Needs Assessment for Roads North of Doctor Fine Bridge in Del Norte County, California

A Community Vision for Smith River

February 2008

Prepared by:
The Local Government Commission

Prepared for:
Smith River Rancheria

ACKNOWLEDGEMENTS

Tribal Council

Kara Brundin-Miller - Tribal Chairperson
Denise Padgette - Tribal Council Vice Chair
Sharyne R. Harper - Tribal Council Secretary
Joel Bravo - Tribal Council Treasurer
Marian Lopez - Tribal Council Member
Loren Bommelyn - Tribal Council Member
Joseph Giovannetti, Ph.d. - Tribal Council Member

Rancheria Staff

Russ Crabtree, Tribal Administrator
Darrell Moorehead, Tribal Employment Rights Officer

Others

Terry Supahan, Tribal Consultant

Design Team

Local Government Commission
Paul Zykofsky, Director of Transportation and Land Use Programs
Anthony Leonard, Project Manager
1303 J Street, Suite 250
Sacramento, Ca 95814
(916) 448-1198

Glatting Jackson Kercher Anglin, Inc.
Dan Burden, Principal, Senior Urban Designer
Executive Director of Walkable Communities
33 E. Pine St.
Orlando, FL 32801
(866) 347-2734

Michael Sweeney, AICP
Environmental Planning & Project Development
P.O. Box 809
Ferndale, CA 95536
(707) 786-9269

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Views and opinions presented in this report do not necessarily represent the views or opinions of Caltrans or the California Business Transportation and Housing Agency.

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EXECUTIVE SUMMARY

The Local Government Commission (LGC), a non-profit membership organization of local government officials, conducted an intensive multi-day public design process at the Smith River Rancheria to produce a conceptual plan for improving transportation connections, safety, mobility and development strategies on a 7-mile corridor of State Highway 101 from Dr. Fine Bridge over the Smith River to the Oregon Border. The study is funded through an Environmental Justice: Context Sensitive Planning Grant from the California Department of Transportation (Caltrans) and with funds from the Smith River Rancheria.

The public design followed a 4-step process that engaged residents of the Smith River Rancheria (Tolowa Tribe) and the town of Smith River, as well as county, regional and state transportation planning officials, public transit (including school buses), Tribal Council members and Rancheria staff. The steps included:

1. Focus group discussions with key stakeholder groups
2. Opening community workshop
3. Walking tour and street design workshop
4. Closing workshop and design presentation

Smith River Conceptual Plan

The conceptual plan presented in this report provides a blueprint for implementing ideas related to traffic calming and pedestrian and bicycle safety as well as a safer and more efficient transportation system that supports long-term, sustainable development and community well-being. The Smith River Conceptual Plan makes the following recommendations for areas along Highway 101 and adjoining roadways:

Workshop participants gather in front of the Howonquet Hall Community Center.

Neighborhood People Solve Problems

Neighbors can best:

- **Mobilize residents**
- **Define the problems**
- **Develop ownership**
- **Identify the best tools**
- **Identify the best locations**
- **Achieve support**
- **Monitor level of success**

Widened shoulders on Hurley Way in Sacramento, County, CA. Steve Price Urban Advantage.

Striping and Colorizing.

Curbs and Landscaping.

Widen Shoulders on Highway 101

Widening all shoulders on Highway 101 to a minimum of 8 feet would accommodate disabled vehicles, and allow for bus stops as well as provide space for bicycles and pedestrians.

Establish Slower Speed Zones

Create slower speed zones on Highway 101 in the approaches to Smith River at Fred Haight Drive and Smith River Rancheria at North Indian Road by applying traffic calming measures including:

Striping

Widening the center line, fog line or bicycle lane line from the typical 4 inch wide stripe to an 8 inch wide line that will alert the motorist that the roadway is changing and motorist behavior must begin to change accordingly.

Colorizing

Striping and colorized shoulders and medians can be expected to reduce motor vehicle speed by a few miles per hour.

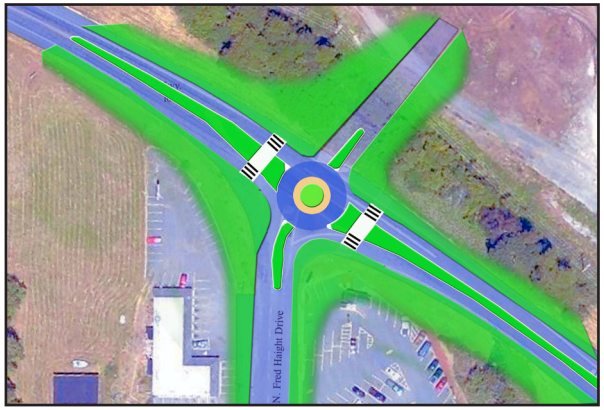
Curbs and Landscaping

Raised curbs extend the narrowing effect of striping and colorizing by adding a vertical dimension. Landscaping with low shrubs and trees can also help delineate these changes and further the awareness by the motorist that the roadway is changing.

Roundabouts

Modern roundabouts can be designed to accommodate the largest of trucks (such as logging trucks) as well as buses and emergency vehi-

cles. The geometry of the roundabout requires motorists to slow to 15 to 20 mph, wait for a gap in traffic, and then enter counterclockwise. Speeds at roundabouts are slow, and conflicts are reduced since all turns into and out of a roundabout are right turns — eliminating more dangerous and complex left turns.



Roundabout at Fred Haight Drive.

Realignment of Rowdy Creek Road

A curve in highway alignment limits northbound views of traffic exiting or entering Rowdy Creek Road from Highway 101 and the absence of right- and left-hand turn pockets result in hazards to exiting the highway. The Rancheria has expressed interest in acquiring and developing the adjoining abandoned mill site. Were this to happen, the opportunity exists to realign Rowdy Creek Road to intersect with Highway 101 at the Fred Haight Drive intersection.

Traffic calming measures such as striped and colorized shoulders, raised curbs, and a roundabout would make this intersection safer for motorists, bicyclists, and pedestrians as well as move through traffic more efficiently.

Limited Sight Distance along Highway 101

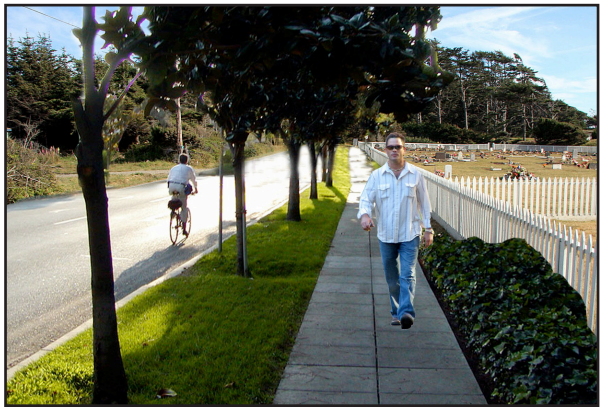
Sight distance issues are difficult to accommodate in their entirety. Traffic calming measures such as the striping and colorizing discussed above can caution motorists and slow speeds where sight distance issues prevail, especially at North Indian Road and Fred Haight Drive.

Realignment of Rowdy Creek Road.

Dedicated Right and Left Turns

Much of Highway 101 through the study area lacks dedicated right turn or left turn pockets allowing safe exit from the travel way. Widened shoulders can serve as a right hand turn pocket allowing motorists to move out of the travel way as they slow down and make their turn, removing the hazard of rear end collisions. Similarly, two way left turn lanes or left turn pockets al-

Pedestrian Crosswalks.



Sidewalk along South Indian Road.

Pedestrian/Bicycle Trail.

low turning motorists to remove themselves from the travel way while awaiting clearance to safely make a left hand turn crossing oncoming traffic.

Pedestrian Crosswalks, Sidewalks, or Pedestrian/Bicycle Trails

Highway 101

Many issues focus attention on the need for more facilities to accommodate non-motorized means of transport, specifically walking and bicycling.

Shoulder widening along Highway 101 will provide adequate space for both pedestrians and bicyclists to avoid encroaching upon the travel way and the hazards motor vehicles pose. Intersection treatments such as striping, colorizing, raised curb and median islands can make it safer and easier for pedestrians to cross and make it easier for motorists to anticipate and see pedestrians and bicycles.

Oceanview Drive

There may be adequate space along Oceanview Drive to utilize adjoining utility easements to provide a wider shoulder for pedestrian/bicycle use. Alternatively, a separate pedestrian trail could be constructed along the downhill side of Oceanview Drive that would allow pedestrians and bicyclists a safe and convenient alternative to using Highway 101 or Oceanview Drive.

North Indian Road

North Indian Road, a County Road, provides access to many tribal services, the gas station/mini-mart, casino/restaurant, and other services. Currently, queuing traffic entering the casino parking lot can back up into the travel way of Highway 101. This condition will increase with the construction of a new hotel and RV Park. Relocating the entry drive to the casino/restaurant/hotel/RV Park complex to the east would eliminate this condition. This is

less of a problem at the driveway to the gas station and mini-mart. However, there are often conflicts among vehicles entering and exiting the gas station, as well as vehicles exiting the casino area. Dedicating an "entry" drive and a separate "exit" could eliminate confusion and reduce conflicts.

Sidewalks should be installed on both sides of North Indian Road from Oceanview Drive to Highway 101.

South Indian Road

Along South Indian Road, there appears to be adequate right-of-way to provide a 6 foot planting strip and a sidewalk or unpaved pedestrian path on the west side with a wider, paved shoulder on the other side. This would allow pedestrians to walk outside of the travel way. Given the relatively low traffic and low speed of motor vehicles, bicycles could safely ride in the travel way.

1st Street

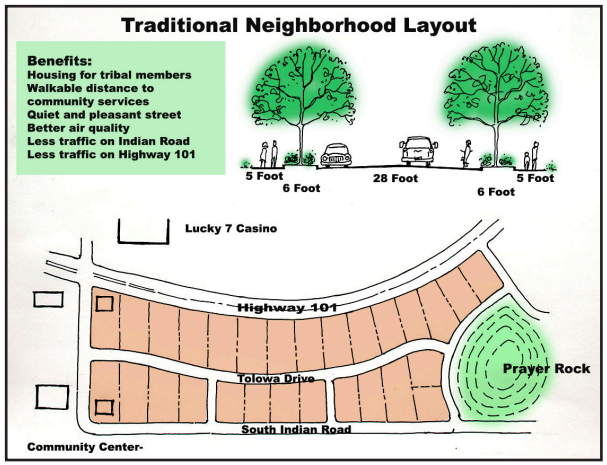
Sidewalks should be installed on both sides of 1st Street from North Beckstead Avenue to Sarina Road providing a safe route to the Smith River School.

Sidewalks on 1st Street.


Gateways and sense of arrival.

Gateways and Sense of Arrival

In general, there is no gateway or "sense of arrival" to the Town of Smith River or the Smith River Rancheria. Implementation of the traffic calming measures discussed above at the approaches to the major intersections at Fred Haight Drive and North Indian Road can provide opportunities to incorporate gateway features including signs, landscaping, monuments or sculptures. The combined effect of traffic calming features such as striping, colorizing, raised curbs and landscaping can create the appropriate sense of arrival.



Traditional Neighborhood Design.

Traditional Neighborhood Design

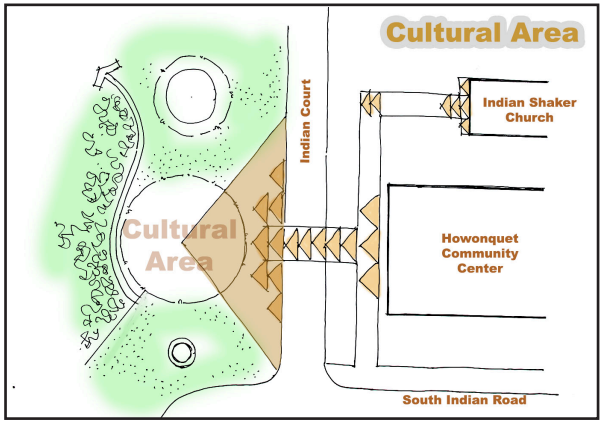
An opportunity exists to establish a template for a traditional village off of South Indian Road. The Smith River Rancheria Master Plan calls for more housing for tribal members, especially for seniors, in this area. There is adequate space to create a compact neighborhood setting by installing a new road (Tolowa Drive) between Highway 101 and South Indian Road, connecting with Prince Island Road. Both multi-family and single-family residences could be constructed along this "neighborhood" road which would include sidewalks, a parking strip, on-street parking, and room for bicycles. This area would be in walking distance to the community center, health clinic, family services, ceremonial dance house, and parkland. This neighborhood could serve as a template for other residential and commercial development within the Rancheria and the Town of Smith River.

