – Watt HPS Luminaries	02/19/82	2	3
Use of Lower Wattage HPS Luminaries	04/21/82	3	4
Red and Yellow Arrow Signal Indications	10/15/82	4	5
Model 170 Traffic Controller Assemblies	08/29/83	5	6-8
Stop Signs at Signalized Intersections	11/05/84	6	9
Short – Circuit Current Interrupting Rating	06/11/86	7	10
Median Mounted Traffic Signal Standards	10/30/86	8	11
Median Mounted Signals	02/17/87	9	12,13
"Prepare to Stop" Signs at Signalized Intersections	07/29/87	10	14
Traffic Signal of removal Guidelines	08/05/87	11	15-17
Break / Slip Base Under Electroliers Located Along Freeways, Expressways and Conventional Highways	10/15/87	12	18-21
Crosswalks and Detector Installations	08/21/89	13	22
Crosswalks and detector Installations	03/27/90	14	23
Shakespeare Fiberglass Lighting Poles	01/09/91	15	24
Nonstandard Lighting Poles on Conventional State Highways Installed and Maintained by Others	01/25/91	16	25,26
Catwalks on Overhead Sign Structures	08/16/91	17	27
Curb Ramp	03/15/93	18	28
Clarification on Lighting of Sag Vertical Curves with Nonstandard Stopping Sight Distance	05/11/93	19	29,30
Lighting for Nonstandard Sag Vertical Curves	06/16/93	20	31-33
Maintenance Factor for Intersection Lighting	12/03/93	21	34,35
Projects Plans Reviews	02/16/95	22	36

SUBJECT	DATE	ITEM	PAGES
New Product Evaluation Process	07/14/95	23	37,38
Main Circuit Breakers in Service Equipment Enclosures	06/28/96	24	39
State- Finished Equipment Policy	03/19/97	25	40
Yellow Change Interval	04/13/98	26	41,42
New and Non – standard Devices Exception Process	02/02/00	27	43
Automated Red-Light Enforcement System	07/07/00	28	44,45
Deploying Battery Backup Systems at Traffic Signalized Intersections	08/02/00	29	46-49
Deploying Battery Back-up Systems at Traffic Signalized Intersection	03/21/01	30	50-52
Left Turn Extinguishable Message Sign	06/01/01	31	53-55
New and Non-standard Devices Exception Process	02/02/02	32	56
Purpose, Application and Approval Authority for Exceptions to Design Standards	03/26/02	33	57,58
Dual – Unit SSP and Standard Plan Updates	04/15/03	34	59
State Furnished Materials for LED Modules and BBS Systems	06/27/03	35	60,61
Vehicle Speed verification Sign	07/21/03	36	62-65
Expediting Safety Improvements	08/08/03	37	63,64

State of California

Business, Transportation and Housing Agency

Memorandum

All District Traffic Engineers

Date: February 19, 1982

Attn: Electrical Design Engineers

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Engineering

Subject: Use of 150-Watt HPS Luminaires

Attached is a copy of the results of a two-year study by District 06 on the use of 150-watt HPS luminaires at intersections. The study shows that when four luminaires are installed at an intersection, the minimum foot-candle requirements specified in the Traffic Manual can be met by using 150-watt units.

Since the 150-watt units use approximately 19 percent less energy and the utility company's rate is about 21 percent less than 200-watt units, it appears to be to our advantage to use the smaller units whenever possible. Additional savings may be realized by using 120-volt ballasts in lieu of 240-volt ballasts. For example, PG&E's LS-2 schedule (7-14-81) shows $4.272 per month for a 150-watt unit at 240 volts and only $3.645 per month at 120 volts. This 15 percent savings is well worth the small effort of providing 120-volts to the ballasts.

We anticipate that Section 9-13.6 of the Traffic Manual will be revised to include the use of 150-watt HPS luminaires.

Therefore, whenever more than two luminaires are to be installed at an intersection, the use of 150-watt units should be considered. Examples of when the 150-watt units are not required would be when there is an existing continuous lighting along the roadway uses units greater than 150-watt or when it would be impractical for maintenance to stock 150-watt lamps for only a few locations. Hal Garfield 485-5063 may be contacted if there are questions.

C[illegible] SWETT, JR., Chief
Division of Traffic Engineering

Attachment

HG:wr
cc:HGarfield
VWaight - 04 ProjDev B
FShoemaker - 04 ProjDev B
BCutter - 07 ProjDev D
Operations Files

of California

Business and Transportation Agency

Memorandum

: All District Traffic Engineers

Attention Electrical Design Engineers

Date: April 21, 1982

File :

From : **DEPARTMENT OF TRANSPORTATION**
Division of Traffic Engineering

Subject: Use of Lower Wattage HPS Luminaires

We have been asked if luminaires of lower wattages than those indicated in Section 9-13.6 of the Traffic Manual may be used. My memorandum of February 19, 1982 indicated that the use of 150-watt HPS luminaires should be considered for intersection lighting whenever two or more units are installed. This applies to either 30-foot or 40-foot mounting heights.

The luminaires shall be selected to meet the illumination requirements in Section 9-13.1. Thus, for mounting heights greater than 30 feet; 150-, 200-or 250-watt units may be used in lieu of the 310-watt unit indicated in Section 9-13.6.

In addition to intersection lighting, the luminaire delineating the entrance to an on-ramp may be 150-watt or larger to match the units at the intersection.

Where a local agency has continuous lighting along a roadway, the lighting at the intersection shall be equal to or greater than the lighting between intersections. If you have any questions on this, contact Hal Garfield on ATSS 485-5063.

C. P. SWEEDLER JR., Chief
Division of Traffic Engineering

cc: VWaight - 04 Proj. Dev. B
FShoemaker - 04 Proj. Dev. B
BCutter - 07 Proj. Dev. D
HSimpkins - Sacto. Des. Branch
HGarfield
CGiroux
IF/WAJH/WRJ
Operations Files

State of California

Business and Transportation Agency

Memorandum

To : All District Traffic Engineers

Attention Electrical Design Engineers

Date: October 15, 1982

File :

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Engineering

Subject: Red and Yellow Arrow Signal Indications

Effective January 1, 1982 the California Vehicle Code describes the meaning of red arrow and yellow arrow signal indications. Thus, California is in complete agreement with the MUTCD on the meaning of these indications.

The FHWA has recently published its final report on Report No. FHWA/RD-82/051, "Evaluation of the Left Turn Red Arrow". This report shows that the violation rate for red arrow indications is less than that for the circular red indications. The results of this 1982 study tend to contradict the results of FHWA's Report No. FHWA-RD-76-2, "Efficacy of Red and Yellow Turn Arrows in Traffic Signals", published in November 1975. A copy of the FHWA's 1982 report is attached.

At new signal installations (and where the left turn indications are being modified) the left turn indications shall consist of 12-inch red arrow, yellow arrow and green arrow indications. Conventional signal faces will prove satisfactory for most left turn lanes in lieu of programmed visibility units. The use of programmed visibility signal faces shall be restricted to those locations where exceptional visibility control is required, such as adjacent parallel roadways, acute-angle intersections, closely spaced intersections or other places where the signal indication could be a problem to the approaching driver.

If you have any questions regarding this new policy, contact Hal Garfield at ATSS 485-5063.

Original Signed C. P. Sweet, Jr.

C. P. SWEET, JR., Chief
Division of Traffic Engineering

Attachment

cc: HPGarfield
VWaight - 04
FShoemaker - 04
BCutter - 07
HSimpkins - Sacto Des
KMcDaniel - HQ Mtc
Operations Files

HPGarfield:cf

Memorandum

To All District Directors

Attention Traffic Operations Engineers
Maintenance Engineers

Date : August 29, 1983

File No.:

From : DEPARTMENT OF TRANSPORTATION
Director's Office

Subject: Model 170 Traffic Controller Assemblies

PURPOSE

To establish policy for the use of State-furnished Model 170 Traffic Signal Controller Assemblies on the State highway system (SHS).

To provide procedures for State-furnishing these controller assemblies.

BACKGROUND

In the mid-1970's, Caltrans, with New York, designed a traffic signal controller assembly--the Model 170--that provided complete interchangeability of controller units, cabinets, detector sensor units, isolation modules, switchpacks, conflict monitors, flashers and MODEMS.

Caltrans has had six years of favorable experience with the Model 170. Because of demonstrated significant improvement over conventional controller assemblies in cost, reliability, flexibility of operation and ease of maintenance, Caltrans has standardized on the Model 170.

Since 1977, Caltrans has been purchasing and warehousing the Model 170 in OBM warehouses. From this source, the traffic controller signal assemblies can be requisitioned by the Districts.

POLICY

Only Model 170 Traffic Signal Controller Assemblies will be installed on the SHS.

This policy applies to each new and existing traffic signal including those at the intersection of freeway ramps and local streets, whether they be maintained by the State or by a local agency.

All new traffic-actuated signals shall use Model 170 Traffic Signal Controller Assemblies. Consideration shall be given to using Model 170 for a pretimed signal where pre-emption or actuated phases are involved.

All electromechanical traffic-actuated controller assemblies shall be replaced with Model 170's. Solid-state (Type 90) traffic-actuated controller assemblies shall be replaced with Model 170's as they become obsolete or develop high maintenance costs. Electromechanical pretimed controller assemblies may also be replaced with Model 170's.

IMPLEMENTATION

State Project

On a State project, the cost of the controller assemblies will be identified in the project report and the preliminary report and will be included in the PS&E. Funding will be from the appropriate allotment.

If the State project is cooperatively financed by the State and a local agency, in accordance with the provisions of the Traffic Manual, the cost of the controller assembly will be included in the cost of the project.

Local Agency Project

The State will furnish a Model 170 Controller Assembly at no cost to the local agency if:

a) The project includes the replacement of an existing controller assembly in advance of the State's planned replacement. The approval document will be the encroachment permit.

b) The project includes the installation of new signal(s) or the modification of existing signal(s) and the project is financed solely by the local agency. The approval document will be the project report.

Private Party Project (Permit Project)

If, as a mitigating factor, the project requires a private party to install a new signal or to relocate or modify an existing controller assembly, the State, in the encroachment permit, will require the private party to install a Model 170. The private party must obtain the Model 170 from the private sector and have it tested by the State's Transportation Laboratory--both at his expense.

However, when a private party is relocating an existing controller assembly as part of a signal modification and the controller assembly is of a type that is scheduled for replacement, the private party will be directed to install a State-furnished Model 170.

PROCEDURES

Ordering

a) All Model 170 Controller Assemblies that are State-furnished will be requisitioned from the Office of Business Management (OBM) warehouse inventory on standard local request (LR EDP) forms.

b) Assemblies that are back ordered by the warehouse may be purchased by the Districts directly from manufacturers/suppliers if they are urgently needed--through individual District contract delegations, with prior approval from Materiel Operations Branch.

c) Assemblies that are not routinely stocked by the warehouse will be requisitioned from OBM on purchase estimates or through individual District contract delegations.