Ceremonial Area

During the workshop, many participants requested an area dedicated to Tribal Ceremonies.

The conceptual plan illustrates one possible location west of the Community Center. This concept simply ties in the activities of the Community Center with adjoining activities of the Native American Church with a ceremonial center or cultural area. The area is adjacent to the proposed ceremonial dance hall and could provide an outdoor venue for ceremonies and dances among other community functions. This location on the bluff of the beach, and next to the fishing access trail to the beach, brings together the past and the present for the Tolowa people.

Ceremonial Area.



Coordination and Phasing

Three possible stages of recommended improvements are presented below:

Stage 1 - Widen shoulders to 8 feet, widen striping to 8-inches, colorize shoulders, medians, passing and two-way left turn lanes, and priority sidewalks within the next 1-2 years.

Stage 2 - Raised curb extensions and landscaping can be added to better define intersections, medians and right and left turn lanes (if speeds have been reduced to 40 mph by widening striping and colorizng widened shoulders), priority sidewalks, bicycle lanes, and pedestrian paths could be accomplished in 2-5 years.

Stage 3 - If traffic volumes were to reach a level that would prompt Caltrans to look at safetly and operation improvements at the intersections of Highway 101 with North Indian Road, Mouth of Smith River Road, and Fred Haight Drive, installing a traffic signal or roundabout would be considered. This could occur within 5-8 years depending on the increase in motor vehicle trips and the rate and extent of new development within the Rancheria and the Town of Smith River. Collectively, the traffic calming measures would complete the slower speed zone concepts for the approaches to North Indian Road, Mouth of Smith River Road, and Fred Haight Drive. Gateways can be incorporated into road improvments such as shoulders, parking strips, medians, and roundabouts.

These elements are described in some detail in Chapter 5. Smith River Conceptual Plan.

Stage 1

Stage 2

Stage 3

Treat the Earth well.
It was not given to you by your parents.
It was loaned to you by your children.

— Indian proverb

CHAPTER 1: INTRODUCTION

The Local Government Commission, a non-profit membership organization of local government officials, in partnership with the Smith River Rancheria, conducted an intensive multi-day public design process known as a "charrette," or design fair, to produce a conceptual plan for improving transportation connections, safety, mobility and development strategies on the Smith River Rancheria and surrounding areas. The study is funded through an Environmental Justice: Context Sensitive Planning Grant from the California Department of Transportation (Caltrans).

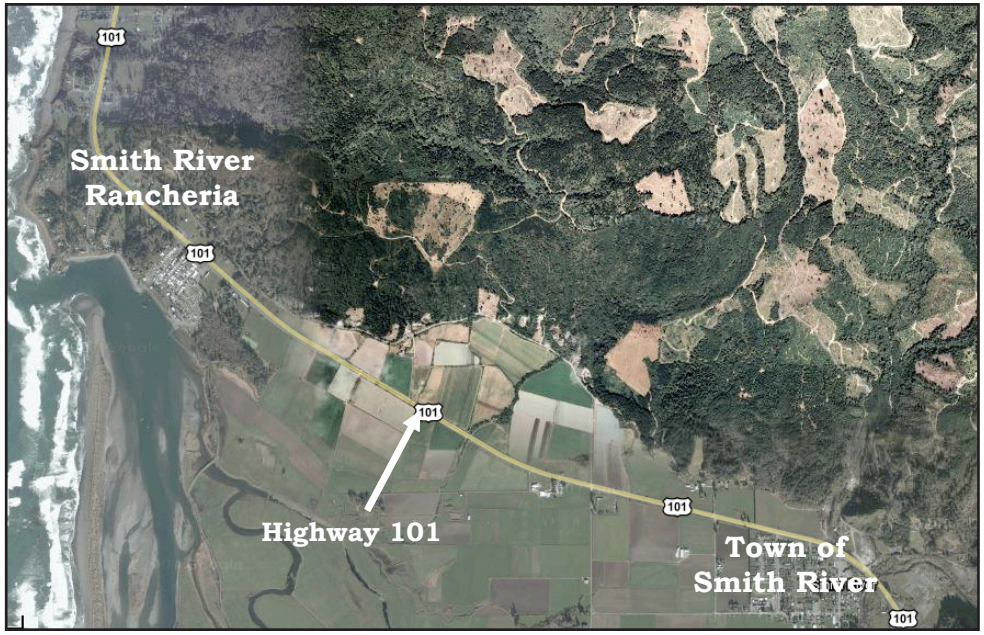
The design study focuses on a 7-mile corridor of State Highway 101 from Dr. Fine Bridge over the Smith River to the Oregon border. This report summarizes the outcome of the design fair and recommends concepts for transportation improvements within the study area.

Environmental Justice: Context Sensitive Planning

The Environmental Justice: Context Sensitive Planning Grant Program was established in 2001. The program demonstrates different approaches to community involvement, land use and transportation strategies, and planning activities in low-income and minority communities.

The program promotes context sensitive planning and interdisciplinary effort to address the interests and concerns of low-income and minority populations in transportation planning and project development. The effort includes reaching out to low income and minority communities; identifying and engaging underrepresented communities early in transportation planning; and developing information, data, analytic tools, and educational workshops.

The Design Fair focused on Highway 101 from the Town of Smith River to the Smith River Rancheria.



As far as we know, Caltrans is the only Department of Transportation in the nation that is providing funding for planning to local jurisdictions/tribes through Environmental Justice and Community Based Transportation Planning Grants.

Deputy Directive 64

Caltrans Deputy Directive 64 establishes walking as a central element of the state's transportation system. Chris Morfas, former executive director of the California Bicycle Coalition calls the Directive "the most powerful pro-bicycling and pro-walking policy document ever to come out of a state department of transportation."

The Directive reads:

> The Department fully considers the needs of non-motorized travelers (including pedestrians, bicyclists, and persons with disabilities) in all programming, planning, maintenance, construction, operations and project development activities and products.
>
> This includes incorporation of the best available standards in all of the Department's practices. The Department adopts the best practice concepts in the US DOT Policy Statement on Integrating Bicycling and Walking into Transportation Infrastructure.
>
> The planning and project development process seeks to provide the people of California with a degree of mobility that is in balance with other values. They must ensure that economic, social and environmental effects are fully considered along with technical issues, so that the best interest of the public is served. This includes all users of California's facilities and roadways.

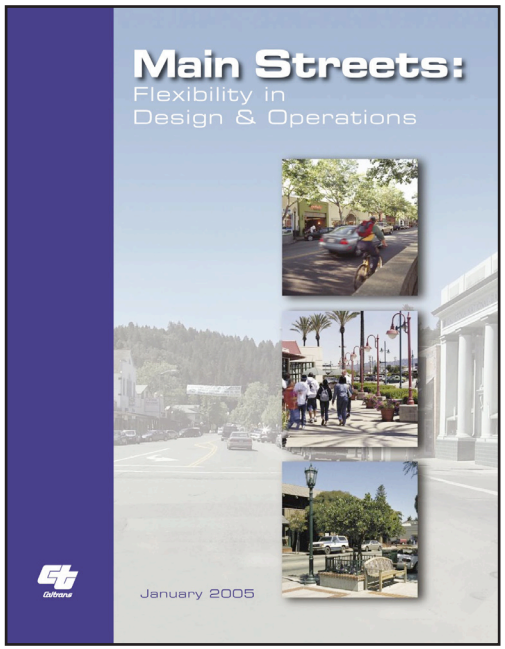
Attention must be given to many issues including, but not limited to, the following:

- Safe and efficient transportation for all users of the transportation system
- Provision of alternatives for non-motorized travel
- Support of the Americans with Disabilities Act (ADA)
- Attainment of community goals and objectives
- Transportation needs of low-mobility, disadvantaged groups
- Support of the State's economic development
- Elimination or minimization of adverse effects on the environment, natural resources, public services, aesthetic features and the community
- Realistic financial estimates
- Cost effectiveness

Context Sensitive Solutions

In 2001, the Director of Caltrans established a policy for "context sensitive solutions" (California Department of Transportation, Director's Policy #20, 11-29-01). Context Sensitive Solutions (CSS) meet transportation goals in harmony with community goals and natural environments. They require careful, imaginative, and early planning, and continuous community involvement. The Director's Policy #20 states:

> In towns and cities across California, the State highway may be the only through street or may function as a local street. These communities desire that their main street be an economic, social, and cultural asset as well as provide for the safe and efficient movement of people and goods. In urban areas, communities want transportation projects to provide opportunities for enhanced non-motorized travel and visual quality. In natural areas, projects can fit aesthetically into the sur-



Main Streets: Flexibility in Design and Operations, California Department of Transportation, January 2005.

roundings by including contour grading, aesthetic bridge railings, and special architectural and structural elements. Addressing these needs will assure that transportation solutions meet more than transportation objectives.

The Department can be proud of the many contributions it has made to improve highways that are main streets and the aesthetics of its highways and structures; however, there is a strongly expressed desire across California for this concept to be the norm.

In 2005, Caltrans published a booklet entitled *Main Streets: Flexibility in Design and Operations* that emphasizes the Department's commitment to make state highways that are local main streets more livable. This booklet is a manifestation of the growing emphasis across the nation in Context Sensitive Solutions (CSS).

Caltrans recognizes the potential benefits of measures such as reducing the number of lanes through a downtown, reducing lane widths, installing traffic calming devices, lowering speed limits, providing angled parking, wider sidewalks, roundabouts, raised medians and other street side amenities that create a feeling that a town's main street is where you want to be.

These measures are consistent with the Caltrans commitment to safety and mobility and all are within the parameters of the Caltrans Highway Design and Project Development Procedures manuals. (*Main Streets: Flexibility in Design and Operations*, California Department of Transportation, January 2005).

CHAPTER 2: BACKGROUND

The Smith River Rancheria

Located three miles from the Oregon/California border, the Smith River Rancheria is the largest Indian Rancheria in California, with 190.4 acres of land in Del Norte County on the northern coast of the state. The Rancheria is located within the aboriginal territory of its people, the Tolowa. The Tolowa have occupied this area for millennia and enjoy a rich and well-developed culture.

One of three Indian reservations serving the Tolowa people, the Smith River Rancheria was established by treaty on November 6, 1908. As a part of the California Rancheria Act (1958), the Smith River Rancheria was terminated on July 28, 1960. Seventeen California Indian Tribes challenged their termination in federal court and the Rancheria regained its status as a result of the Tillie Hartwick vs. United States ruling on July 15, 1983. Members of the Rancheria adopted their constitution and formally reinstated their Tribal Government on June 27, 1987.

The Smith River Rancheria is a federally recognized Indian tribe of Tolowa Indians consisting of around 1,000 tribal members who form the general membership. The Smith River Rancheria is governed by a seven-member Tribal Council elected by the general membership. Direct tribal operations are administered by the Tribal Office.

The Smith River Rancheria is actively pursuing ways to mitigate issues related to a small land base, loss of traditional culture, and a depressed local economy. Currently, tribal members are engaged in cultural revitalization; members young and old participate in language classes, traditional dances, basket weaving, resource collection, and community events. In addition, the Tribe is buying land and placing it in Tribal Trust status, reserving this land for future uses which would benefit the community.

The Tolowa people have occupied this area for millennia.

Currently, the Tribe owns 27% of the Rancheria. These Tribally-owned properties are used for the water treatment facility, Tribal Administrative Offices, Lucky 7 Casino, a Fuel Mart, apartments for the elderly, the Howonquet Cemetery, a United Indian Health Service (UIHS) medical/dental clinic, the Howonquet Head Start and Day Care facility, a proposed rental housing project, and Howonquet Hall Community Center.