Charges and Coding

a) When Model 170 Controller Assemblies are requisitioned for either a State or State/Local Agency project, the appropriate EA will be used and the assemblies will be transferred by the warehouse on a Transaction Code 200 (TC 200).

b) Assemblies may also be requisitioned at any time as a transfer from OBM warehouse inventory to a District's inventory. EA's will not be used in these transactions and the warehouse will transfer assemblies on a TC 220.

Maintenance should order all their requirements on a TC 220.

Districts will transfer assemblies from their inventory to specific projects on a TC 100 using an appropriate EA.

c) When a controller assembly is to be supplied at no cost to a local agency or to a private party, the District can take the assembly from their own inventory or requisition one from OBM on a TC 220 for shipment to the District for pretest. In either case, the assembly will be transferred out of the District's inventory to the local agency or to the private party on a TC 451.

Permit numbers will be used on these documents.

Original Signed J. R. Cropper

R. G. ADAMS
Deputy Director
Highway Maintenance and
Transportation Operations

HLBegin:sb
bcc:HLBegin
WAJHoversten
KCGilbert
HFox - FOC
SCarlson - FOC
RNevis - OBM
All Dist. Materiel Managers
Director's Files
Director's X-Ref.

State of California | Business and Transportation Agency

Memorandum

All District Traffic Engineers

Attention Electrical Design Engineers

Date: November 5, 1984

File :

From : **DEPARTMENT OF TRANSPORTATION**
Division of Traffic Engineering

Subject: Stop Signs at Signalized Intersections

Senate Bill No. 1870 (Royce) has been passed and signed by the Governor. This bill amends Section 21355 of the Vehicle Code to prohibit stop signs to be erected at any entrance to an intersection controlled by official traffic control signals. A copy of the Bill is attached.

For many years, Section 9-02.3 of the Traffic Manual (Case D) has allowed the use of R1 STOP and R41 RIGHT TURN ONLY signs to be used to control egress from private driveways at a signalized intersection. SB 1870 no longer allows us that option.

In addition, SB 1870 requires us to bring existing intersections into conformance with the new requirements by January 1, 1990.

There are several options available to you in bringing an intersection into conformance with this new law. They include:

1. Remove the STOP sign and control egress with red flashing beacons. The R41 may be removed or may remain in place.

2. Remove the STOP sign and provide three-color signal indications for the private driveway. The R41 may be removed or may remain in place.

3. Remove the STOP sign and provide three-color signal indications/detectors, separate signal phasing for the private driveway. The R41 may be removed or remain in place.

4. Close the access and egress for the private driveway.

5. Remove the signal.

C D Bartell

C. D. BARTELL, Chief
Division of Traffic Engineering

Attachment

cc: VWaight - 4; FShoemaker - 4; HSimpkins - SactoDesign; HGarfield; RGilbert; PLowden; NWingerd

State of California

Memorandum

Electrical Design Engineers

Date: June 11, 1986

File :

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Engineering

Subject: Short-Circuit Current Interrupting Rating

Section 110-9 of the National Electrical Code states;

> "Equipment intended to break current at fault levels shall have an interrupting rating sufficient for the system voltage and the current which is available at the line terminals".

Section 86-2.11, "Service," of the Standard Specifications states;

> "Circuit breakers used as service disconnect equipment shall have a minimum interrupting capacity of 10,000 amperes, rms."

While an interrupting capacity of 10,000 amperes is adequate for most of our service installations, it will not cover all situations. For example, San Diego Gas and Electric requires an interrupting capacity of 40,000 amperes. Other utilities have indicated that the available short circuit current in major CBD areas often exceeds 10,000 amperes.

It is the responsibility of the electrical design engineer to determine the short-circuit fault current available at each service point. To assist you in making these calculations, I have attached the formulae for determining the fault current and an example of how the formulae are to be applied. The pages were taken from the "Electrical Protection Handbook" published by the Bussman Division of McGraw-Edison.

Harold Garfield

HAROLD GARFIELD
Assistant Traffic Engineer

Attachment

State of California

Business, Transportation and Housing Agency

Memorandum

To : Electrical Design Engineers

Date : October 30, 1986

File No.:

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Engineering

Subject: Median Mounted Traffic Signal Standards

Section 9.24.2 of the 1986 revision to Chapter 9 of the Traffic Manual includes the following paragraph.

"The preferred locations for new installations of signal faces for fully-protected left turn movements at a typical intersection are on a mast arm of sufficient length to place one signal face as nearly as practicable in line with the left turn lane and to place the second face on a standard at the far left corner. Unusual roadway geometrics, wide medians, wide roadways, more than one left turn in the same direction or other factors may require the left turn signal face(s) to be mounted on standard(s) located in a median to satisfy visibility requirements."

In order to expedite the review of any project where the preferred mast arm installation is not possible and you anticipate installing a signal standard in a median for a new signal or where you propose to leave or relocate an existing signal standard in a median as part of a major revision of the signal, the Federal Highway Administration (FHWA) reviewer and the Headquarters signal reviewer should be notified very early in the design stage. They realize that every effort is being made in yourdesigns to eliminate as many fixed objects in the right of way as possible. Therefore, a minimum amount of review and revision will be necessary. The FHWA has agreed to allow the installation of our 2-1/2-inch pedestrian push button posts in medians, so you will not be required to get a separate okay if that is the only pole going in the median.

While the use of long mast arms for the left turn face may increase the cost of the project over the use of a Type 1-A standard in the median, the reduced maintenance costs associated with replacing a "knockdown" could provide an overall benefit to the State.

If you have any questions regarding the installation of signal standards in medians, please call me (ATSS 485-4595) or your District's electrical reviewer.

R. L. DONNER, Chief
Office of Electrical Systems

Form FHWA-391 (Rev. 11-67)

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
MINUTE - MEMO

Use this form in lieu of transmittal slips within Dept. of Trans. when message comment is to be retained as file material. Do not prepare carbons. Not to be used in lieu of Form FHWA-121 for informal correspondence.

SUBJECT

Median Mounted Signals

TO	MESSAGE/COMMENT	FROM/DATE
C. G. Clinton	On February 5, 1987, I attended a meeting in CALTRANS, District 7, to discuss median mounted signals. The following were in attendance: Kwan Lau, Headquarters Traffic Bob Donner, Headquarters Traffic Fred Erbe, District 7, Traffic Operations Ozzie Baele, District 7, Traffic Operations Ben Cutter, District 7, Traffic Operations We discussed the general philosiphy of using median mounted signals and where we will allow their use. It was agreed that median mounted signals would not normally be used but that we would normally not question their use in the following situations: (1) Intersections where the mast arm length required to place a signal head at the mid point of a lane would exceed the 45' standard. (CALTRANS probably should be working to get a standard for longer mast arms). (2) Locations where there are double left turn lanes and it is felt that a seperate indication is needed for each left turn lane. (3) Short intersections where a left turn indication needs to be mounted lower than could be provided with a mast arm. (4) Unusual intersections at oblique angles where the far side indication may be too far to provide good visibality. We also discussed specific projects in District 7 with median signals and discussed which should be allowed to proceed and which should be analized further and redesigned without median signals if possible. Our general guideline was that any project with the design essentially complete and scheduled for PS&E in the near future should continue on schedule, but if design is in the early stage and/or PS&E is not scheduled soon the project should be reanalyzed and median signals eliminated if possible.	L. Onstott 02/17/87

Form FHWA-301 (Rev. 11-67)

U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
MINUTE - MEMO

Use this form in lieu of transmittal slips within Dept. of Trans. when message comment is to be retained as file material. Do not prepare carbons. Not to be used in lieu of Form FHWA-121 for informal correspondence.

SUBJECT

Median Mounted Traffic Signals File: 722.05

TO	MESSAGE/COMMENT	FROM/DATE
D. Kamnikar D. Eyres G. Clinton M. Cook E. Sheldahl	The attached October 30, 1986 memo from Bob Donner provides policy guidance for median mounted traffic signal standards. Because of "pipe line" projects, additional time is required to fully implement this policy. Accordingly, we have agreed with Caltrans that all projects submitted after April 30, 1987 will comply with the October 30 memo. A special review was made by Lee Onstott of District 07 "pipe line" projects. Our action on these projects will be according to Lee's agreement.	J. H. Lamb HPO-CA 3/11/87
	cc: Mr. Bob Donner, Caltrans Mr. J. H. Lamb, FHWA	

State of California

Business, Transportation and Housing Agency

Memorandum

: District Traffic Engineers

Date : July 29, 1987

File No.:

From : **DEPARTMENT OF TRANSPORTATION**
Division of Transportation Operations and Toll Bridges/Division of Traffic Engineering

Subject :
"Prepare to Stop" Signs at Signalized Intersections

Studies indicate that use of active narrative signs that say "Prepare to Stop", or variations of this message, are generally not effective warning devices for motorists approaching a signalized intersection. Accident statistics do not indicate any reduction in accidents when these "Prepare to Stop" signs are installed or, conversely, any increase in accidents when such signs are removed.

Therefore:

- No new installations of active "Prepare to Stop" signs, or variations of this message, should be made; and
- Existing installations should be reviewed to see if other treatment is more appropriate.

ORIGINAL SIGNED BY
P KAY GRIFFIN

P. KAY GRIFFIN, Chief
Division of Transportation Operations and Toll Bridges

Original Signed
C. D. BARTELL

C. D. BARTELL, Chief
Division of Traffic Engineering

SBalog:cf
bcc: SBalog
NWingerd
JPerry
KCGilbert
Operations Files

FA 24 (3-79)

SURNAME				
DEPT.				
DATE				

State of California | Business, Transportation and Housing Agency

Memorandum

To : District Traffic Engineers

Date : August 5, 1987

File No.:

From : DEPARTMENT OF TRANSPORTATION
Division of Transportation Operations and Toll Bridges

Subject: Traffic Signal Removal Guidelines

While the Manual on Uniform Traffic Control Devices (MUTCD) lists 11 "warrants" for the installation of a traffic signal, it gives very little guidance on the removal of an existing signal. Section 4C-2 "Warrants for Traffic Signal Installation" states in paragraph one "If these requirements are not met, a traffic signal should neither be put into operation nor continued in operation (if already installed)."

The Federal Highway Administration (FHWA) published its Report No. FHWA/RD-80/104, entitled "Criteria for Removing Traffic Signals", (September 1980). This report discusses the signal removal activities of 31 jurisdictions. The most notable example was Buffalo, New York, where nearly 100 traffic signals were removed in 1976 as a cost reduction measure.

IDENTIFICATION OF CANDIDATE LOCATIONS

Because of manpower and financial constraints, a continuous program for reviewing and evaluating all signalized intersections on the State highway system with regard to installation warrants should not be initiated at this time.

However, as pointed out in the FHWA report, the identification of candidate locations for traffic signal removal is most often an intuitive process. The local traffic engineering staff determined which signals should be considered for removal based on their personal knowledge of conditions at the intersection.

At intersections where the traffic signal was installed under Warrant 6 "Accident Experience" or at signalized locations that continue to have a large number (four or more) intersecting-type accidents, special attention to changing conditions is necessary when considering the removal of the signal.

A School Area Traffic Signal should not be considered for removal due to the politically sensitive nature of such an action.

SIGNAL REMOVAL CRITERIA

The MUTCD has added three new warrants for the installation of a traffic signal since the FHWA report was published in 1980. These are:

1. The Four Hour Volume Warrant
2. The Peak Hour Delay Warrant
3. The Peak Hour Volume Warrant

The addition of these new warrants justifies a decision to classify a traffic signal as "unwarranted" if it fails to meet the requirements for warrants 3 through 11, and the intersection volumes are less than 90 percent of the MUTCD volume requirements for at least eight hours.

NOTIFICATION

The local agency traffic engineer or Public Works Department shall be notified whenever the removal of a traffic signal is contemplated. Concurrence of the local agency in the decision to remove a signal is desirable.

In addition, the local Office of the California Highway Patrol and the local law enforcement agency shall be notified of the contemplated removal of the signal.

PUBLICITY

The use of press releases, letters and special signing are discussed in the FHWA report. The advantages/disadvantages of each method are listed.

INTERIM CONTROL METHODS

Where the intersection is being converted to multi-way "STOP" control the STOP signs should be installed and the signal placed on all-red flashing operation for at least 30 days before removing the traffic signal.

Where the intersection is being converted to two-way (one way at "T" intersections) "STOP" control, the STOP signs should be installed and the signal heads covered for at least 30 days before removing the traffic signal. In lieu of covering the signal heads, the signals may be placed on flashing operation with flashing red for the approaches with STOP signs and flashing yellow for the approaches that are not required to stop. The visors on the flashing yellow signals may be removed.

Special attention to the signal indications may be required where railroad and/or other pre-emption circuits are involved.

ORIGINAL SIGNED BY
P. KAY GRIFFIN

P. KAY GRIFFIN, Chief
Division of Transportation Operations
and Toll Bridges

SBalog/HGarfield:cf
bcc: SBalog
HGarfield
NWingerd
JPerry
KCGilbert
Operations Files

emorandum

: All District Traffic Engineers
All Electrical Design Engineers

Date : October 15, 1987

File No.:

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Engineering

Subject: Breakaway/Slip Base Under Electroliers Located Along Freeways, Expressways and Conventional Highways

BACKGROUND

There are presently two types of slip bases for electroliers shown in our Standard Plans. These are the slip base and the slip base insert. Breakaway type bases were installed under electroliers as far back as the mid-sixties to minimize injuries to occupants of vehicles and damage to vehicles by enabling the poles to yield or break away from the foundations when hit by the vehicles. The initial "breakaway" was a six-inch cast aluminum insert introduced shortly before 1966. This was followed by the "transformer-type" base in 1966. In 1969, slip bases and slip base inserts were added to our Standard Plans.

PURPOSE

To establish design criteria for the installation of breakaway/slip bases and slip base inserts for new or existing electroliers located on freeways, expressways and conventional highways.

DESIGN

Design Criteria

New Installations:

a. Freeways

Slip bases shall be used under Types 30 and 31 standards on freeways, freeway ramps and collector roads where the prevailing speed is in excess of 40 miles per hour. Slip bases or slip base inserts shall be used under Type 15 standards located on freeway ramps and collector roads within an interchange area where the prevailing speed is in excess of 40 miles per hour.

Slip bases or slip base inserts shall be used under lighting standards located at a non-signalized intersection of a freeway ramp with a local street or a conventional highway where the

posted speed limit on the local street or the conventional highway is greater than 40 miles per hour.

Exceptions to this policy are that slip bases or slip base inserts are not to be used under lighting standards located:

1. on or behind structures, retaining walls or barrier railings;

2. in sidewalk areas;

3. behind guard rail;

4. more than 30 feet from the traveled way;

5. where pedestrians would be close enough to be endangered by a pole knockdown.

b. Expressways

Slip bases or slip base inserts shall be used under lighting standards located on the right shoulders of expressways where the posted speed limit on the expressway is in excess of 40 miles per hour.

Slip bases or slip base inserts shall be used under lighting standards located at the intersection of an expressway (or a ramp from an expressway) with a local street or a conventional highway where the posted speed limit is greater than 40 miles per hour.

Exceptions to this policy are that slip bases or slip base inserts are not to be used under lighting standards:

1. that have signal heads;

2. located on or behind structures, retaining walls or barrier railing;

3. located in sidewalk areas;

4. located behind guard rail;

5. located more than 30 feet from the traveled way;

6. located where pedestrians would be close enough to be endangered by a pole knockdown.

c. Convention Highways

Slip bases or slip base inserts shall be used under lighting standards located on the right shoulders of conventional highways where the posted speed limit on the highway is in excess of 40 miles per hour.

Slip bases or slip base inserts shall be used under lighting standards located at the intersection of a conventional highway with another highway or a local street where the posted speed limit is greater than 40 miles per hour.

Exceptions to this policy are that slip base or slip base inserts are not to be used under lighting standards:

1. that have traffic signal heads or flashing beacons;

2. located on or behind structures, retaining walls or barrier railing;

3. located in the sidewalk areas;

4. located close to a populated area/facility such that the occupants of the area/facility would be endangered by a pole knockdown;

5. located behind guard railing;

6. located more than 30 feet from the traveled way;

7. located where pedestrians would be close enough to be endangered by a pole knockdown.

Existing Installations:

All lighting standards that satisfy the conditions noted above under "New Installations" and are within an area of a project that has other highway lighting work should be considered to be modified to include slip bases or slip base inserts, except as noted below.

Any lighting standard which has been hit repeatedly or is in a particularly vulnerable location should be eliminated or moved laterally if such a change will not degrade the lighting level, or should be replaced with a standard with longer luminaire arm to be

installed further away from the edge of traveled way. Such a standard be provided with a slip base or a slip base insert if it satisfies the conditions noted above under "New Installations".

Any lighting standard with 6-inch cast aluminum breakaway insert or a "transformer-type" breakaway base may remain in place. In the event of a knockdown, a new 6-inch insert or a transformer base may be installed under a new standard. However, in the interest of standardization, preference should be given to a slip base insert for the 6-inch cast aluminum breakaway insert and a converted type of slip base for the transformer base if either is readily available and will fit the anchor bolt patterns.

C. D. BARTELL, Chief
Division of Traffic Engineering

CKLAU:jmac
bcc: JPerry
NWingerd
KGilbert
Traffic Files

State of California

Business, Transportation and Housing Agency

Memorandum

To : All District Traffic Engineers

Date : August 21, 1989

File No.:

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Operations

Subject: Crosswalks and Detector Installations

Where marked crosswalks are installed at a signalized intersection to channelize pedestrian traffic, front detector loops should not be installed inside the crosswalk areas.

Original Signed by

R. L. DONNER, Chief
Office of Electrical Systems

State of California

Business, Transportation and Housing Agency

Memorandum

To : All District Traffic Engineers

Date : March 27, 1990

File No. :

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Operations

Subject : Crosswalks and Detector Installations

This is a clarification to my memorandum on "Crosswalks and Detector Installations," dated August 21, 1989, attached.

Unusual intersection geometrics or signal designs that provide non-locking detector operation may require placing the front detector loops partially into the crosswalk areas.

Original Signed by

R. L. DONNER, Chief
Office of Electrical Systems

Attachment

CKLau:ph
bcc: CKLau
CPerry
RDonner
Operations Files
File: CRO041CL.MEM

CALIFORNIA—BUSINESS, TRANSPORTATION AND HOUSING AGENCY
PARTMENT OF TRANSPORTATION
N STREET
BOX 942873
RAMENTO, CA 94273-0001
324-5000
445-2476
DD) 445-5945

January 9, 1991

Mr. L. Wayne Shealy, President
Shakespeare Fiberglass Pole Co.
P.O. Box 733
New Berry, S.C. 29108

Dear Mr. Shealy:

The testing and evaluation of Shakespeare Fiberglass Lighting Poles has been completed. I am pleased to inform you that the AHW27 through AHW35 series of poles with grooved breakaway anchor bases and maximum 12-foot mast arm lengths have been approved for use on California state highways.

Enclosed, for your information, is a copy of the memorandum prepared by the Transportation Materials and Research Laboratory describing the testing of the poles.

If you should have any questions or comments, please contact Mr. Charles Perry at (916) 445-5063.

Sincerely,

Original Signed by

C. D. BARTELL, Chief
Division of Traffic Operations

Enclosures

CPerry:ph
bcc: CPerry
RDonner
CBartell
Operations Files
File: SHA074CP.LTR(021)

State of California

Business, Transportation and Housing Agency

Memorandum

: District Permit Engineers

Date : January 25, 1991

File No. :

From : DEPARTMENT OF TRANSPORTATION
Division of Traffic Operations

Subject : Nonstandard Lighting Poles on Conventional State Highways Installed and Maintained by Others

The standard plans show the type of lighting standards to be used on state highways. We have learned that in some cases, cities, counties and utility companies are pushing for the approval of lighting standards on conventional highways that do not meet our criteria. In order to clarify our position further, we are attaching a memo dated October 15, 1987 distributed to district traffic and electrical design engineers detailing the policy and the exceptions to the policy (Attachment A). It is our policy that slip bases or slip base inserts shall be used when the posted speed limit on the highway is in excess of 40 miles per hour. The policy is applicable to all electroliers installed and maintained by the permittee. At intersections, an additional requirement is that the minimum illumination levels shown in the Traffic Manual should be met. Slip base or slip base inserts are not to be used under lighting standards:

1. that have traffic signal heads or flashing beacons;
2. located on or behind structures, retaining walls or barrier railing;
3. located in the sidewalk areas;
4. located close to a populated area/facility such that the occupants of the area/facility would be endangered by a pole knockdown;
5. located behind guard railing;
6. located more than 30 feet from the traveled way;
7. located where pedestrians would be close enough to be endangered by a pole knockdown.

Caltrans has also approved the use of specific models of Shakespeare Fiberglass lighting poles as an acceptable alternative to our standard slip base pole on state highways (Attachment B).

Nonstandard lighting standards may be authorized on conventional highways for locations not requiring slip bases or slip base inserts when they are installed and maintained by the permittee.

All lighting poles installed and maintained by others should be reviewed by Electrical Design prior to permit issuance.

If you have any questions, please call me at 492-3270 or Charles Vierria at 485-7871.

ASIF J. HAQ, Chief
Encroachment Permits Branch

Attachments

Business, Transportation and Housing Agency

Memorandum

To : ALL DISTRICT TRAFFIC ENGINEERS

Date : August 16, 1991

File No. :

From : **DEPARTMENT OF TRANSPORTATION**
Division of Traffic Operations

Subject : Catwalks on Overhead Sign Structures

Recent instructions have eliminated the need for illumination on many overhead sign panels. Whether or not the sign panel is illuminated, the catwalk is still required for some maintenance purposes and should be included in new contracts.

Please be sure to inform your Project Development and Design groups of this situation.