According to Russ Crabtree, Tribal Administrator, the Smith River Rancheria Master Plan calls for a number of community development projects within the next 2-5 years. A new wastewater treatment plant will eliminate a major barrier to new development – the need for on-site sewage disposal systems (septic tanks and leach fields). The existing road network will also need to be upgraded to accommodate proposed future development. The following new facilities are proposed:

- New waste water treatment facility
- Expand casino
- 80-unit hotel
- RV Park
- Grocery store/retail/restaurant/lounge
- New administrative offices
- Community playground/park
- New health clinic/safe house/wellness center
- Educational services center
- Ceremonial dance hall
- Single family residences
- Multi-family residences/apartments
- Senior housing/assisted living

The Town of Smith River

The town of Smith River is 13 miles south of the Oregon border, adjacent to Rowdy Creek and near where the Smith River meets the Pacific. The community and the river were named after the legendary mountain man Jedediah Smith, the first European to explore the area. Many of the 2,000 residents are direct descendants of the area's first farmers who settled the valley in the mid 1800s.

The community of Smith River is composed of older, small lot residential areas, small commercial and light industrial areas, and an old, abandoned mill site. The visitor-oriented Ship-A-Shore restaurant and Pelican Beach State Park are on Highway 101 north of town. Several rural residential areas are located adjacent to agriculture and timber lands along the highway.

Today, Smith River is considered the Easter Lily "capital of the world" with blooms covering the farms in July. Residents celebrate the lily with an "Easter in July Festival" held annually during the second weekend in July. The Arcata Lumber Company, the major redwood firm in the region, has its tree nursery there. The Rowdy Creek Fish Hatchery, established in 1968, was the first privately-owned fish hatchery in the state.

The lily farms, among other agricultural operations, have attracted an increasing number of Hispanic people to live and work in the area, contributing to the vitality and diversity of the Smith River community. According to the Del Norte County General Plan, 70% of the County's population is of European ancestry; 13.9% is Hispanic; 5.8% is Native American; 4.2% is African American; and 2.3% is Asian American.

Around 75 percent of the land base in Del Norte County is publicly-owned as national forest, state and national parks or County parks (Source: Del Norte County Public Works Department). As the land around Crescent City "builds out" (available land is developed), the Smith River area will likely see more growth as it is one of the few areas in the County that can accommodate ad-

The Hispanic community attended many of the workshop sessions.

Smith River is called the Easter Lily "capital of the world."

ditional development. The Del Norte County General Plan encourages infill within existing urban areas. Currently, the absence of a wastewater treatment facility, and the reliance on on-site sewage disposal systems, is a major barrier to future development.

CHAPTER 3: TRANSPORTATION NETWORK – EXISTING CONDITIONS

Highway 101 Route Concept Report

The Route Concept Report (RCR) is a Caltrans planning document which describes the conceptual improvement options for a given transportation route or corridor. Considering reasonable financial constraints and projected travel demand over a 20-year planning period, the RCR considers transportation facility needs for each route or corridor. The RCR is a tool for implementing interregional and statewide continuity of the State's transportation network, and will be updated as needed as conditions change, or new information is obtained (*Route Concept Report, Route 101 Corridor*, Caltrans, October 2002).

The objective of the RCR is to have local, regional, and state consensus on route or corridor concepts, improvement goals, and strategies. This document provides concept information only and does not determine policy nor establish a course of action. Route Concept Reports are prepared by District staff in cooperation with local and regional agencies.

The Concept for Route 101 from the Washington Boulevard Interchange in Crescent City to the California/Oregon border is a four-lane freeway/expressway. However, it is recognized that a four-lane freeway/expressway may not be necessary within the near 20-year period.

Route 101 is the economic lifeline of the north coast and the most important route in the District. It is a principal arterial serving interregional and interstate traffic, with use by both truck and tourist traffic.

The District recognizes that much of Route 101 cannot be developed to ultimate standards within 20 years without significantly increased revenues.

The Pacific Coast Bicycle Route goes from British Columbia to Mexico.

Nevertheless, route improvements should be directed toward achievement of this concept. Improvements will have to be deferred on some segments over the 20-year period, depending upon many factors, including available revenues, competing priorities along the route and other routes in the District, environmental concerns, and local/regional priorities.

Caltrans supports community enhancement opportunities and is interested in achieving livable community goals by partnering with Regional Transportation Planning Agencies, counties, cities, and communities where Route 101 is the Main Street through a city or community. Examples of this include Orick and Crescent City.

Community enhancements, which include the development of traffic calming improvements to reduce traffic speed and noise, development of context-sensitive improvement alternatives, and development of bicycle/pedestrian facilities to increase the opportunities for non-motorized trips, can improve the quality of life in our communities.

Most of Route 101 through the District (from Route 1 at Leggett to the California/Oregon State Line) is legislatively designated as the "Pacific Coast Bike Route." Shoulders on Route 101 are relatively narrow in some locations, and not well suited to non-motorized traffic. Caltrans is interested in upgrading shoulders to better accommodate bicycle traffic, particularly between the community of Leggett and the California/Oregon State line where Route 101 serves as the "Pacific Coast Bike Route." Discussion has been ongoing in many communities regarding the development of alternate parallel routes that would be safer and more attractive to both cyclists and pedestrians.

Caltrans is developing a strategy to inventory gaps in shoulder facilities for bicyclists, and a methodology to help determine the focus of priorities. Caltrans has evaluated the segments of Route 101 which comprise the "Pacific Coast Bike Route" using the Bike Compatibility Index (BCI) methodology in an effort to determine the "bicycle friendliness" of the roadway segments. Production testing of the BCI methodology on Route 101 segments has re-

vealed flaws in the methodology limiting its applicability in this corridor. Caltrans will continue to evaluate other tools to assist in identification of gaps in acceptable service for bicyclists along the Pacific Coast Bike Route sections of Route 101.

Caltrans is additionally conducting a study to determine the highest priority areas within identified segments of Route 101 for non-motorized projects where existing shoulder widths are less than 1.2 meters (4 feet), and will evaluate further tools to assist in this prioritization.

U.S. Highway 101

US Highway 101, the principal interregional highway in the region is identified as a key route for the interregional movement of people and goods by the 2025 California Transportation Plan (CTP). The 2025 CTP is a statewide, long-range transportation policy plan that provides for the movement of people, goods, services, and information. The CTP is being updated to comply with the federal Safe, Accountable, Flexible, Efficient Transportation Equity Act – A Legacy for Users (SAFETEA-LU).

US Highway 101 is also designated by the California 1998 Interregional Transportation Strategic Plan (ITSP) as a "High Emphasis" and "Focus" Route. There are a total of 34 state-designated High Emphasis routes in the state ITSP. Focus Routes are those routes that should have the highest priority for minimum facility standards within the next 20 years. They are a system of high volume primary arterial routes, to which lower volume and facility-standard state highways connect. Focus Routes provide access to rural areas and statewide "Gateways". The routes connect to fast-growing urbanized areas and are generally designated Surface Transportation Assistance Act (STAA) Truck Routes.

US Highway 101 is Del Norte County's principal north-south route to both Oregon and the rest of California. US Highway 101 is a designated "brown" route, which refers to highways with frequent areas of restricted passing

Highway 101 is the principal highway in the region.

Highway 101 allows for all legal-size trucks.

and/or highways with very high vehicle demand. On Brown routes all trucks, including STAA and California legal-size trucks, are allowed to pass.

The 2003 County General Plan references the designating of US Highways 101, 199 and SR 197 in Del Norte County as scenic highways. However, subsequent studies have not been undertaken, and no highways in the county have been designated.

Average Daily Traffic and Levels of Service

According to the Del Norte County 2007 Regional Transportation Plan, the Annual Average Daily Traffic (AADT) on Higway 101 for Smith River is 7,300 for 2005. The Level of Service (LOS) for Smith River is C. AADT is expected to increase to 9,490 in 2025 with an LOS of D, E. (Refer to *Note* on next page.)

In a Project Study Report dated 2004, Caltrans Office of Traffic Forecasting and Modeling provided higher ADTs for Post Mile (PM) 36.80 (junction with 197) to PM 42.32 (near Mouth of Smith River Road):

Year	Annual ADT
2002	1,180
2010	9,090
2020	11,600
2030	14,100

Accident Data

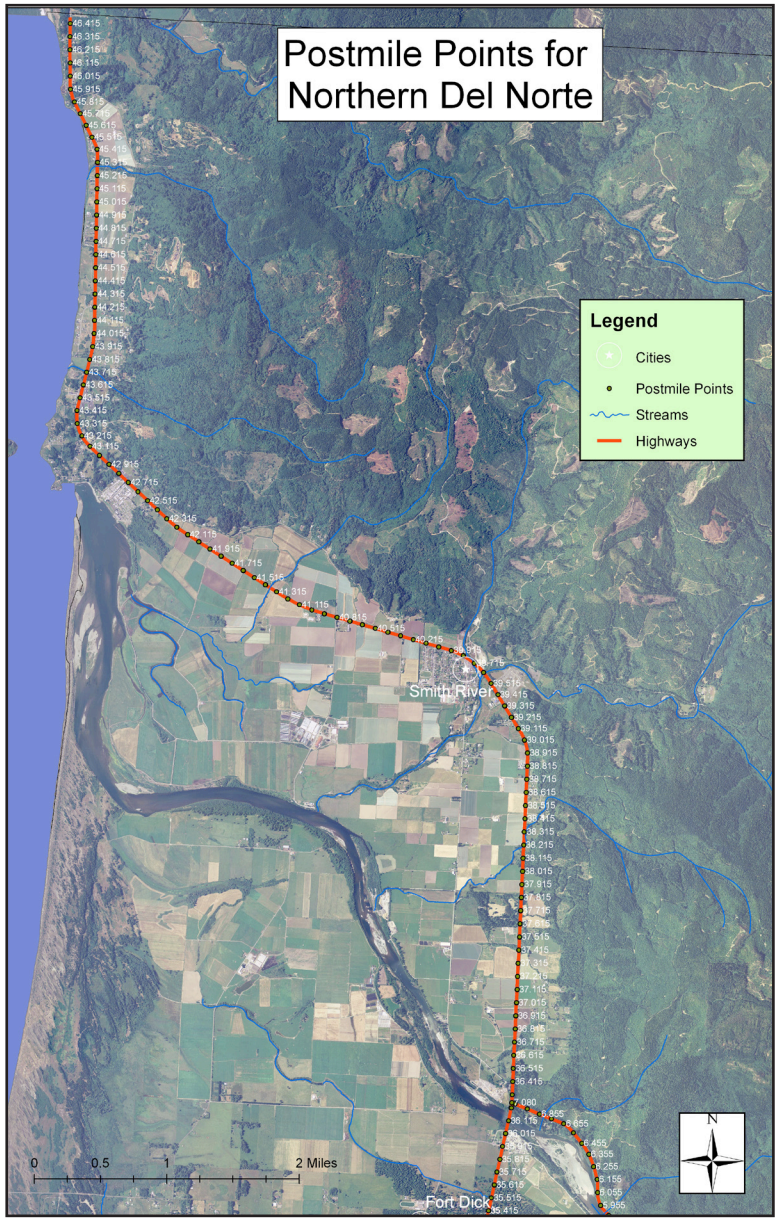
A Traffic Accident Summary Report was provided by Caltrans for the seven-mile study corridor for the last five years (2002-2007). Over the 5-year report period, there were a total of 138 collisions, which included

Note:

Annual average daily traffic (annual ADT, or AADT) is the total volume for the year divided by 365 days. Traffic counts are adjusted to an estimate of annual ADT by taking into account seasonal influences, weekly variations or other variables. Annual ADT is needed to present a view of state-wide traffic flow, provide trends, congestion, identify accident rates, and for planning and designing of highways. The peak month ADT is the average daily traffic for the month of heaviest traffic flow. The peak month ADT data is useful because many routes, such as Del Norte County's highways, experience consistently higher traffic volumes during the peak recreational travel months of summer-fall months. Peak month ADT is more representative of traffic conditions during these periods. Annual ADT information was obtained from Caltrans Annual ADT data, using peak month totals for the high volume traffic segments of US Highways 199 and 101, and State Routes 197 and 169. ADT and LOS for 2005 and 2025 are shown on the Figures on the following pages.