Signed by

P. R. LOWDEN, JR., Interim Chief
Division of Traffic Operations

JAlleman:vd
bcc: JAlleman
FJager
JGomes
LWelsh
CPerry
KLau
NWingerd
WHoversten
KGilbert
RDonner
PLowden
WSmith - Project Planning & Design
KBandow - Central Design
ERiker - Structures
Traffic Operations
FILE: CAT038JA.MEM(016)

Business, Transportation and Housing Agency

M o r a n d u m

To : ALL DEPUTY DISTRICT DIRECTORS
Project Development and
Operations

Date : March 15, 1993

File No. :

From : **DEPARTMENT OF TRANSPORTATION**
Division of Traffic Operations

Subject : Curb Ramp

As noted on Standard Plan sheets NSP A88 and ES 8, effort should be made to relocate pull boxes out of the boundaries of a curb ramp prior to its construction. No new pull boxes shall be installed within the boundaries of any existing curb ramps or new ramps at an existing signalized intersection of a project involving extensive reconstruction that requires relocation of poles and pull boxes.

When it is not cost effective and practical to relocate all pull boxes in a retrofit case, a pull box may be located on the non-grooved side slope areas of the ramp and the top of the pull box must be flush with the slope area.

ROBERT L. DONNER, Chief
Office of Electrical Systems

ate of California

Business, Transportation and Housing Agency

Memorandum

To. PROJECT DEVELOPMENT COORDINATORS
GEOMETRIC REVIEWERS, AND
TRAFFIC LIAISON ENGINEERS

Date : May 11, 1993

File No. :

From: DEPARTMENT OF TRANSPORTATION
DIVISION OF STATE AND LOCAL PROJECT DEVELOPMENT - OFFICE OF PROJECT PLANNING & DESIGN

Subject: Clarification on Lighting of Sag Vertical Curves with Nonstandard Stopping Sight Distance

The language contained in the Highway Design Manual (HDM), Section 201.5, suggests that lighting may be considered when headlight sight distance is not obtainable at grade sags. It has been an informal practice to provide this lighting under these conditions without consideration of long term maintenance and operations cost or an analysis of the accident history. In cooperation with the Division of Traffic Operations, agreement has been reached on the process of handling future projects when nonstandard stopping sight distances are a factor.

The following actions will be taken to help clarify procedures:

1. A sentence will be added to HDM Section 201.5: The OPPD Coordinator and the Traffic Liaison Engineer shall be contacted to review any proposed grade sag lighting to determine if such use is appropriate.

2. The OPPD Coordinator and the Traffic Liaison Engineer shall work closely in determining whether lighting is appropriate on a case-by-case basis and shall inform the District of the decision. This decision shall be final and shall not be the subject of review by either Headquarters or the District functional units.

3. All situations having nonstandard grade sag sight distance shall have the appropriate documentation, even if there is a decision to provide lighting as a mitigation to the reduced headlight sight distance.

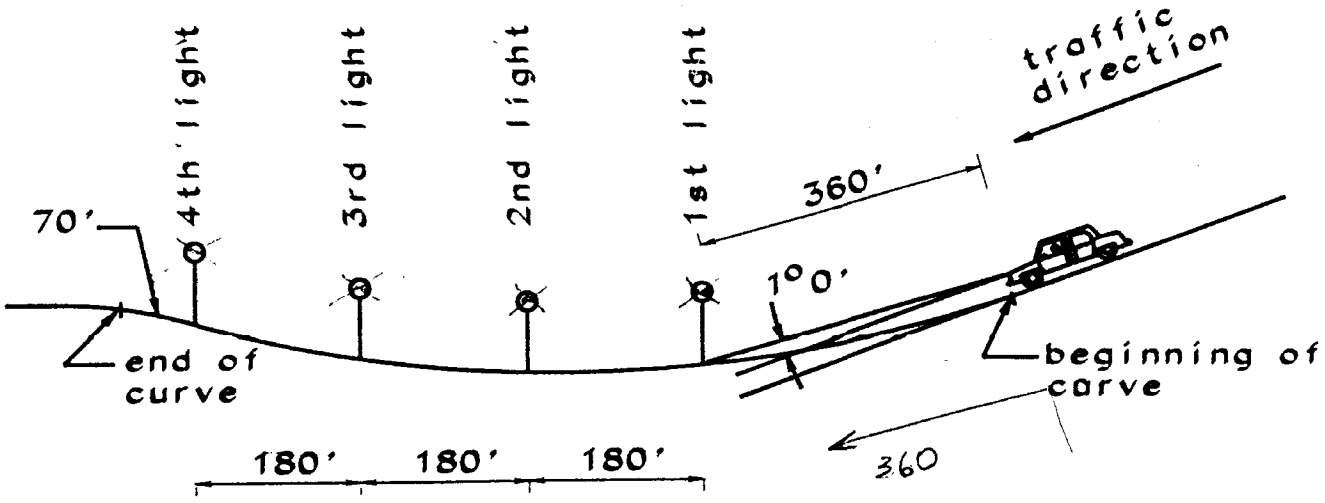
4. There may be cases where a District has decided to install lighting for reasons other than mitigating a non-standard mandatory feature. These decisions shall remain a District decision as per the 1988 delegations.

If you have any questions please call Alan Glen, Chief, Geometric Design and Standards Branch, at 263-1042 or Calnet 435-1042.

AGlen:jl
cc:
JBorden
BDonner
WSmith, EPMarshall
AGlen, OPPD File

W P Smith

W. P. SMITH, Chief
Office of Project Planning
and Design


4th light
3rd light
2nd light
1st light
traffic direction
360'
70'
1°0'
end of curve
beginning of curve
180'
180'
180'
360

No Scale

Memorandum

To: DEPUTY DISTRICT DIRECTORS
OPERATIONS

DEPUTY DISTRICT DIRECTORS
PROJECT DEVELOPMENT

Date: June 16, 1993

From: **DEPARTMENT OF TRANSPORTATION**
Division of Traffic Operations

Subject: Lighting for Nonstandard Sag Vertical Curves

Attached is a Memorandum from W.P. Smith, Chief of the Office of Project Planning and Design (OPPD), clarifying the lighting of sag vertical curves with nonstandard stopping sight distance.

When the OPPD Coordinator and the Traffic Liaison Engineer, with input from the district functional units, determine that lighting should be installed, the following guidelines should be used to decide the locations of electroliers:

a) The responsible project engineer (civil) shall provide the actual sight distance from the beginning of the curve and the length of the curve, for each direction of travel, to the electrical engineers doing the lighting design.

b) The first electrolier should be located at the actual sight distance down-stream from the beginning of the curve. Additional electroliers should be located at 180-foot intervals to within 90 feet of the end of the curve. (Note that the last electrolier will, in some cases, be beyond the end of the curve.)

c) The types of electroliers used should be those with 310-watt HPS luminaire and pole shaft of 35 feet in length.

d) As an example (see attached drawing), if the actual sight distance of the nonstandard vertical curve is 360 feet and the length of the curve is 970 feet for the direction shown, then--

   1) The location of the electrolier should be 360 feet (the actual sight distance) from the beginning of the curve. The second electrolier should be 540 feet (360 + 180 feet) from the beginning of curve, the third 720 feet (540 + 180 feet), and the fourth 900 feet (720 + 180 feet).

2) Since the last electrolier is within 90 feet from the end of the curve, no additional electroliers are needed.

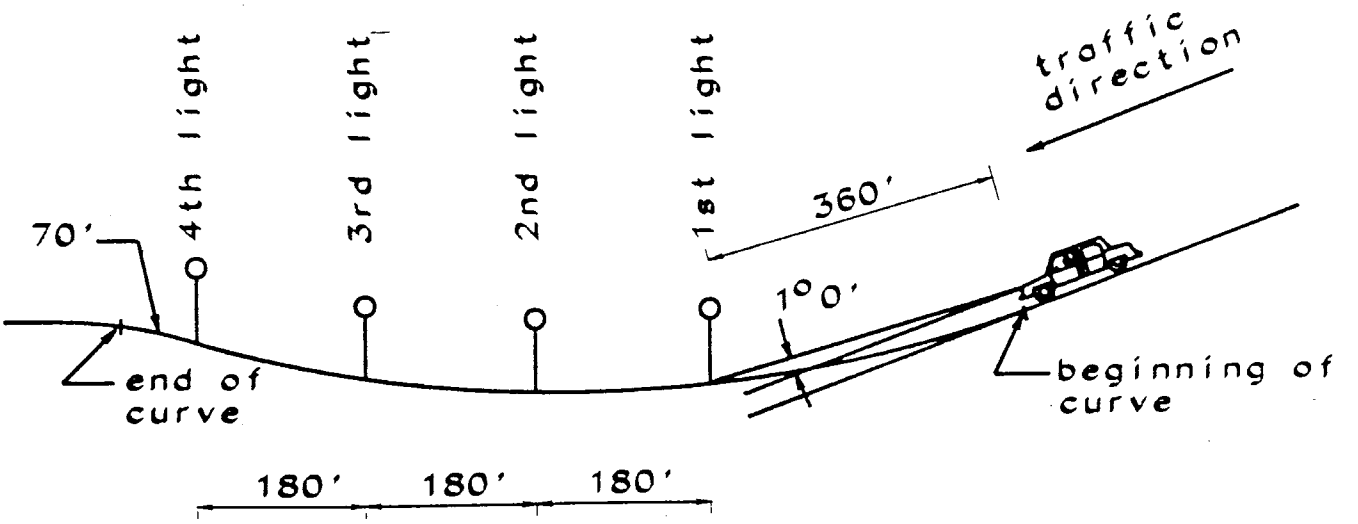
e) Repeat the same procedure for the opposing direction.

Original Signed by

ROBERT L. DONNER, Chief
Office of Electrical Systems

Attachments

cklau:cindy
bcc: JBBorden
RLDonner
CKLau
CPerry
WPSmith - OPPD
GCorrigan - Office Engineer
WHoversten
KNystrom
NWingerd
Ops
Read
Sag Vertical Curves/Lau


4th light
3rd light
2nd light
1st light
traffic direction
360'
70'
1°0'
end of curve
beginning of curve
180'
180'
180'

No Scale

State of California | Business, Transportation, and Housing Agency

Memorandum

To: SEE ATTACHED LIST

Date: December 3, 1993

File No:

From: **DEPARTMENT OF TRANSPORTATION**
Division of Traffic Operations

Subject: Maintenance Factor for Intersection Lighting

Section 9-10, "Highway Safety Lighting Design Standards" of the Traffic Manual sets standards for safety lighting at State highway intersections. To calculate the initial horizontal illuminance (IHI), a light maintenance factor must be included in the design of the lighting.

Maintenance factor (MF) for a luminaire is based on two variables. These variables are based on the environment surrounding the luminaire and the relamping time interval. The MF is the product of the luminaire dirt depreciation (LDD) factor and the lamp lumen depreciation (LLD) factor.

The LDD factors based on the different types of environment for enclosed and gasketed luminaries for four-year relamping interval are listed as follows:

CLEAN	:	From 78% to 85% approx.
MODERATE	:	From 65% to 75% approx.
DIRTY	:	From 47% to 55% approx.

CLEAN	-	No nearby smoke or dust generating activities. Light traffic. The ambient particulate level is no more than 300 micrograms per cubic meter.
MODERATE	-	No nearby smoke or dust generating activities. Moderate to heavy traffic. The ambient particulate level is no more than 600 micrograms per cubic meter.
DIRTY	-	Smoke or dust plumes generated by nearby activities may occasionally envelop the luminaries.