Level of Service (LOS) is a technical term that describes how much traffic congestion exists on a roadway. The level of congestion is expressed in terms of LOS 'A', meaning little or no congestion, through LOS 'F', meaning extreme congestion, or gridlock. LOS definitions generally describe traffic conditions in terms of speed, travel time, freedom to maneuver, traffic interruption, comfort, and convenience. Typically, level of service D is used as the design standard in urban areas and level of service C is used as the design standard in rural areas.

Also see Appendix



Highway 101 from Dr. Fine Bridge to the Oregon border. Source: Caltrans

Traffic Accident Summary

Primary Collision Factor	
28%	Improper turn
24%	Speeding
12%	Other
10%	Alcohol
8%	Failure to Yield
1.4%	Fell asleep
0.7%	Auto/pedestrian

Type of Collision	
45%	Hit Object
23%	Rear-end
13%	Broadside
6.5%	Overturn
4.3%	Heads-on
7%	Sideswipe

Source: Caltrans

80 involving property damage only, 51 involving injuries, and 7 fatalities. An additional accident on Dr. Fine Bridge since the reporting period resulted in another fatality for a total of 139 accidents and 8 fatalities over the last 5 years.

59% of the accidents were northbound while 41% were southbound.

According to Caltrans, the accident rate is close to the state-wide average for collisions. The auto/pedestrian accident rate is slightly lower than the state-wide average.

Many of the collisions are clustered along specific portions of Highway 101. The major clusters are located at:

- Both the northbound and southbound approaches to Fred Haight Drive
- Both the northbound and southbound approaches to Indian Road

Planned Projects

Passing Lanes

A Project Study Report (PSR) has been prepared to develop a northbound and southbound passing lane approximately 1.6 km in length on Route 101 near the community of Smith River from approximately 0.5 kilometers (km) north of the Junction of routes 101 and 197 to just south of the Ship-A-Shore resort (approximately 4 miles north of Rowdy Creek bridge). Currently, there are no passing or right turn lanes north of the junction of Highway 101 with Highway 197.

The project is needed because the northbound and southbound traffic frequently operate below the posted 55 mph speed limit causing delays. Providing passing lanes would enhance traffic flow and increase capacity by giving slow moving vehicles (truck and tourist traffic) a lane to travel in and allow mainstream traffic to flow at the posted speed limit (Project Study Report (PSR), Caltrans, 1/24/05).

Shoulder Widening

A project on US 101 to widen shoulders and provide left turn channelization near Smith River, approximately 4 miles north of Rowdy Creek Bridge #1-23 to 0.7 miles south of Oregon State line (2009) is currently under construction.

Bridge Replacement

Replace bridge over South Fork Smith River (Dr. Fine Bridge) (2012 - 2015)

County Streets and Roads

Del Norte County streets and roads are essential to traffic and goods movement to and from the County. County arterial and collector roads such as Parkway Drive, Lake Earl Drive, Elk Valley Road, Fred Haight Drive, and Ocean View Drive carry more daily traffic than US Highway 199 and most sections of US Highway 101. These roads provide access for local traffic, and help relieve congestion on parallel state highways. Trucks use County and City routes in lieu of state routes.

The goal of the County Scenic Drive Program is to promote tourism, enhance the County's image, encourage improvement of County roads, and increase local residents' appreciation of their natural environment. There are several routes that are potentially eligible for County designation as scenic drives. They include the following:

- Ocean View Drive to Mosely Road
- North Indian Road to Lower Lake Road
- Mouth of Smith River to Northcrest Drive
- Sarina Road to Washington Boulevard
- First Street to Pebble Beach Drive

Bicyclists admire the view at the Mouth of the Smith River.

Bike Plan Classifications

Class 1: Bicycle Pathway

A bicycle pathway is physically separated from motorized vehicular traffic

Class 2: Bicycle Lane

Bicycle lanes are designated on roadway shoulders by striping, signs, and pavement markings

Class 3: Bicycle Route

Provides for shared use with motor vehicle traffic and is identified only by sign.

- Fred Haight Drive to P.J. Murphy/Requa Road
- Lake Earl Drive to South Fork Road
- Howland Hill (east of Bertsch) to Enderts Beach Road
- Douglas Park Dr.

Bicycle Routes

Pacific Coast Bicycle Route (PCBR)

The Pacific Coast Bicycle Route (PCBR) is the most significant bicycle route in Del Norte County. It extends from Vancouver, British Columbia to Imperial Beach, California, near the Mexico border, winding along the Pacific Ocean coastline for approximately 1,830 miles. The Del Norte County segment features breathtaking cliffs, ocean vistas, redwood forests, lighthouses, beaches, and a rugged coastline. This all-weather accessible route offers varied terrain, including steep ascents, moderate climbs, and gentle grades. It includes state highways, county roads, city streets, rural side roads, and designated bike paths. The route also offers rest stops, which are necessary for distance cycling. Touring cyclists typically travel north to south, taking advantage of the tailwinds from the prevailing wind patterns.

In California the PCBR is a State-designated bike route of Class 2 and 3 bikeways, beginning at the California-Oregon border in Del Norte County. The Del Norte County segment runs along US Highway 101, except at two locations where it uses county roads. In the vicinity of the Town of Smith River, the PCBR is linked by Fred Haight Drive, First Street, and Sarina Road and is designated as Class 3. In the area north of Crescent City, it runs along Lake Earl Drive and continues south on Northcrest Drive through Crescent City to US Highway 101, which takes it all the way to Humboldt County.

When Caltrans improves US Highway 101, it widens the shoulders for bicyclists, wherever possible. Caltrans is currently evaluating priorities for shoulder improvements along Highway 101.

Del Norte County and Crescent City 2007 Bicycle Facilities Plan

This 2007 Bike Plan contains a bikeway system assessment of Del Norte County routes. It sets forth goals, policies and objectives, and an implementation schedule of proposed bikeway system improvements. The needs of both commuting and recreational bicyclists are considered. Routes in the Bike Plan were selected to accommodate existing and future needs, especially in areas where development activity or growth is anticipated.

There are Class 2 and Class 3 bikeways in several areas of rural Del Norte County. The Smith River area bikeway and Fred Haight Drive provides a scenic route near the coast and north of Smith River. Fort Dick area bikeways include Lower Lake Road and Lake Earl Drive. These are scenic routes with access to the Lake Earl area, as well as to the community of Fort Dick.

Planned Del Norte County Bikeway Improvements

Several existing bikeways are proposed for upgrading to Class 1 or Class 2 in northern and eastern Del Norte County. Bicycle routes are planned to connect the Town of Smith River to downtown Crescent City and Enderts Beach, and Gasquet to the east. When completed, bicyclists will have use of a variety of scenic routes. A Class 2 bikeway is proposed for 1st Street and Sarina Road in Smith River. A Class 3 bikeway is proposed for Fred Haight Drive and Rowdy Creek Road from US Highway 101 to Smith River National Recreation Area.

A longer term bicycle projects list (2017 – 2027) includes Class 2 bike lanes from Fred Haight Drive to Wilson Avenue (along Highway 101); Timbers Boulevard to Fred Haight Drive (along Highway 101); Oceanview Drive to North Indian Road (along Highway 101); Sarina Road to 1st Street, and 1st Street from Sarina Road to Beckstead (Del Norte County and Crescent City 2007 Bicycle Facilities Plan, Planwest Partners, 2007).

Source: Del Norte County and Crescent City 2007 Bicycle Facilities Plan.

The Pacific Coast Bicycle Route winds along the Pacific coastline for approxiamtely 1800 miles.

Bicycling for touring, commuting and recreatonal purposes is growing in demand.

Bicycle Routes to Schools

Over 4,000 children in Del Norte County attend public elementary, middle, and high schools. Providing safe bicycle routes to schools will give students the option of biking to school. The benefits of these routes include: increased opportunities for exercise, reduced fuel consumption, less traffic on the roadways, and time savings for those transporting students to school. The Smith River School (K-8) in Smith River is located on proposed bike routes, including the Pacific Coast Bicycle route, which turns off Highway 101 to Sarina Road to 1st Street to Fred Haight Drive.

Pedestrian Transportation (Sidewalks)

According to the 2007 Del Norte County Regional Transportation Plan (RTP), sidewalks in Del Norte County are found primarily in downtown Crescent City. Many of the rural roadways in the County do not provide safe pedestrian sidewalks or paths. This forces pedestrians to walk along the shoulder of the road or near the travel lane of the road, posing safety issues. Smaller communities in rural areas of the County, such as Smith River, Fort Dick, Gasquet, Hiouchi or Klamath, also have limited opportunities for safe pedestrian access due to lack of sidewalks. Sidewalk accessibility for pedestrians is increasingly becoming a community health issue, as well as a safety concern. Provision of sidewalks encourages people to walk and can help reduce motor vehicle trips and emissions, and support air quality policies.

Although pedestrians include all segments of the population, people who are elderly, low income, have disabilities, and children of school or college age, tend to be most likely to rely on pedestrian travel. People with disabilities comprise a substantial proportion of the pedestrian population, especially elderly citizens, who may have limited mobility.

Lack of sidewalks is a safety hazard for children. In order to improve the safety of children walking to and from school, a School Routes and Established School Crossings Plan, also known as Safe Routes to School, was developed

by the Del Norte County Unified School District during fiscal year 1991/92. The School Routes and Established School Crossings Advisory Committee reviewed problems with school pedestrian safety on the approaches to local schools with the intent of guiding and coordinating activities connected with school traffic safety concerns. Approved walkways to each school within the Del Norte Unified School District have been mapped, and recommendations for safety improvements prioritized. Implementation of the recommendations contained within the School Routes and Established School Crossings Plan is discussed in the Action Element of the RTP.

Public Transit

Redwood Coast Transit Authority (RCTA)

The Redwood Coast Transit Authority (RCTA) is the public transit agency for Del Norte County. The RCTA currently provides a number of transit services within the county. These include the four Crescent City Fixed Routes, the Klamath Commuter Fixed Route, the Smith River-Arcata Intercity Route, and Dial-A-Ride service.

The Smith River-Arcata Intercity Route was established on July 1, 2005 to replace interregional service provided by the Greyhound Bus Lines service, which had connected Del Norte County with the intercity bus and rail network.

The Smith River-Arcata Intercity Route provides bus service three times per day from Monday-Saturday to Smith River, Crescent City, Klamath, Orick, and Arcata.

Integrated Land Use, Air Quality and Transportation Planning

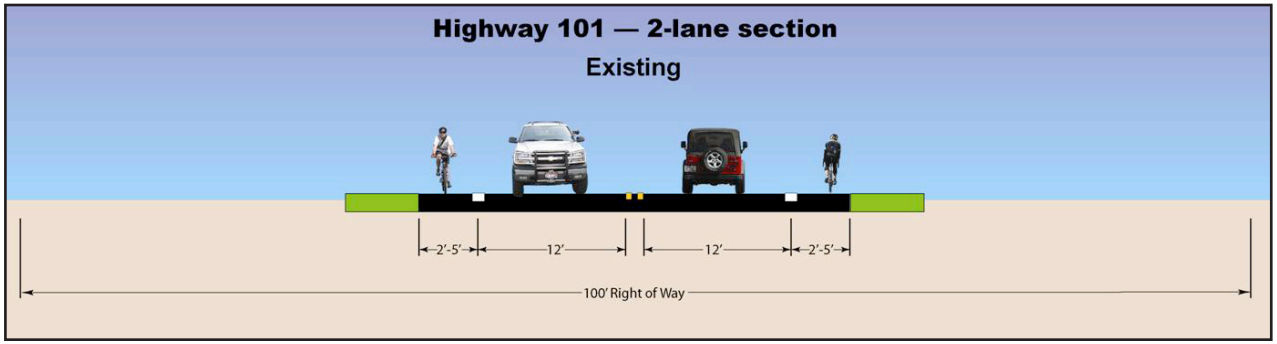
Del Norte County's General Plan and the City of Crescent City General Plan emphasize the integration of land use, transportation and air quality planning to make the most efficient use of public resources. In approving new

development, the County encourages infill within urban areas, non-intensive Neighborhood Commercial uses to provide local services, (Policy Goal 3.c), and consideration of the effects of new development upon air quality and transit.

Del Norte County Regional Transportation Plan

The Del Norte Regional Transportation Plan (RTP) defines the mobility conditions, needs and actions necessary for a coordinated and balanced regional transportation system. The RTP is based on the existing transportation system, and describes the development needs for all transportation modes that operate in Del Norte County. RTP preparation and implementation is done at the direction of the Del Norte Local Transportation Commission (LTC), which uses the document to direct future Del Norte County transportation improvements. The overall goal of the RTP is to produce a coordinated and balanced regional and interregional transportation system, considering all modes of transportation and available funding. The following policies are directed at reducing motor vehicle emissions:

- Reduce vehicle trips (by providing pedestrian and bicycle trails, public transit, shorter trip distances).
- Improve traffic flow to eliminate unnecessary stops.
- Encourage land use policies that minimize need for auto transit.
- Locate new development in areas of existing public infrastructure and services.



Highway 101 has a 100 foot right-of-way with adequate space for 8 foot shoulders, 12 foot travel ways, and a 12 foot median or two-way left turn lane.

CHAPTER 4: DESIGN FAIR PROCESS

The Smith River Conceptual Plan followed a 4-step process that engaged the residents of the community in a variety of activities during a 5-day Design Fair consisting of a series of workshops.

Focus Group Discussions

Initially, the LGC Design Team held focus group discussions with key stakeholder groups including the following:

- County Roads Department and Pubic Transit officials (including school buses).
- Caltrans staff representing the Office of Traffic Safety, Office of Transportation Planning, and Office of Design and Engineering Services.
- Tribal Council members and Rancheria staff.

Summary of Focus Group Issues

In general, group discussions focused on the fact that the area is growing in population and development with more people walking and more motorized traffic. County Roads staff acknowledged that many County roads need to be enhanced to accommodate the increase in pedestrian and vehicular traffic. Improvements could include wider shoulders, lighted intersections and walkways. The school buses need at least an 8 foot shoulder to get out of the travel way and stop without using flashing lights. Public transit faces a similar problem. Shelters and park and ride areas could support greater use of public transit.

Speeding and the need to control vehicle speeds was a major concern. Many felt that a flashing yellow pedestrian crossing sign or other means of alerting motorists that they are approaching a congested area should

Rancheria staff share insights with Design Team.

Design Team discusses transportation issues with Caltrans staff.

Approximately 50 people attended the Opening Community Workshop.

The Design Fair was held at the Howonquet Hall Community Center.

be installed. Others commented on the difficulty making left or right turns from Highway 101 to adjoining roads or driveways without dedicated turn lanes. Tribal staff emphasized that future development in the Rancheria will add still more cars and people to area roadways. This is especially critical at North Indian Road, Mouth of Smith River Road, and Fred Haight Drive. High speed traffic through the area also causes conflicts when slow-moving agricultural equipment uses Highway 101 to move from one field to another or to move harvested crops to staging areas.

Caltrans' major concern was that the Route Concept Report (RCR) for Highway 101, which calls for a 4-lane expressway, be acknowledged as the long-term policy of Caltrans. They recognized, however, that the availability of funding to actually develop a 4-lane highway remains unknown if not doubtful. Any proposed improvements to 101 they thought should not preempt or eliminate the 4-lane concept. A speed limit reduction would be difficult without an engineering and traffic survey. The design exception process, as described in the Highway Design Manual Chapter 80 (Application of Design Standards, Section 82.2: Approvals for Nonstandard Design), would be required for most "non-standard" features. While Caltrans has installed roundabouts and other traffic calming features elsewhere in the state, staff questioned the compatibility of a roundabout with the long-term goal of a 4-lane highway.

This report features "context sensitive" solutions to improve the community in the near term. If the RCR is ever engaged at some point in the distant future it will be appropriate to re-engage the community on the best set of solutions meeting the needs of both the community and Caltrans at that time. The community will reach an agreement to alter roadway and corridor designs to meet these future needs in ways that benefit all who live, work, shop and otherwise make use of the corridor.

Opening Community Workshop

Purpose and Goals

The purpose of this collaborative project is to develop a plan for creating a network of roadways that promote compact and efficient community development and support walking, bicycling, and public transit use as an alternative to motorized vehicles, especially for short distances within the community.

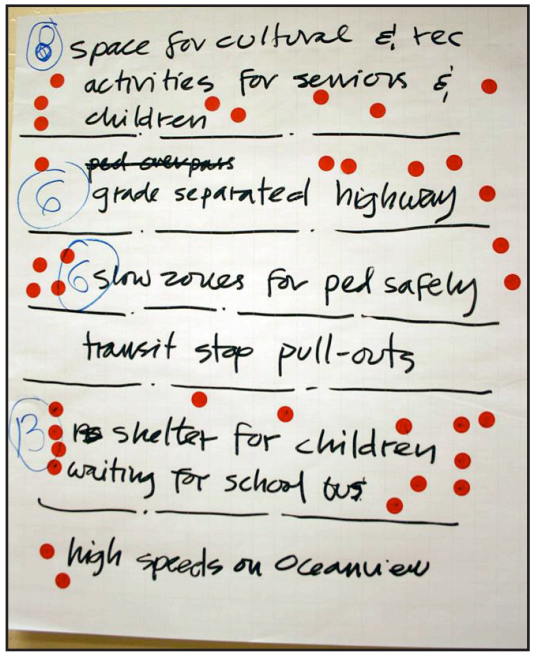
Approximately 50 people attended the Opening Community Workshop at the Howonquet Hall Community Center. At this workshop the LGC Design Team was introduced and the purpose and goals of the study were explained. Then a visioning exercise to engage participants in identifying key values and local transportation issues was conducted.

A visioning exercise engaged participants in identifying key values and local transportation issues.

Values Clarification

Participants were asked to list 5 words or terms that best described what is most important to them – what they value. These terms were then posted on a wall and organized around common themes. The major themes identified by residents were:

- Health and Safety
- Trees/Beauty
- School/Education
- Language/Culture
- Family/Friends
- Love



Participants were given six dots to vote for priorities.

The walking audit surveys issues at the North Indian Road intersection with Highway 101.

Priority Concerns

Participants were also asked to list priorities that they would like addressed in the Design Fair process. After brainstorming key issues the participants were given six dots with which to vote for their highest priorities. The final list included the following:

1. Visible crosswalks near school (17)
2. Sidewalks, Smith River and Indian Road (15)
3. Roundabout (14)
4. Exiting highway 101 (13)
5. Traffic signal (13)
6. Shelter for children waiting for school bus (13)
7. Speeding on 101, nowhere to walk, bike, sit (10)
8. Space for cultural and recreational activities (8)
9. Pedestrian overpass at Mouth of Smith River (7)
10. Flasher system for emergency vehicles at North Haight Avenue (23)

Walking Tour and Street Design Workshop

On the morning on Saturday, June 21, a walking tour attracted approximately 14 people who accompanied the Design Team in a brief discussion of issues related to the intersection of Highway 101 with North Indian Road, other intersections along the highway, and opportunities to enhance and improve South Indian Road. After the walking tour, the LGC Design Team presented the concepts and tools associated with “traffic calming” and “context sensitive” solutions.

Participants discuss the virtues of a separate pedestrian path along South Indian Road.

After lunch, the participants worked at Design Tables in groups of eight using aerial photos as base maps. Two Design Tables utilized the concepts and tools presented earlier to identify preferred improvement options for different locations. Specifically, the Design Tables looked at the following intersections along Highway 101:

- North Indian Road
- Mouth of Smith River Road
- Fred Haight Drive
- Rowdy Creek Road
- Sarina Road
- Oceanview Drive
- Lopez Street

Design Tables utilized the concepts and tools presented earlier to identify preferred improvement options for different locations.

North and South Indian Roads and Oceanview Drive were reviewed in their entirety. Each Design Table presented their concepts to the group. The Design Tables proposed the following:

- Roundabouts at each of the major intersections with Highway 101 including North Indian Road, Mouth of Smith River Road, Fred Haight Drive, Rowdy Creek Road, and Lopez Street;
- A pedestrian trail parallel with Highway 101 from North Indian Road to Sarina Road;
- Moving the casino and L7 Fuel Mart entrances further away from the intersection of North Indian Road with Highway 101; and,
- Relocating Rowdy Creek Road to align with Fred Haight Drive.

Design Tables focused on major intersections along Highway 101.

Closing Workshop and Design Presentation

After the design sessions, the LGC Design Team spent several days assembling the ideas of the focus groups and community workshops into an overall conceptual plan. On Tuesday, June 24, the Conceptual Plan was presented to the approximately 40 people in attendance.

The Conceptual Plan employed the following Design Principles:

- **Slower motor vehicle speeds**
- **Safer intersections**
- **Support for walking and bicycling**
- **Reinforce community centers**
- **Compact/efficient communities**
- **Facilitate interaction**
- **Respect history and culture**

The Conceptual Plan is presented in detail in the following chapter.

CHAPTER 5: SMITH RIVER CONCEPTUAL PLAN

The conceptual plan presented in this report is the culmination of the 5-day event involving members of the Smith River community and the Design Team in identifying problems and issues related to motor vehicle traffic, bicycling, and pedestrian safety and proposing solutions.

The plan provides a blueprint for implementing ideas related to traffic calming, bicycling, and pedestrian safety as well as a safer and more efficient transportation system that supports long-term community development and well-being.

Inadequate shoulder widths pose hazards to disabled vehicles, bicyclists, and pedestrians.

Summary of Issues and Recommendations

Focus group discussions, community values and priority issue exercises, the walking audit, and design table sessions, identified the land use and transportation design issues summarized below. The Design Team recommendations refine and describe the choices available to the community to address these issues.

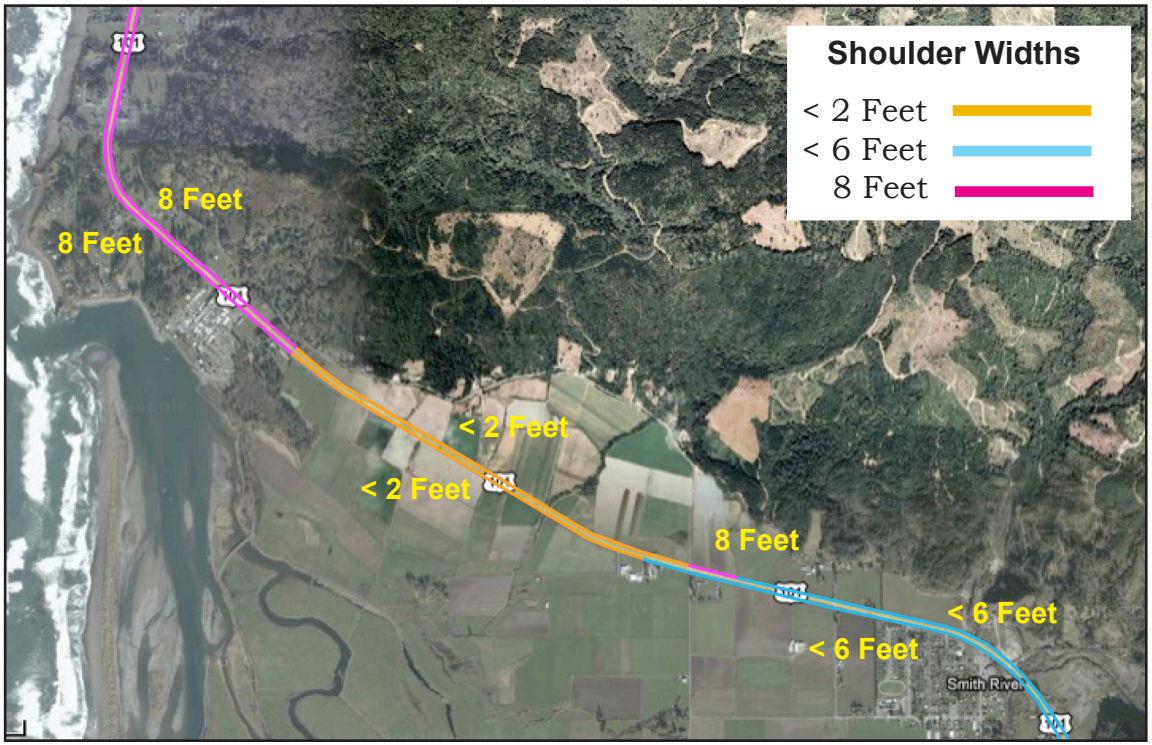
Shoulder Width Issues

Shoulder widths vary throughout the study corridor from 8 feet in width (which is considered adequate) to less than 6 feet (in some cases less than 2 feet) which is considered inadequate. Inadequate shoulder widths pose a number of hazards and restrictions. In many cases there is not adequate shoulder width for disabled vehicles to move out of the travel way. Similarly, there is inadequate width in many cases for transit and school buses to safely move out of the travel way to pick up or drop off passengers. Narrow shoulder widths are also problems for pedestrians and bicyclists who are forced dangerously close to high-speed travel ways, or onto unstable gravel edges.