The LLD factor based on a relamping interval of four years is 73% (See General Electric Lighting System Product Application Guide).

As an example, if lighting is to be installed at an urban intersection where traffic is heavy but has no smoke or dust generating activities nearby, the IHI in lux (1 fc = 10.764 lux) is calculated as follows:

At the intersection of centerlines of the entering streets

IHI = (0.6 x 10.764) lux/MF
= 6.5 lux/(LDD x LLD)
= 6.5 lux/(0.65 x 0.73)
= 13.7 lux

At crosswalk areas

IHI = (0.15 x 10.764) lux/MF
= 1.6 lux/(LDD x LLD)
= 1.5 lux/(0.65 x 0.73)
= 3.40 lux

ROBERT L. DONNER, Chief
Office of Electrical Systems

State of California | Business, Transportation and Housing Agency

Memorandum

To: ALL TRAFFIC ENGINEERS

Date: February 16, 1995

From: **DEPARTMENT OF TRANSPORTATION**
Traffic Operations

File:

Subject: Project Plans Reviews

It has been the policy of the Office of Electrical Systems to review all projects that contained electrical facilities for compliance with the California Department of Transportation Electrical Design Standards. This has been done in conjunction with the Office of Office Engineer, who prepared the contract documents in compliance with the State Contract Act, and other departmental standards.

It has been determined that in the future there is no need to send the projects to the Office of Electrical Systems. When requested by the Office of Office Engineer, the Office of Electrical Systems will provide assistance and support to assure conformance with electrical standards.

Original Signed By

LES KUBEL, Chief
Office of Electrical Systems

ARastegarpour: dc

bcc: LKubel
GCorrigan
CPerry
ARastegarpour
Traffic Operations

DEPUTY DIRECTIVE

Number: DD-45

Refer to Director's Policy: 02-Ethics
09-New Technology Implementation

Effective Date: 7-14-95

Supersedes: New

Title: New Product Evaluation

POLICY

Caltrans ensures the objective, impartial and consistent evaluation of new products for use in the construction, maintenance and operation of the State's transportation system. All new products are evaluated on the basis of need; performance; cost-competitiveness; and compliance with health, safety and environmental regulations.

BACKGROUND

In 1993, an audit of the Department's new product evaluation process was conducted. It was found that many of the Department's policies and practices regarding the introduction of new products were informal and not well documented. This resulted in some decisions to introduce or reject new products which were not supported by evidence. This Directive formalizes Caltrans' policy governing the evaluation of new products.

DEFINITIONS

New Products - are defined as fully developed and marketable products for use in the construction, maintenance and operation of the State's transportation system that have not been previously evaluated by Caltrans and are not covered by existing Caltrans specifications.

Evaluation - is defined as a comprehensive process that includes an assessment of need, cost-benefit, performance, and conformance with health, safety and environmental regulations.

Lead Corporate Program - is defined as the Corporate Program ultimately responsible for implementation of a new product.

RESPONSIBILITIES

The Director, Engineering Service Center:

- Appoints a New Product Coordinator responsible for the overall coordination of all new product evaluations.
- Ensures that staff of the Engineering Service Center (ESC) provide the lead corporate programs with technical expertise, testing and field inspection support, and assistance in amending or developing specifications, guidelines and other Caltrans standards and procedures that are required to enable the use of new products.

The New Product Coordinator:

- Coordinates the initial assessment of new product approval requests and assigns requests to appropriate lead Corporate Programs for evaluation.

- Establishes new product evaluation procedures, including an appeals process.
- Maintains a list of approved and disapproved products, and a file containing evaluation records.

The Lead Corporate Program Manager:

- Involves the appropriate individuals in the fair and impartial evaluation of new products, resulting in a written approval or rejection sent to the New Product Coordinator.
- Removes barriers to the use of approved new products by updating specifications and standards and notifying Districts of product availability.

District Directors:

- Assist the lead corporate programs in conducting new product evaluations by assessing need, providing test sites and monitoring performance of the product being evaluated.
- Ensure that only those products evaluated and approved following Caltrans' policy and procedures are implemented and used in their respective Districts.

The Environmental Program Manager, in cooperation with the New Product Coordinator, ensures, as part of the initial assessment, that the conditions of use for new products are in compliance with applicable environmental rules and regulations.

The Chief, Office of Employee Safety and Health, in cooperation with the New Product Coordinator, ensures, as part of the initial assessment, that the conditions of use for new products are in compliance with applicable health and safety regulations.

Employees refer all initial contacts involving new products to the New Product Coordinator and conduct subsequent new product evaluations in accordance with applicable Caltrans policies and procedures.

APPLICABILITY

All Caltrans employees involved in the initial assessment and evaluation of new products.

A. A. PIERCE
Chief Deputy Director
Operations

Distribution: B

State of California

Business, Transportation and Housing Agency

Memorandum

To: DISTRICT TRAFFIC ENGINEERS

Date: June 28, 1996

File:

From: DEPARTMENT OF TRANSPORTATION
Traffic Operations

Subject: Main Circuit Breakers in Service Equipment Enclosures

We received an opinion in 1990 from the National Electrical Code Committee that the California Department of Transportation (Caltrans) service equipment enclosures should be classified as lighting and appliance panel boards. Caltrans service equipment enclosures as defined should comply with Section 384-16 of the National Electrical Code and be protected on the supply side by main circuit breakers. The National Electrical Code Section 384-16 allows the use of up to two main circuit breakers for each lighting and appliance panel board.

To comply with the National Electrical Code requirement, a memorandum to the District Traffic Engineers was issued July 31, 1990 by this office. This memorandum required the use of main circuit breaker(s) in Caltrans service equipment enclosures. Since that memorandum was issued, additional confusion has been encountered because Section 86-2.11, service of the standard specifications requires that "each service shall be provided with a circuit breaker which shall simultaneously disconnect all ungrounded service entrance conductor." This requirement can be interpreted as allowing only one main circuit breaker in Caltrans service equipment enclosures even when the National Electrical Code interpretation allows a maximum of two main circuit breakers.

To clarify this issue the Caltrans Standard Special Provision 86.19 (Service), will be modified to agree with the National Electrical Code Section 384-16. This will affect the wording of Standard Specification Section 86-2.11 service and the main circuit breaker requirements shown on standard plan drawings ES-2D, ES-2E and ES-2F and allow the use of up to two main circuit breakers in Caltrans service equipment enclosures.

Original Signed By

LES KUBEL, Chief
Office of Electrical Systems

CPerry: dc
bcc: LKubel
CPerry
Traffic Operations

e California Business, Transportation and Housing Agency

emorandum

DISTRICT DIRECTORS

DISTRICT DIVISION CHIEFS
Project Development, Construction
and Operations

Date: March 19, 1997

File:

DEPARTMENT OF TRANSPORTATION
Traffic Operations
Mail Station 36

ıt ıct: State-Furnished Equipment Policy

The following is to clarify existing policy regarding State-furnished equipment:

- All Model 170 Controller Assemblies, regardless of application, installed on the State highway system that are included in contracts that the State advertises, awards or administers shall be State-furnished.

  When the Model 2070 Controller units are introduced, all Model 2070 Controller Assemblies, regardless of application, installed on the State highway system that are included in contracts that the State advertises, awards or administers shall be State-furnished.

We are currently working on a new Model 170 and 2070 Controller policy for traffic signals installed on the State highway system. Until the new policy is implemented, traffic signal controller assemblies that are not covered under the criteria listed above shall be State-furnished, if possible, or contractor provided with testing being performed by Material Engineering & Testing Services or an independent lab.

We also will further explore the possibility of future contractor furnishing of Changeable Message Signs and Model 170 Controller equipment by establishing a task force to examine all the issues. On a statewide basis; Steve Hancock from the Office of Electrical Systems will organize this task force. Please contact Steve Hancock at 654-5309 for input to and/or participation on the task force.

JAMES B. BORDEN
Program Manager
Traffic Operations

SHancock: dc
bc: JBorden
LKubel
SHancock

Attachments

State of California | Business, Transportation and Housing Agency

Memorandum

To: SEE ATTACHED

Date: April 13, 1998

File:

From: **DEPARTMENT OF TRANSPORTATION**
Traffic Operations
Mail Station 36

Subject: Yellow Change Interval

This memorandum is being issued to supersede the June 12, 1997 memorandum on Revision to Chapter 9 of the Traffic Manual. After consultation with the Traffic Signal Committee, it was agreed upon that Section 9-04.5, "Yellow Change Intervals," in the Metric version of the Traffic Manual shall read as follows:

9-04.5 Yellow Change Intervals

The purpose of the yellow signal indication is to warn traffic approaching the signal that the related green movement is ending or that a red indication will be exhibited immediately thereafter and traffic will be required to stop when the red signal is exhibited.

The length of the yellow change interval is dependent upon the speed of approaching traffic. Suggested yellow change intervals are shown below:

Approach Speed		Yellow
(mph)	(km/h)	(seconds)
25 or less	40	3.0
30	48	3.2
35	56	3.6
40	64	3.9
45	72	4.3
50	80	4.7
55	89	5.0
60	97	5.4
65	105	5.8

A revised Section 9-04.5 will be sent to all registered holders of the Traffic Manual by the California Department of Transportation Publication Distribution Unit. If you have any questions, please call Mr. Sam Ehsan at (916) 654-5039 or Calnet 464-5039.

SOMPOL CHATUSRIPITAK, Chief
Office of ITS and Electrical Systems
Development and Support

Table 9-1
SUGGESTED DETECTOR SETBACKS FROM LIMITLINE

Deceleration Rate $d = 3.05$ **m per second**^{2}

Deceleration Time $= V/d$

Deceleration Distance $= \frac{1}{2}dt^2$ **or** $\frac{1}{2}Vt$ **or** $\frac{V^2}{2d}$

Reaction Time $r = 1.00$ **second**

Reaction Distance $= Vr$

Total Time = Deceleration Time + Reaction Time $= t + r$ **or** $\frac{V}{d} + r$

Detector Setback = Decerlation Distance + Reaction Distance

$$= \frac{V^2}{2d} + Vr$$

Yellow Interval $T = r + \frac{V}{2d}$

V = **Speed (meter per second)**

d = **Deceleration Rate (meter per second**^{2}**)**

t = **Deceleration Time (seconds)**

T = **Yellow Interval (seconds)**

SPEED			DEC. TIME	DEC. DIST.	TOTAL TIME	DETECTOR SETBACKS	
						ACTUAL	SUGGESTED
mph	km/h	m/s	Seconds	Meters	Seconds	Meters	Meters
25	40	11.18	3.67	20.49	4.67	31.67	30
30	48	13.42	4.40	29.51	5.40	42.93	45
35	56	15.65	5.13	40.17	6.13	55.82	55
40	64	17.89	5.87	52.46	6.87	70.35	70
45	72	20.13	6.60	66.40	7.60	86.52	85
50	80	22.36	7.33	81.97	8.33	104.33	105
55	89	24.60	8.06	99.18	9.06	123.78	125
60	97	26.83	8.80	118.04	9.80	144.87	145
65	105	29.07	9.53	138.53	10.53	167.60	170
70	113	31.29	10.27	160.50	11.27	191.79	190

State of California Business, Transportation and Housing Agency

Memorandum

To: District Electrical Seniors **Date:** February 2, 2000

File No: **Elect Review**

From: **DEPARTMENT OF TRANSPORTATION**
TRAFFIC OPERATIONS PROGRAM

Subject: New and Non-standard Devices Exception Process

To facilitate experimental field deployment of new and non-standard electrical and electronic devices, an exception process has been in effect. This process has been designed to document the needs and results of each experiment for reference. Each experimental deployment requires an approval from Headquarters Traffic Operations.

To acquire an approval for a field experimental deployment of new and non-standard electrical and electronic devices, we ask that a request be forwarded to the Office of ITS Development and Support. In addition, we need a description of the need for the device(s), alternatives considered, and the expected benefits from the experimental deployment.

If the request is found appropriate, an approval should be given within 2 weeks. The approval will be given under the condition that the requester provides a report within 3 months of the deployment, at the conclusion of the deployment, or at a particular milestone. This report shall summarize the following:

- **Why the non-standard device(s) is needed** (Were there any alternatives considered? What operational, maintenance, safety and cost factors were involved in the decision)
- **Description of the device(s) used** (Type, make, model, signal technologies, operation characteristics, power, communications and maintenance requirements, etc.)
- **Efficiency and effectiveness** (Does the device(s) perform well in all conditions? Does it meet expectations? What deficiencies were experienced? How superior to the existing system?)
- **Recommendations** (What should be adopted as standards and specifications? What are desirables and undesirables for the device(s))

If you have questions regarding this exception process, please call Theresa Gabriel at (916) 654-5039, calnet number 8- 464-5039.

Sompol Chatusripitak, Chief
Office of ITS Development and Support

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROGRAM DIRECTIVE

TR-0011 (New 9/15/1999)

TRAFFIC OPERATIONS PROGRAM DIRECTIVE	NUMBER	Page 1 of 2
L. NYSTROM, PROGRAM MANAGER *(Signature)*	DATE ISSUED July 7, 2000	EFFECTIVE DATE July 7, 2000
SUBJECT Automated red-light enforcement systems	DISTRIBUTION ☐ All Distribution Directors ☒ All District Division Chiefs - Traffic Operations ☒ All District Division Chiefs - Maintenance ☐ All District Division Chiefs - Construction ☐ All District Division Chiefs - Project Development ☐ All District Division Chiefs - Planning ☐ Service Center Directors ☐ All Headquarters Program Managers	
DOES THIS DIRECTIVE SUPERSEDE ANOTHER DOCUMENT? ☐YES ☒NO	IF YES, DESCRIBE	
THIS DIRECTIVE BE INCORPORATED IN TRAFFIC MANUAL? ☐YES ☒NO	IF YES, DESCRIBE	

DIRECTIVE

Automated red-light enforcement systems owned and operated by local agencies and private entities may be permitted at Caltrans owned and operated intersections if such systems meet the following criteria:

1. The compelling need for said systems is demonstrated.
2. Said systems are operated independently of Caltrans equipment and systems. Electrical connections with Caltrans equipment and systems are limited to intersection signal outputs as prescribed by Caltrans. These connections must be optically, or otherwise, isolated. Caltrans will not provide electrical power to these systems.
3. Caltrans is held harmless and indemnified from any and all liabilities or losses resulting from the use or presence of said systems.
4. Said systems meet all safety requirements pertaining to intersection operations and all applicable codes.

Caltrans reserves the right to remove said systems at owner's costs if and when above criteria are not met.

A rider to an existing signal maintenance agreement or new agreement must be executed between Caltrans and the owner which clearly defines the scope of said systems and certifies that the above criteria are met. The owner shall agree to submit a complete set of design drawings and installation plans for review by Caltrans and the applicable city or county engineer. The installation plans shall include all electrical, electronics, civil and mechanical work pertaining to said systems. The Caltrans review is intended to discover only obvious errors and defects and shall not relieve the owner of design liability. Furthermore, Caltrans reserves the right to inspect and approve the completed stallation.

While it is recognized that revenues may be realized through said systems, Caltrans present policy is to forfeit revenue sharing.

IMPLEMENTATION

This policy shall be the guide to issuing encroachment permits for installation of automated red-light enforcement systems. Permit applications shall not be considered until all of the above criteria are met and a fully executed signal maintenance agreement is in place.

This policy does not apply to red-light enforcement aids such as extra signal lights mounted in the rear of typical signal lights.

BACKGROUND

Red-light violation enforcement systems have been popular in Europe and South America for over a decade. They have begun to be deployed in the U.S. in recent years, mostly on the East Coast. These systems, although well received by law enforcement agencies, have not been widely implemented due to legal and institutional barriers. In New York, for instance, initial deployment was halted as elected officials legislated against citing and fining violators identified through video recordings.

In California, a number of cities have been experimenting with video enforcement systems. Only a few of these systems exist on state right-of-ways within the City and County of San Francisco. These systems have only been connected to traffic signal control systems owned and operated by the City. These systems also exist in a few other cities on local streets.

It is anticipated that many other local agencies will now attempt to deploy red-light enforcement systems in one form or another. District 11 and District 2 have recently been approached with a proposal for the deployment of such systems and other districts have also received similar requests.

This policy and directive provides guidelines for agencies interested in deploying red-light enforcement systems in order to maintain project objectivity and statewide consistency.

State of California | Business, Transportation and Housing Agency

Memorandum

To: DISTRICT DIVISION CHIEFS
Maintenance

Date: August 2, 2000

File No:

From: **DEPARTMENT OF TRANSPORTATION**
MAINTENANCE PROGRAM

Subject: Deploying Battery Backup Systems at Traffic Signalized Intersections

The intent of this memorandum is to give some guidelines for the use of battery backup systems at traffic signalized intersections on the State Highway System. If these guidelines are followed there will be an organized, standardized approach to the implementation and deployment of these systems. These guidelines are interim until the department adopts a formal policy and standards for statewide use and deployment of these systems.

The current California Department of Transportation (Caltrans) policy on the operation of traffic signals during unplanned power failures is defined in the Maintenance Manual Vol. 1, Section K.09.03 as:

"...It will be Caltrans general policy not to provide power or stop signs at traffic signals during unplanned power outages as described above.

...As with any general policy, there may be extenuating circumstances that requires exceptions to this policy. These exceptions may be approved by the District Division Chief of Maintenance."

Under the current policy, the District Division Chief of Maintenance is given final authority to make decisions surrounding the use of emergency power systems.

Battery backup systems that operate the signal in flashing red mode may be permitted at intersections that have been converted to red Light Emitting Diode (LED) signal modules. The District Division Chief of Maintenance should establish a district plan for installing and operating such systems. The district traffic branch should be consulted when developing the deployment plan. This plan should clearly define signal sites and installation schedules consistent with safety considerations and availability of LED signal modules and funding priorities. Traffic considerations include intersection approach speeds, frequency of power outages and mean time for power recovery, and the difficulty of manual traffic control during a power outage. The District Division Chief of Maintenance may include other circumstances such as the location of signals, time to reach the site, or other conditions deemed fitting.

It is critical that the plan delineates the conditions for using battery backup, and the present locations with battery backup be reviewed for compliance with the established criteria. It is the intent to provide battery backup where power outages may occur, and where safety will be enhanced by the use of battery backup power.

Each District Division Chief of Maintenance should maintain each district's plan and ensure its availability for review by Headquarters (HQ) Maintenance Program. A copy of each plan should be made available to the HQ Maintenance Liaison, and Gonzalo Gomez, HM-4 Program Advisor.

The single phase EA 916035 should be used to charge all labor and materials relating to the installation of these systems.

Deployment plans, questions or comments can be directed to Mr. Gomez of the Maintenance Program, at Calnet 464-2461 or (916) 654-2461.

ORIGINAL SIGNED BY
LARRY ORCUTT

LAWRENCE H. ORCUTT
Program Manager
Maintenance

Attachments

bc: Rob Marsh, Maintenance Program
Kim Nystrom, Traffic Operations
Gonzalo Gomez, Maintenance Program
Ahmad Rastegarpour, Traffic Operations
Theresa Gabriel, Traffic Operations

GG:amc

DRAFT

Battery Backup System Suggested Deployment Prioritization

Site Selection factors should include:

1. high speed approach (over 45 MPH),
2. being an isolated rural intersections,
3. response time over 40 minutes,
4. a history of power outages,
5. type of traffic (i.e. how much tourist traffic frequents the area since tourists will not be familiar with the area and could be much more exposed to the hazard of a dark signal).
6. Locations that are the approach to a developed, urbanized area from a rural, high-speed highway.

The district could use other selection factors and these should be detailed in the district's deployment plan.

Priorities should be assigned to the locations selected for deployment of the battery backup systems. Suggestions are as follows:

Priority 1: To be installed within one year of finalization of deployment plan
Any location that meets three or more of the site selection factors

Priority 2: Installed within two years from finalization of deployment plan
Any location that meets two of the site selection factors

Priority 3: To be installed after systems have been deployed to locations in priorities 1 and 2
Any location that meets one or less of the site selection factors

Red LED modules must be installed before the battery backup system can be installed. Evaluations of the intersections may require inspection by the district traffic engineer and the electrical maintenance representative.

Other locations, where the district traffic engineer and electrical maintenance representative agree that a battery backup system will greatly enhance the safety of that intersection, should be prioritized according to the estimated safety improvement.

Units Currently Available

Electro-Tech's Power Sentinel 200	909-734-1812
Online Power Signal Saver IPC	800-227-8899
Clary SP1000	800-442-5279
Dimensions Unlimited DUI-12/500BT	651-653-7000

State of California Business Transportation and Housing Agency

Memorandum

To: DISTRICT DIVISION CHIEFS
Maintenance and Operations

Date: March 21, 2001

File:

From: **DEPARTMENT OF TRANSPORTATION**
Traffic Operations
Maintenance Program

Subject: Deploying Battery Back-up Systems at Traffic Signalized Intersections

This memo supersedes the August 2, 2000 memo to the District Division Chiefs of Maintenance (attached). The memo addressed red Light Emitting Diodes (LEDs) and battery back-up systems (BBS) that would only allow for red flash in the event of a power failure. This memo is to request a priority list of traffic signals to be retrofitted with full color LED modules and to install BBS. This memo is signed jointly by the Maintenance and Traffic Operations Programs.

Based on the current ongoing energy crisis and the potential for an increase in demand during the hotter months, (resulting in rolling blackouts), there is an immediate need to retrofit traffic signals with LED modules of all colors and install BBS. Every effort should be made to coordinate the installation of BBS, prior to the summer months, as soon as the LED retrofits are complete. This coordinated effort should include additional prioritization of locations retrofitted with BBS (after installation of full color LED modules).

Installing battery backup systems (BBS) will provide the ability for traffic signals (with full color LED modules) to be fully operational during times of power failures or rolling blackouts. During power outages, these systems, by operating normally, provide improved traffic control, safe operation, and reduce delays and congestion. During times of blackouts these systems will also assist emergency response equipment such as fire, police, and ambulance by continuing to provide Emergency Vehicle Preemption at traffic signals.