Widening all shoulders to a minimum of 8 feet would provide more room for pedestrians and bicyclists.

Recommendations:

Widening all shoulders to a minimum of 8 feet would address most of the issues associated with inadequate shoulder widths discussed above. Eight foot wide shoulders would accommodate disabled vehicles, and allow for bus stops as well as provide space for bicycles and pedestrians. School buses, in particular, need to be inside the fog line in order to stop without using flashing lights that require oncoming traffic in both directions to stop. Some areas along the corridor already have 8 foot wide shoulders. At the time of this report, shoulder widening and left turn channelizaton (middle lane allowing left turns in both directions) was under construction north of Indian Road (PM 43.6 – 45.8). Areas where shoulders are less than 8 feet in width should be widened as soon as possible.



Shoulder Widths on Highway 101
Shoulder widening will be needed from South of Lopez Road to the Doctor Fine Bridge. Portions with two feet or less of width should have a higher priority for widening.

Speeding

The Highway 101 route through the study area is posted at 55 mph. The actual speed is likely 60-65 mph or greater, especially through relatively straight sections of the highway. Speeding is the primary collision factor in 24% of the accidents along this stretch of roadway according to Caltrans' Accident Summary Report. Several areas along the highway are developed as commercial, tourist, or residential land uses that generate traffic that intersects with the highway. Pedestrian and bicycle use of the highway adds to the hazards associated with high speeds.

Future development proposed by the Rancheria will generate more vehicles entering and exiting the highway at North Indian Road and Mouth of Smith River Road intersections and likely more pedestrians utilizing and crossing the highway.

Agricultural land uses adjoining the highway often result in large tractors, trailers, and other agricultural equipment using the highway usually at much lower speeds than the posted or actual speeds. Future development in the area of the Town of Smith River would also generate more motor vehicle and pedestrian traffic in the vicinity of Fred Haight Drive.

Recommendations:

The Design Team recommends slowing traffic speeds on Highway 101 in the approaches to Smith River at Fred Haight Drive and Smith River Rancheria at North Indian Road.

For Smith River, a slower speed zone would begin as the northbound traffic enters the curved alignment approximately 1,000 feet before Fred Haight Drive. For southbound traffic, a similar southbound slow speed zone would begin approximately 1,000 feet before Fred Haight Drive.

Highway 101 Accident Detail

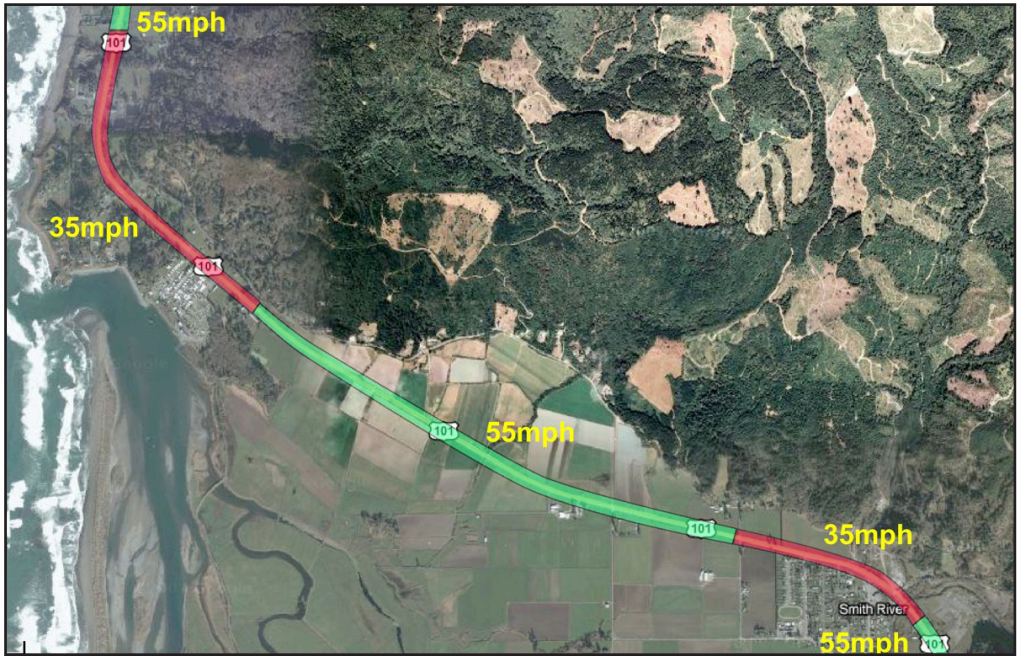
From Dr. Fine Bridge to Oregon Border

2002 – 2007

Primary Collision	*Factor*
Improper turn	28 percent
Speeding	24 percent
Alcohol	10 percent
Other	12 percent
Failure to Yield	8 percent
Fell asleep	1.4 percent

Motor vehicles must share the roadway with farm equipment.

Proposed Speed Zones
Additional travel time from Smith River Bridge to the Oregon border = 72 seconds.



For the Rancheria, a slower speed zone would begin as the northbound traffic enters the curved alignment approximately 1,000 feet before North Indian Road. Another slow speed zone would begin at the crest of the hill of the southbound approach to North Indian Road.

Ideally, the speed limit would be reduced from 55 to 35 mph. Initiating the slower speeds zones would increase the travel time from the Smith River Bridge to Oregon border by approximatley 72 seconds (a minute plus).

Caltrans cannot arbitrarily reduce the posted speed limit for a highway with the current "major arterial" designation. However, motorist behavior can be modified by encouraging slower speeds through the introduction of design features that effectively narrow the visual perception of the roadway. A narrower field of view creates a sense of enclosure and narrows the driver's field of vision. Most motorists will travel narrow streets and lanes at slower speeds (*Streets and Sidewalks, People and Cars, The Citizens' Guide to Traffic Calming*, Dan Burden, Local Government Commission, April 2000). There are a number of ways to accomplish this.

1. Striping

Initially, striping (painted lines on roadway) can be used to further define (and in the motorists eye, narrow) the travel way as distinct from the roadway itself. Widening the fog line or bicycle lane line from the typical 4-inch wide stripe to an 8-inch wide line alerts the motorist that the roadway is changing and motorist behavior must begin to change accordingly. Wider stripes delineating cen-

ter lines can create the same situation and combined with wider fog lines further narrow the visual perception of the roadway.

This is not a widespread or widely adopted solution, and so there are no specific guides. However, experiences where these treatments are being applied are positive. A number of streets using these treatments, such as in Hartford, Connecticut; Boise, Idaho and University Place, Washington have shown moderate reductions in speed and added alertness among drivers.

Widening the fog line or bicycle lane line from the typical 4-inch wide stripe to an 8-inch wide line alerts the motorist that the roadway is changing.

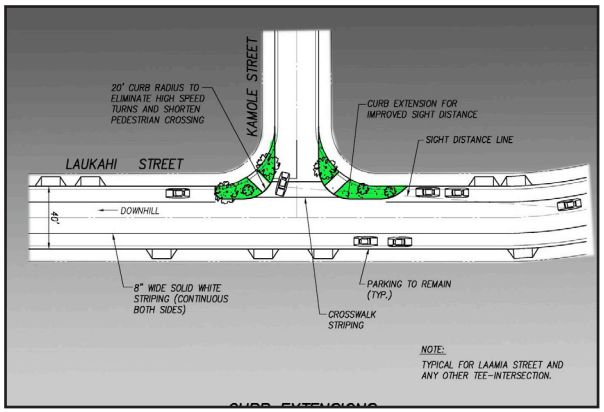
2. Colorizing

As shoulders are widened to accommodate disabled vehicles, pedestrians, bicyclists, and transit stops, color can be added to further delineate a change in roadway conditions that will require a corresponding change in motorist behavior. Color can also be added to center medians and turn lanes furthering the sense that the roadway is narrowing (even though the actual travelway remains the same width). Color can be added to the asphalt via an overlay. Stamped asphalt can also be used to create a contrasting surface texture. This texture process is done in a way that does not affect safe use by pedestrians or bicyclists.

Colorizing the shoulder can further delineate a change in roadway conditions that will require a corresponding change in motorist behavior.

Combined, wider center and edge striping and colorized shoulders and medians can be expected to reduce motor vehicle speed by 5-10 mph. These treatments would announce the proposed slower speed zones within the 1,000 foot approaches to Fred Haight Drive and North Indian Road.

Making use of colorized bike lanes and stronger edge striping has been shown to create a visual narrowing and speed reducing effect. Although most reporting is subjective in nature, results appear consistent and positive. Caltrans has applied these treatments in the Esparto area, and numerous other California treatments are either proposed or on the ground in a number of cities, such as Sacramento.



A further reduction in speed can be accomplished by installing raised curb extensions and landscaping.

3. Raised Curbs and Landscaping

As the motorist approaches the proposed slow speed zones it is hoped that the driver will begin to lower his or her speed. This behavior can be encouraged through the use of changes in roadway conditions such as wider striping and colored medians and shoulders.

A further reduction in speed can be accomplished by installing raised curb extensions at intersections to delineate turning lanes (often refereed to as "porkchop" islands), center medians and left turn lanes. Raised curbs extend the narrowing effect of striping and colorizing by adding a vertical dimension. Landscaping with low shrubs and trees can also help delineate these changes and further the perception of the motorist that the roadway is changing, becoming more narrow and further slowing the speeds the motorist is comfortable with.

According to the Highway Design Manual used by Caltrans, a speed zone of 40 mph or less would be required before raised curbs would be allowed. (*Highway Design Manual*, Topic 309.1: Clear Recovery Zones and Index 303.2: Curb Types and Uses).

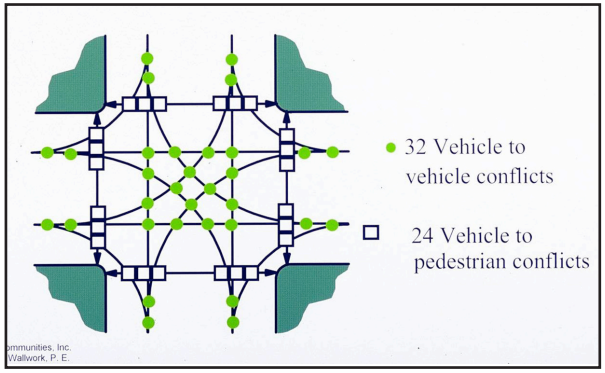
Raised curbs and landscaping extend the narrowing effect of striping and colorizing by adding a vertical dimension.

4. Roundabouts

Over time, as traffic increases on Highway 101 due to new development in the vicinity of Smith River and the Smith River Rancheria, traffic volumes may reach levels that would prompt Caltrans to look at installing a traffic signal or other means of traffic control such as a roundabout.

Traffic signals are expensive to install, impede traffic flow as traffic must stop at red lights and wait for green, and increase auto emissions and noise as stopped traffic continues to idle. Accidents at traffic signal controlled intersections tend to be more severe as motorists often speed up to beat the yellow caution light or go through a red light at high speeds.

Collisions with other vehicles are often of the "T bone" variety (perpendicular) and can cause major injuries and damage. Pedestrians are especially vulnerable at a signalized intersection, as the number of vehicle turning movements and possible conflict points are considerable. Conflict points at a 4-way intersection total 32 for vehicle-to-vehicle and 24 for vehicle-to-pedestrian.

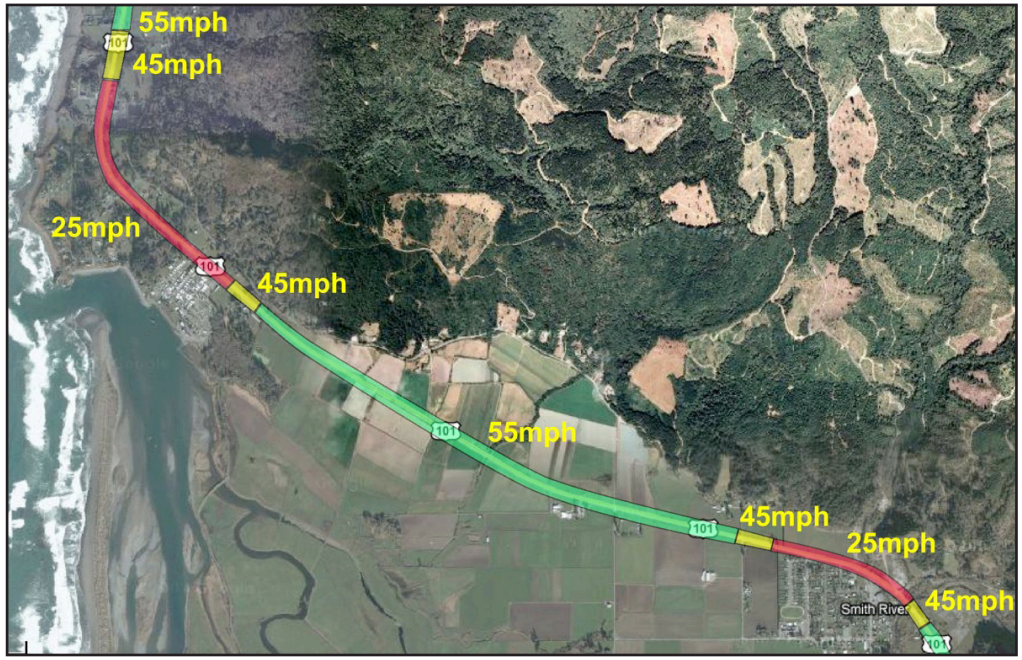


Conflicts points at a 4-way intersection total 32 for vehicle-to-vehicle and 24 for vehicle-to-pedestrian.

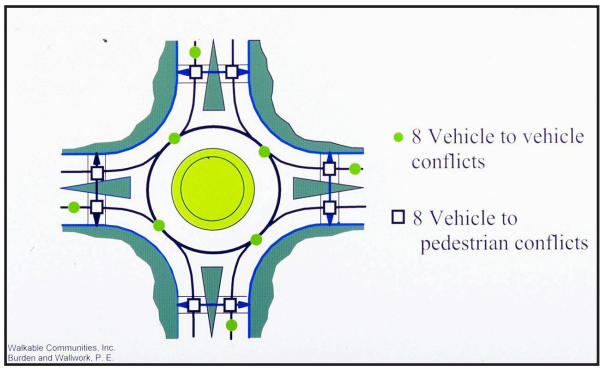
Modern roundabouts have been used in Europe and Australia for decades. Roundabouts can be designed to accommodate the largest of trucks (such as logging trucks) as well as buses and emergency vehicles. The geometry of the roundabout requires motorists to slow to 15-20 mph, wait for a gap in traffic, and then enter counterclockwise. In areas where pedestrians are not anticipated, or for two-lane roundabouts, design speeds are often left at 25 mph for entries and exits. All turns into and out of a roundabout are right turns thus eliminating more dangerous and complex left turns.

Adding roundabouts to the intersections would reduce the slower speed zone limit to 25 mph speed. With the slower speed zones and roundabouts in place, the travel time from the Smith River Bridge to the Oregon borer would increase by 130 seconds (2 minutes plus).

Motorists are often able to enter a roundabout without stopping. If vehicles need to stop to await a gap in circulating traffic, the stop time is much shorter than with a signalized intersection. Conflict points at roundabouts total 8 vehicle-to-vehicle and 8 vehicle-to-pedestrian.



Proposed Speed Zones with Roundabouts
Additional travel time from Smith River Bridge to the Oregon border = 130 seconds.



Conflict points at roundabouts total 8 vehicle-to-vehicle and 8 vehicle-to- pedestrian.

Research indicates that the major intersections along Highway 101 have adequate right-of-way for a roundabout. A roundabout would provide a safer and more efficient hub for traffic to flow around it as motor vehicles enter or leave the highway. A roundabout can handle higher traffic volumes than a typical intersection at slower and safer speeds. If properly designed, a roundabout can also accommodate bicyclists and pedestrians. Pedestrian crossing distances are shorter and are safer and more convenient while accommodating Americans with Disabilities Act requirements.

An added benefit of the roundabout is that with proper treatment such as landscaping and/or a fountain or monument, it can also serve as a beautiful gateway feature. Installation of gateway features would require maintenance agreements with the state as Caltrans does not typically maintain such treatments

Proposed Roundabout at Indian Road

Existing intersection at North Indian Road and Highway 101.

What a roundabout at North Indian Road and Highway 101 would look like.

Proposed Roundabout at Fred Haight Drive

Existing intersection at Fred Haight Drive and Highway 101.

What a roundabout at Fred Haight Drive and Highway 101 would look like.

Proposed roundabout at Mouth of Smith River Road

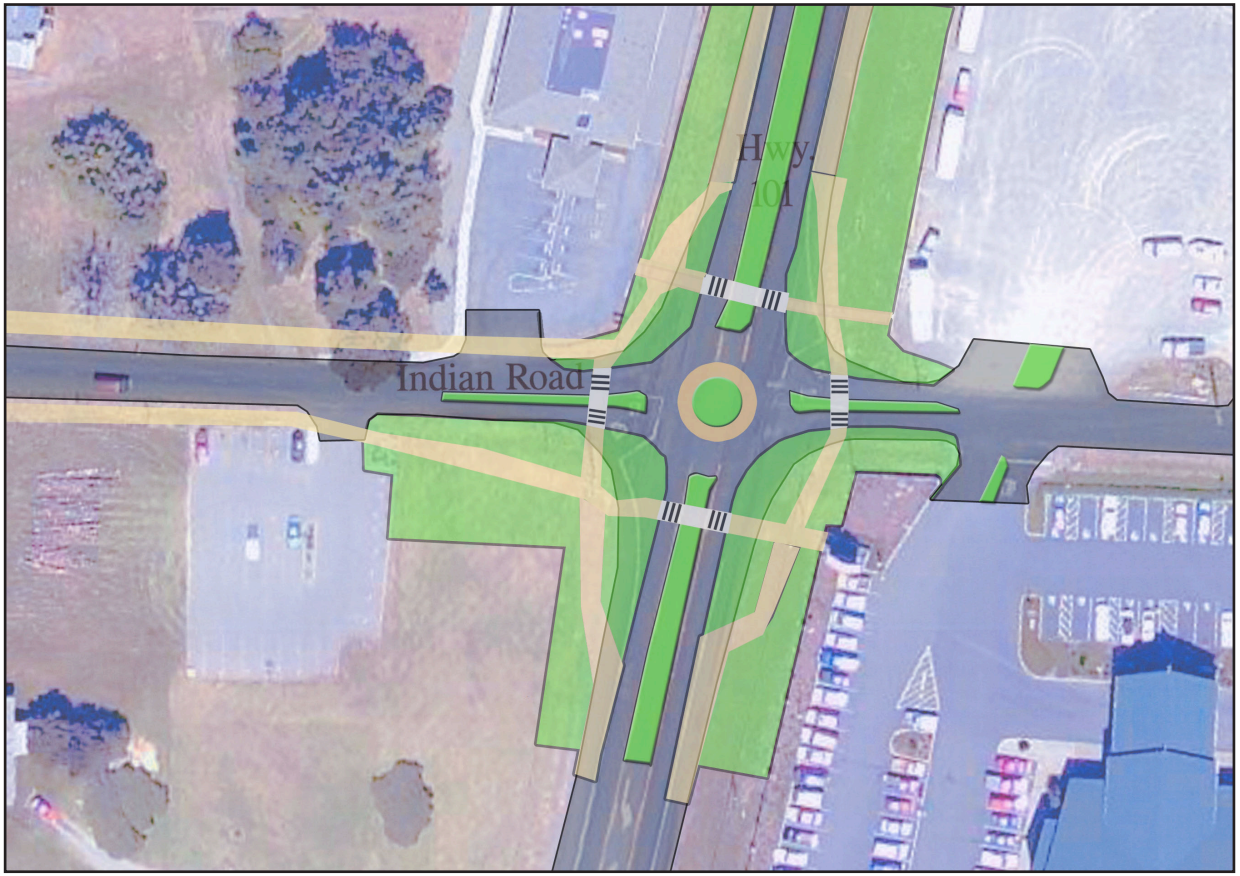
Existing intersection at Mouth of Smith River Road and Highway 101.

What a roundabout at Mouth of Smith River Road and Highway 101 would look like.

Caltrans supports a philosophy that explicitly allows flexibility in applying design standards and approving exceptions to design standards that improve mobility and safety while complementing and enhancing community values and objectives. Over time, an ongoing dialogue with Caltrans could lead to a compromise solution that meets the needs of both the community and Caltrans.

Motorists are often able to enter a roundabout without stopping.

Roundabouts can be designed to accommodate the largest of trucks as well as buses and emergency vehicles.

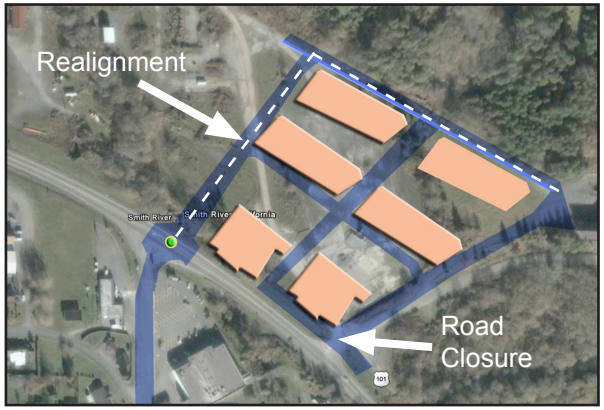


How the layout of a roundabout would address traffic flow at the Intersection of Highway 101 and North Indian Road.

Realignment of Rowdy Creek Road

A curve in highway alignment limits northbound views of traffic exiting or entering Rowdy Creek Road from Highway 101. Similarly, the lack of a left hand turn pocket for southbound traffic often results in motorists stopping before making cross traffic left turns onto Rowdy Creek Road. No turn lanes mean that traffic intending to exit must slow down in the travel way and risk rear-end collisions from vehicles traveling too fast or following too closely. The bridge over Rowdy Creek limits the amount of land available for widening the roadway or providing a right-hand turn pocket for northbound traffic.

The adjoining abandoned mill site at the intersection of Rowdy Creek Road and Highway 101 has the potential to be redeveloped as highway-serving commercial, multi-family residential, and other appropriate land uses. The Rancheria has expressed interest in acquiring and developing this site. Were this to happen, the opportunity exists to realign Rowdy Creek Road to intersect with Highway 101 at the Fred Haight Drive intersection. Traffic calming measures discussed previously would make this intersection safer for motorists and pedestrians as well as move traffic through more efficiently.



The abandoned mill site has potential for compact, mixed use development and an opportunity to realign Rowdy Creek Road.

Curves in the alignment of Highway 101 limit distant views of Rowdy Creek Road for both north and southbound traffic.

The realignment of Rowdy Creek Road would look something like this.

For southbound traffic, a hill restricts the view of the upcoming intersection of Highway 101 and North Indian Road.