The traffic signal should be retrofitted with LED modules prior to installing any BBS. Presently, the Maintenance and Traffic Operations Program are involved in a statewide project to retrofit all traffic signals with all colors of LED modules. This conversion will not only provide considerable energy savings but also provide the opportunity to implement full operation BBS. Estimated completion date of this LED retrofit project is June 30, 2001.

Your District is requested to develop a plan for the implementation of these systems. This plan will establish an organized and standardized approach to the implementation and deployment of these systems and should represent the priorities of the individual district in accordance with the attached guidelines. Each district should provide:

- A list of intersections where BBS will be installed under priority one.
- A schedule showing when these locations will be ready for BBS (anticipating that all LED retrofit are completed by June 30, 2001).
- A schedule showing when locations under priority two will be ready for BBS retrofit.
- Resource needs (personal service dollars, overtime, etc.) if this work is to be done by state forces.

Districts should submit their list of prioritized traffic signals and implementation schedule to Gonzalo Gomez by April 13, 2001. Any questions or comments can be directed to Gonzalo Gomez, Maintenance Program, at Calnet 464-2461 or (916) 654-2461 or Jesse Bhullar, Traffic Operations Program, at Calnet 464-5975 or (916) 654-5975.

JOSEPH HECKER
Acting Program Manager
Traffic Operations

LAWRENCE ORGUTT
Program Manager
Maintenance Program

Attachment

Guidelines

Battery Backup System Deployment Prioritization

Priority 1

To be installed immediately following LED retrofit (before mid-summer if possible)

- Single Point Interchanges
- All intersections with high speed approach (over 45 MPH)
- Traffic signals that are part of a corridor (conventional highway or non-freeway) that function as a major arterial in urbanized areas
- Signals that are part of a coordinated system

Priority 2

To be installed following priority 1 (before end of summer if possible)

- Any intersection that meets two or more of the site selection factors listed below

Priority 3

To be installed after priority 1 and 2 locations have been completed

- All remaining locations

Site selection factors include:

1. Areas with frequent limited visibility such as fog, dust, etc.
2. Isolated rural intersections
3. Response time is over 40 minutes
4. Locations with a history of power outages
5. Type of traffic (tourists may not be familiar with the area)
6. Changing highway environment from a rural, high-speed highway to a developed urbanized area. Evaluation of the intersection may require inspection by the District Traffic Engineer and the Electrical Maintenance Representative.

Other locations and considerations that could enhance the safety of intersection and agreed upon by the District Traffic Engineer and the Electrical Maintenance Representative may also be included.

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

PROGRAM DIRECTIVE

TR-xxxx (New x/xx/2000)

TRAFFIC OPERATIONS POLICY DIRECTIVE	NUMBER 01-03	PAGE 1 OF 2
JOSEPH HECKER, ACTING DIVISION CHIEF, TRAFFIC OPS *(Signature)* Joseph Hecker	DATE ISSUED 06-01-01	EFFECTIVE DATE 06-01-01
SUBJECT LEFT-TURN EXTINGUISHABLE MESSAGE SIGN	DISTRIBUTION ☐ All District Directors ☒ All Deputy District Directors - Traffic Operations ☒ All Deputy District Directors - Maintenance ☒ All Deputy District Directors - Construction ☒ All Deputy District Directors - Project Development ☐ All Deputy District Directors - Planning ☒ Division Chief, Division Engineering Service Center ☒ Legal Division _____ ☐ All Headquarters Division Chiefs For _____	
DOES THIS DIRECTIVE SUPERSEDE ANOTHER DOCUMENT? ☐YES ☒NO	IF YES, DESCRIBE	
DOES THIS DIRECTIVE BE INCORPORATED IN THE TRAFFIC MANUAL? ☒YES ☐NO	IF YES, DESCRIBE **Section 9-03.8 Permissive Left-Turn Phasing**	

DIRECTIVE

This directive is to notify Caltrans Traffic Operations personnel that Traffic Manual Section 9-03.8, Permissive Left-Turn Phasing is revised to allow local agencies to install an Extinguishable Message Sign (EMS) "Left Turn Yield" in lieu of the "Left Turn Yield On Green Ball" (R73-7) sign. The text in the Traffic Manual is revised as noted in the underlined portion of the attached page.

Both the Traffic Manual and the Federal Manual on Uniform Traffic Control Devices state that when a protected-permissive or permissive protected left-turn phasing operation is used for a traffic signal on a street or highway, no information sign is necessary.

If a sign is used on a State highway, it shall be an R73-7, LEFT TURN YIELD ON GREEN (Green Ball Symbol) sign. An EMS shall not be used at an intersection with a State Highway

In lieu of the R73-7 sign, local authorities may use an EMS. The message shall say LEFT TURN YIELD. Letters shall be at least 150 mm (6-inch) in height. The light source shall be designed and constructed so that when illuminated, the message shall be white and remain dark when not in use. The message shall be illuminated when only the green permissive ball is lighted.

IMPLEMENTATION

Caltrans policy and practice in the use of the R73-7 "Left Turn Yield on Green" sign on state highways remains unchanged. Local authorities may use an EMS on local street and roads.

GROUND

Between 1996 and 1999 the City of San Jose experimented with an extinguishable message left turn yield sign. The City concluded that the illuminated sign provided a benefit over the R73-7 sign and reported this to the California Traffic Control Devices Committee (CTCDC). The CTCDC recommended that Caltrans include language in the Traffic Manual which makes the EMS an official traffic control device in California.

EMSs are not to be used on State Highways at this time for two reasons:

1. The San Jose experiment was limited in scope and did not provide conclusive evidence regarding safety/operational benefit; and,
2. Traffic signals mast arms on State Highways may not have been designed to withstand the additional dead load and wind load caused by an EMS.

Caltrans does not have a Standard Plan for this EMS.

Attachment

9-03.8 Permissive Left-Turn Phasing

This type of operation allows vehicles to make left turns during a fully-protected interval with a green arrow indication, or to make a permissive left turn with a circular green indication when there are adequate gaps in opposing traffic. Permissive left turn phasing may be either pre-timed or traffic actuated. Examples of the operation may be found in the Traffic Control Devices Handbook (FHWA).

There are normally two sequences that can be utilized with permissive left turn phasing:

1. *Protected-Permissive.*

   With this operation, left turn traffic is first directed to turn left on the display of a green arrow and then permitted to turn during the nonprotected interval on the display of a circular green.

2. *Permissive-Protected.*

   With this operation, the left turn traffic is first permitted to turn during the nonprotected interval on the display of a circular green and then directed to turn left on the display of a green arrow.

The advantages of this operation when compared to fully-protected left turn phasing only are:

1. Reduces delay as left turn drivers may have an opportunity to make their left turns during the green interval or yellow change interval for through traffic.

2. Allows the use of shorter cycle lengths in coordinated systems by reducing the time of the fully protected green interval for the left turn movement.

3. Less chance of disrupting traffic in adjacent through lanes as left turn queues are less likely to exceed the length of the left turn lane.

When a protected-permissive or permissive-protected left-turn phasing operation is used for a traffic signal on a street or highway, no information sign is necessary.

If a sign is used on a State highway, it shall be a R73-7, LEFT TURN YIELD ON GREEN (Green Ball symbol) sign.

In lieu of the R73-7 sign, local authorities may use an extinguishable message sign. An extinguishable message sign shall not be used at an intersection with a State highway. The message shall say LEFT TURN YIELD. Letters shall be at least 150 mm in height. The light source shall be designed and constructed so that when illuminated, the message shall be white and remain dark when not in use. The message shall be illuminated when only the green permissive ball is lighted.

The following shall apply to permissive left-turn phasing:

1. This operation shall not be initiated where the left turn accident warrant is satisfied.

2. Signal faces should not be placed in a median facing a left turn lane.

3. Signs are not required for this operation unless U-turns are to be prohibited.

4. Both directions of through traffic shall be terminated simultaneously except where opposing left turns or opposing U-turns are prohibited.

State of California Business, Transportation and Housing Agency

Memorandum

To: District Electrical Seniors **Date:** February 2, 2000

File No: **Elect Review**

From: **DEPARTMENT OF TRANSPORTATION**
TRAFFIC OPERATIONS PROGRAM

Subject: New and Non-standard Devices Exception Process

To facilitate experimental field deployment of new and non-standard electrical and electronic devices, an exception process has been in effect. This process has been designed to document the needs and results of each experiment for reference. Each experimental deployment requires an approval from Headquarters Traffic Operations.

To acquire an approval for a field experimental deployment of new and non-standard electrical and electronic devices, we ask that a request be forwarded to the Office of ITS Development and Support. In addition, we need a description of the need for the device(s), alternatives considered, and the expected benefits from the experimental deployment.

If the request is found appropriate, an approval should be given within 2 weeks. The approval will be given under the condition that the requester provides a report within 3 months of the deployment, at the conclusion of the deployment, or at a particular milestone. This report shall summarize the following:

- **Why the non-standard device(s) is needed** (Were there any alternatives considered? What operational, maintenance, safety and cost factors were involved in the decision)
- **Description of the device(s) used** (Type, make, model, signal technologies, operation characteristics, power, communications and maintenance requirements, etc.)
- **Efficiency and effectiveness** (Does the device(s) perform well in all conditions? Does it meet expectations? What deficiencies were experienced? How superior to the existing system?)
- **Recommendations** (What should be adopted as standards and specifications? What are desirables and undesirables for the device(s))

If you have questions regarding this exception process, please call Theresa Gabriel at (916) 654-5039, calnet number 8- 464-5039.

Sompol Chatusripitak, Chief
Office of ITS Development and Support

Memorandum

Flex your power!
Be energy efficient!

To: DISTRICT/ REGION DIRECTORS
DISTRICT/REGION DEPUTY DIRECTORS
ALL PROJECT MANAGERS
DISTRICT MAINTENANCE & OPERATIONS ENGINEERS

Date: March 26, 2002

File: 608

From: **DEPARTMENT OF TRANSPORTATION**
DIVISION OF DESIGN - MS 28

Subject: Purpose, Application and Approval Authority for Exceptions to Design Standards

The Department has established design standards for several reasons. One reason is to promote consistency in the design and appearance of our highway facilities to satisfy driver expectations to the highest degree possible. The purpose of an Exception to Design Standards is to document or demonstrate that sound engineering judgment was used in determining the justification for the nonstandard feature. This process of approving nonstandard design features allow flexibility in the application of design standards, and provides documentation of the engineering design process necessary for design immunity in tort issues.

Approval authority for exceptions to advisory and permissive standards rests at the district/region level. The Chief, Division of Design (delegated to the Design Coordinators) retains approval authority for Exceptions to Mandatory Design Standards. Additional discussion on design standards can be found in the Highway Design Manual, Topic 82. Documentation for exceptions to advisory and mandatory design standards are to be filed in the official district files (which is the repository for design exception fact sheets). For Exceptions to Mandatory Design Standards, two additional copies should be forwarded to the Division of Design, Office of Geometric Design, MS #28, for filing in Headquarters.

Exceptions to minimum design standards must be documented for any of the following conditions:

1. Capital improvement projects that create a nonstandard feature or do not upgrade an existing nonstandard feature. This includes safety, rehabilitation, Minor A, and Minor B projects. Under certain circumstances, CAP-M projects may also require design exceptions (see "Capital Preventive Maintenance Program Guidelines," September 26, 2000).

2. During construction when a nonstandard feature is discovered or is proposed as part of a contract change order.

DISTRICT/ REGION DIRECTORS
DISTRICT/REGION DEPUTY DIRECTORS
ALL PROJECT MANAGERS
DISTRICT MAINTENANCE & OPERATIONS ENGINEERS

3. Any project or activity where a new nonstandard feature is created. Examples include:
    a. Striping installation orders or major maintenance projects where existing striping is modified to create nonstandard lane, shoulder, or median widths.
    b. Overlays that reduce vertical clearance to less than standard.

4. Work done by others within State right of way (e.g., locally funded and permit projects) that creates or perpetuates a nonstandard feature.

The procedure for documenting Mandatory Design Exceptions is found in the PDPM, Chapter 21 and Appendix BB (as superceded by memorandum dated September 25, 2000 by Bob Buckley). Alterations to this format must be discussed with, and agreed to, by the Headquarters Design Coordinators. If you have any questions, please contact your Design Coordinator.

Original Signed By:
KARLA SUTLIFF

KARLA SUTLIFF
Chief
Division of Design

WFarnbach:dlt
bc:
KSutliff
TCraggs
KCozad
MBHerritt
WFarnbach
All Coordinators
All Geometricians
Design Files

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: STANDARD SPECIAL PROVISION/
STANDARD PLAN OWNERS

Date: April 15, 2003

From: BRIAN LEE
Chief
Office of Project Scheduling and Support
Office Engineer
Division of Engineering Services

Subject: Dual-Unit SSP and Standard Plan Updates

The Department has made available for local agency use, dual-unit versions of its Standard Specifications, Standard Plans and Standard Special Provisions (SSPs). To keep these documents current:

- New requests for SSPs and Standard Plans must include a dual-unit version in addition to the metric version. Any requests received without a dual-unit version will not begin processing until the dual-unit version is received.

- For requests received prior to this memo but not yet approved, the Standards engineer processing the Request will be contacting the appropriate representative regarding the submission of a dual-unit version. Approval will not occur until the dual-unit version is received.

- For requests approved prior to this memo, the Standards engineer will prepare a dual-unit version that will be forwarded to your representative for concurrence.

The dual-unit SSPs are available on the Department's website at http://www.dot.ca.gov/hq/esc/oe/conststand.html.

If you have questions regarding these procedures, please contact Joyce Hirano at Calnet 8-498-6254.

c: John McMillan
Don Scheel
Paul Burdick
Joyce Hirano

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
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To: DEPUTY DIRECTOR
DEPUTY DISTRICT DIRECTORS
Operations and Maintenance
DISTRICT ELECTRICAL SENIORS, D1-D12
ENGINEERING SERVICE CENTER- HQOE

Date: June 27, 2003

File:

From: JOHN A. (Jack) BODA
Chief
Division of Traffic Operations

Subject: State Furnished Materials for LED Modules and BBS Systems

This memorandum is to clarify the process used for obtaining the Light Emitting Diodes (LED) Traffic Signal Modules and LED Pedestrian signal face modules. It is the policy of the department that traffic signals and pedestrian service shall require LED Traffic Signal Modules and LED Pedestrian signal face Modules. The use of LED modules saves the State over 84% in energy costs.

In addition, because of the low power consumption of the LED Traffic Signal Modules, signalized intersections may require Battery Back-Up Systems. Please refer to the March 21, 2001, memo "Deploying Battery Back-up systems at Traffic Signalized Intersections." The BBS will benefit the State as well as the traveling motorist in case of a power interruption.

1. LED Traffic Signal and Pedestrian Modules and BBS Systems shall be State Furnished Equipment for all State projects involving new traffic signal system installations and/or modifications to existing system.

2. District Electrical Engineers will order the required LED Modules and BBS Systems through their district warehouse personnel. Be alerted that a lead-time of 30-45 days may be required to acquire the units from the HQ Warehouse.

3. Permit Fees for projects involving traffic signals, shall include adequate funds to State Furnish the LED signal modules and the BBS systems. District Permit Electrical

Reviewer will order the required LED modules and the BBS Systems through their district warehouse personnel. Be alerted that a lead time of 30-45 days may be required to acquire the units from the HQ Warehouse

4. This process applies to each new and existing traffic signal system within the State Highway System, including those at the intersection of freeway ramps and local streets, whether they are maintained by the State or by local agency.

Any questions may be directed to Ms. Theresa Gabriel (916-654-5039) of my staff.

cc: Jack Boda
Chris Tan, Translab
Theresa Gabriel
Bob McMillan
Paul Cavanaugh

STATE OF CALIFORNIA • DEPARTMENT OF TRANSPORTATION

POLICY DIRECTIVE

TR-0011 (REV 7/1/2003)

TRAFFIC OPERATIONS POLICY DIRECTIVE	NUMBER **03-04**	PAGE 1 OF 3
KARLA SUTLIFF, DIVISION CHIEF *(Signature)*	DATE ISSUED 07/21/03	EFFECTIVE DATE 08/01/03
SUBJECT VEHICLE SPEED FEEDBACK SIGNS	DISTRIBUTION ☐ All District Directors ☒ All Deputy District Directors - Traffic Operations ☒ All Deputy District Directors - Maintenance ☐ All Deputy District Directors - Construction ☐ All Deputy District Directors - Project Development ☐ All Deputy District Directors - Transportation Planning ☐ Chief, Division of Engineering Services ☒ Chief Counsel, Legal Division ☐ Publications (for Distribution to all holders of Traffic Manual) ☐ Headquarters Division Chiefs for:	
DOES THIS DIRECTIVE AFFECT OR SUPERSEDE ANOTHER DOCUMENT? ☐ YES ☒ NO	IF YES, DESCRIBE NOT APPLICABLE	
WILL THIS DIRECTIVE BE INCORPORATED IN THE TRAFFIC MANUAL? ☒ YES ☐ NO	IF YES, DESCRIBE Section 4-03.6 Individual Policies For Regulatory Signs	

DIRECTIVE

The following Traffic Operations Policy Directive supplements the California Department of Transportation Traffic Manual, Section 4-03.6, Individual Polices For Regulatory Signs - R2 SPEED LIMIT SIGN. The Directive is applicable on public roadways in California.

A Vehicle Speed Feedback Sign that displays to approaching drivers the speed at which they are traveling may be installed in conjunction with an R-2 Speed Limit Sign.

☒ If checked, see continuation page(s).

IMPLEMENTATION

Standard:

If a Vehicle Speed Feedback Sign displaying approach speeds is installed, the legend shall be YOUR SPEED XX.

Legend shall be white, yellow, yellow-green or amber color on black background.

When activated, lights shall be steady-burn conforming to the provisions of California Vehicle Code Sections 21466 and 21466.5.

Guidance:

To the degree practical, numerals for displaying approach speeds should be similar font and size as numerals on the corresponding R-2 Speed Limit Sign.

Option:

When used, the Vehicle Speed Feedback Sign may be mounted on either a separate support or on the same support as the R-2 Speed Limit Sign.

In lieu of lights, legend may be retroreflective film for flip-disk systems.

The legend YOUR SPEED may be black on white plaque located above the changeable speed display.

Support:

Driver comprehension may improve when the Vehicle Speed Feedback Sign is mounted on the same support below the R-2 Speed Limit Sign.

Vehicle Speed Feedback Signs are appropriate for use with Advisory Speed Signs and with temporary signs in work zones.

The California Department of Transportation 1996 Traffic Manual, Section 4-01.24 Lateral Clearance, applies to Vehicle Speed Feedback signs. Also, refer to Section 7-02.3 for sign supports.

BACKGROUND

In Sacramento, on June 5, 2003, the California Traffic Control Devices Committee recommended that the California Department of Transportation adopt language proposed by the Federal Highway Administration to be incorporated into the Manual on Uniform Traffic Control Devices for Section 2B.11 Speed Limit Sign (R2-1).

ADA Notice For individuals with sensory disabilities, this document is available in alternate formats. For information call (916) 654-6410 or TDD (916) 654-3880 or write Records and Forms Management, 1120 N Street, MS-89, Sacramento, CA 95814.

DEFINITIONS

When used in this Traffic Operations Policy Directive, the text shall be defined as follows:

1) **Standard** - a statement of required, mandatory, or specifically prohibited practice. All standards text appears in **bold** type. The verb **shall** is typically used. Standards are sometimes modified by Options.

2) Guidance - a statement of recommended, but not mandatory, practice in typical situations, with deviations allowed if engineering judgement or engineering study indicates the deviation to be appropriate. All Guidance statements text appears in underlined type. The verb should is typically used. Guidance statements are sometimes modified by Options.

3) Option - a statement of practice that is a permissive condition and carries no requirement or recommendation. Options may contain allowable modifications to a Standard or Guidance. All Option statements text appears in normal type. The verb may is typically used.

4) Support - an informational statement that does not convey any degree of mandate, recommendation, authorization, prohibition, or enforceable condition. Support statements text appears in normal type. The verbs shall, should and may are not used in Support statements.

ATTACHMENTS

NONE

State of California
DEPARTMENT OF TRANSPORTATION

Business, Transportation and Housing Agency

Memorandum

Flex your power!
Be energy efficient!

To: DISTRICT DIRECTORS

Date: August 8, 2003

File:

From: RANDELL H. IWASAKI
Deputy Director
Maintenance and Operations

BRENT FELKER
Deputy Director
Project Delivery

Subject: Expediting Safety Improvements

The purpose of this memo is to reaffirm the Department's commitment to safety and provide guidance to expedite delivery of highway safety improvements. The Department has established safety as the top strategic goal.

The Department investigates all high collision concentration locations. Where data indicates a collision pattern susceptible to correction, safety projects are initiated to improve roadway features. The scope of the improvement can vary from a simple sign installation order to a SHOPP Safety project.

Upon identification of the improvement, Districts must initiate immediate action. Early buy-in by the Project Development Team on the scope, cost, and schedule is essential to expedite the delivery of the safety improvement. If the recommendation is a SHOPP Safety project, Headquarters Traffic Safety Program approval is needed. To help expedite this process, early coordination with the Headquarters Traffic Safety Program is encouraged to minimize delay with programming. As soon as the district has an approved scooping document, a SHOPP amendment should be prepared to program the project. Once programmed, many steps can be initiated concurrently to expedite the project. Other work will be set aside if necessary to complete this project in the shortest possible time. Project Delivery Teams need to establish aggressive but realistic schedules to ensure the timely delivery of safety projects and make every effort to meet their commitment.

The importance of delivering safety improvements must be stressed with externals to expedite environmental review and approvals. Partnering with local agencies can help resolve mobility issues before they become safety issues.

The Department's target is to deliver all safety projects as soon as practicable and program no long lead safety projects. Timely delivery of safety projects will help in achieving the Department's strategic goal of safety. Guidance on expediting safety improvements is available at:

http://onramp/hq/trafops/tsi/

Please share this statement of priority with all staff involved with the delivery of safety improvements.