Limited Sight Distance

There are two areas where sight distance limits views of pedestrians along or crossing the highway, motorists entering or exiting the highway from intersecting roads or driveways, presence of tractors, or other slow moving vehicles, and wildlife in the travel way. Sight distance is limited in both the northbound and southbound approach to Fred Haight Drive, the primary access to the Town of Smith River, due to pronounced curves in the roadway alignment. Sight distance is limited in the northbound approach to the North Indian Road intersection due to a pronounced curve in the roadway alignment. Sight distance is also limited in the southbound approach due to a hill which restricts distant views of the upcoming intersection. Numerous other rural roads and driveways are affected by sight distance issues along the corridor.

Recommendations:

Sight distance issues are difficult to accommodate in their entirety. Traffic calming measures such as striping and colorizing discussed previously can caution motorists and slow speeds where sight distance issues prevail, especially at North Indian Road and Fred Haight Drive.

For northbound traffic, a pronounced curve limits the view of the upcoming intersection of Highway 101 and North Indian Road.

Limited sight distances imperil vehicles entering or exiting the highway.

Dedicated Right and Left Turns

Much of the highway through the study area lacks dedicated right turn or left turn pockets allowing safe exit from or entry to the travel way. This situation occurs at both major and minor intersections as well as at numerous driveways. Combined with the speeding and sight distance issues discussed above, the absence of turn lanes often results in rear end collisions when the exiting vehicle slows down to turn and the vehicle behind is unable to stop in time to avoid a collision. Similarly, motorists wanting to make a left turn across traffic slow down and often must stop to await a sufficient break in traffic to turn safely.

Potentially conflicting turning movements are often found at intersections.

According to Caltrans' Accident Summary Report, 23% of the accidents along this stretch of roadway are rear end collisions. 28% of accidents are identified as "improper turns." 4.3% of accidents are head-ons which may be a result of swerving into the oncoming travel lane to miss the slowing or stopped vehicle trying to make a turn or passing in areas of limited sight distance. The absence of adequate shoulder width further aggravates this situation as the turning vehicle is forced to remain in the travel lane or there is inadequate space for following traffic to use shoulder areas to avoid turning vehicles.

Dedicated turn lanes allow the motorist to make safe turns in a timely manner.

Recommendations:

Shoulder widening to 8 feet and dedicated right- and left-hand turn lanes can help address issues related to motor vehicles exiting and entering the highway. Widened shoulders can serve as a right-hand turn pocket allowing motorists to move out of the travel way as they slow down and make their turn, removing the hazard of rear end collisions. Similarly, two-way left turn lanes or left turn pockets allow turning motorists to remove themselves from the travel way while awaiting clearance to safely make a left hand turn crossing oncoming traffic.

Pedestrians must often run to get across Highway 101 ahead of oncoming traffic.

Pedestrian Crosswalks, Sidewalks, or Pedestrian/Bicycle Trails

Though there are increasing numbers of people using the roadway on foot or bicycle, there are no dedicated pedestrian facilities. This condition is especially hazardous in the area of the intersection of Highway 101 with North Indian Road. This area is the "village center" for the Smith River Rancheria. Many people live on the west side of Highway 101. The casino, restaurant, gas station and mini-mart are all located on the east side of 101. Pedestrians must cross a distance of approximately 90 feet to get from one side of the highway to the other. Limited sight distances in both directions make it difficult and dangerous to make the crossing as oncoming traffic is often not seen until the pedestrian is in the middle of the roadway. Similarly, motorists do not see the pedestrian until they round the curve (northbound) or crest the hill (southbound). There are no signs, lights, or dedicated crosswalks to alert the motorist to pedestrian activity. Collisions with pedestrians make up .7% of the total collisions. Future development proposed by the Rancheria will generate more vehicles entering and exiting the highway at this intersection and likely more pedestrians crossing the roadway.

There is an overall lack of pedestrian facilities on County and Rancheria roadways. In many cases, the relatively low traffic makes it safe, if not convenient, to walk or bicycle in the travel way. However, roads in proximity to schools, such as 1st Street in Smith River, can be hazardous to children walking or bicycling to school.

Widened shoulders can provide space for both pedestrians and bicyclists.

Recommendations:

Many issues focus attention on the need for more facilities to accommodate non-motorized means of transport, specifically walking and bicycling. Shoulder widening along Highway 101 will provide adequate space for both pedestrians and bicyclists to avoid encroaching upon the travel way and the hazards motor vehicles pose. Intersection treatments such as striping, colorizing, and raised curbs make it easier for motorists to anticipate and see pedestrians and bicycles.

Oceanview Drive

The Pacific Crest Bicycle Trail currently follows Highway 101 through much of its course through the study corridor. Options exist to detour onto Oceanview Drive near the Rancheria and Sarina Road and Fred Haight near Smith River. None of these roadways have dedicated bicycle lanes and it is not likely that bicyclists will veer very far off of their intended course without greater convenience or special attractions.

Oceanview Drive, a County road, does not have adequate right of way to provide wider shoulders or dedicated pedestrian facilities such as sidewalks or bike lanes. There may be adequate space utilizing adjoining utility easements to provide a wider shoulder for pedestrian/bicycle use. Alternatively, a separate pedestrian trail could be constructed along the downhill side of Oceanview Drive that would allow pedestrians and bicyclists a safe and convenient alternative to using Highway 101 or Oceanview Drive.

A pedestrian trail could be constructed separate from, but parallel to Oceanview Drive.

North Indian Road

North Indian Road, a County Road, provides access to many residences in close proximity to tribal services, the gas station and mini-mart, casino and restaurant among other services. There are no sidewalks on either side of North Indian Road. Sidewalks should be installed on both sides of North Indian Road from Oceanview Drive to Highway 101. Where mature cypress exist on the south side, a pedestrian trail may be an alternative.

Currently, queuing traffic entering the casino parking lot can back up into the travel way of Highway 101. This condition will increase with the construction of a new hotel and RV Park. Relocating the entry drive to the casino/restaurant/hotel/RV Park complex to the east would eliminate this condition. There are often conflicts among vehicles entering and exiting the gas station, as well as vehicles exiting the casino area. Dedicating an "entry" drive and a separate "exit" could eliminate confusion and reduce conflicts.

Along Oceanview, adjoining utility easements may provide space for pedestrian and bicycle use.

Sidewalks should be installed on both sides of North Indian Road from Oceanview Drive to Highway 101.

South Indian Road

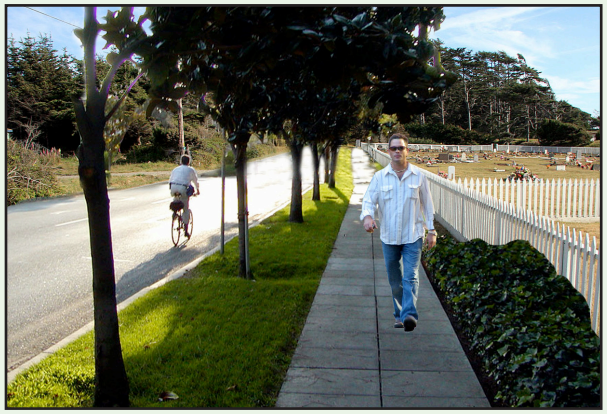
Currently, South Indian Road carries a low volume of traffic at relatively slow speeds due to its perceived and actual narrow travel way and the sharp left turn. There appears to be adequate right of way to provide a 6 foot planting strip and a sidewalk on at least one side with a wider, paved shoulder available on the other side.

Given the rural nature of the setting, a paved or porous surfaced pedestrian trail may be more fitting than a standard concrete sidewalk. Much of South Indian Road is highly vegetated with mature trees lining the roadway. In these cases, a trail could be aligned to avoid existing trees. In areas where there is no tree cover, the planting strip could provide space for residential scale street trees. Bicyclists could still use the travel way. Pedestrian scale street lighting, especially near intersections, may be desirable. Since this is a rural area and nighttime glare from street lights could disturb the rural quality, the right type of lights should be used.

The Rancheria is interested in funding pedestrian improvements for both Oceanview and South and North Indian Roads if the County is able to deed the roadways to the Tribe.

Currently, there are no sidewalks along South Indian Road (left photo).

What a sidewalk and planting strip along South Indian Road would look like (right photo).



1st Street

1st Street connects Sarina Road with North Beckstead Avenue and Fred Haight Drive in Smith River. The Smith River School is located at the corner of North Beckstead Avenue and 1st Street. North Beckstead Avenue has paved sidewalks on both sides of the street. 1st Street however does not have any sidewalks and shoulders are narrow or non-existent along the majority of its length. There is a sidewalk on the north side of 1st Street from the school to Fred Haight Drive. The roadway between Fred Haight Drive and Sarina Road is straight and narrow facilitating speeds in excess of posted limits. This is especially hazardous in and near the Smith River School. Sidewalks should be installed on both sides of 1st Street from North Beckstead Avenue to Sarina Road.

No sidewalk poses hazards to children walking to school along 1st Street (left photo).

A sidewalk along the east side of 1st Street will improve safety for pedestrians (right photo).

Landscapping can also be used to indicate to motorists that they are entering a new environment and should slow down.

Gateways and Sense of Arrival

A gateway is a physical or geometric landmark on a highway, road or street which indicates a change in environment from a major road and higher speeds. Gateways may involve a combination of street narrowing, medians, signs, arches over the roadway, roundabouts, or other identifiable features (Burden, 2000).

Gateways can inform the motorist that they are entering an area different from the long stretches of highway that pass through rural areas. These areas provide food, lodging, and gas for the traveling motorist, as well as access to local residences and businesses.

Caltrans defines a "Gateway Monument" as any freestanding structure or sign, non-integral or non-required highway feature that will communicate the name of a city, county or township (Section 501.3F, Encroachment Permit Manual, Caltrans). A Gateway Monument may include the officially adopted seal or slogan of a local community.

In general, there is no gateway or "sense of arrival" to the Town of Smith River or the Smith River Rancheria. Increased traffic congestion may be the only clue that something is happening along the highway that is different. Many businesses, especially those located along or near the highway, depend on highway traffic for much of their sales and activity. This is especially true at the Highway 101 intersection with Fred Haight Drive where the local food market is located; and, at the intersection with North Indian Road, where there is a gas station, mini-mart, casino, restaurant, and proposed RV Park and hotel.

This sign serves as a gateway feature announcing arrival at a special place.

Recommendations:

Implementation of the traffic calming measures discussed previously at the approaches to the major intersections at Fred Haight Drive and North Indian Road can provide opportunities to incorporate gateway features

including signs, landscaping, monuments or sculptures. The combined effect of traffic calming features such as striping, colorizing, raised curbs and landscaping can create the appropriate sense of arrival. Such gateway treatments can be incorporated into new intersection designs that will inform the motorist that they are entering (or leaving) a distinct area or community where they may find food, lodging, gas, or bathrooms and that a new set of driving behaviors may be required.

Traditional Neighborhood Design

The car culture has subordinated our neighborhoods and communities to the roads and streets (and parking lots) necessary to accommodate a "drive everywhere" society. Across the United States, this has led to communities where you must drive to almost everything because there are few facilities to accommodate pedestrians in a safe and efficient manner. Emerging issues such as global warming/climate change and the increasing cost of oil and gasoline further the need to reduce our reliance on motorized transportation. There is an opportunity to reconfigure our roads and highways to support community development and healthier lifestyles. Benefits include less motorized traffic, better air quality, less noise, more pedestrian facilities that support walking and bicycle use, improvement in safety and attractiveness, and a greater sense of community.

The Del Norte County General Plan emphasizes the importance of integrating land use, transportation and air quality planning. The County encourages infill within established urban areas with existing public infrastructure and services.

Traditional neighborhood or village design provides a more efficient layout of our communities and an opportunity to enhance "quality of life" while reducing the ecological footprint necessary to protect the environment. More compact communities involve a diverse mix of land uses that are well-connected both internally and to surrounding neighborhoods.

INTEGRATING LAND USE, AIR QUALITY AND TRANSPORTATION PLANNING

Del Norte County Regional Transportation Plan

To reduce motor vehicle emissions:

- Reduce vehicle trips by providing pedestrian and bicycle trails, public transit, shorter trip distances.
- Improve traffic flow to eliminate unnecessary stops.
- Encourage land use policies that minimize need for auto transit.
- Locate new development in areas of existing public infrastructure and services.

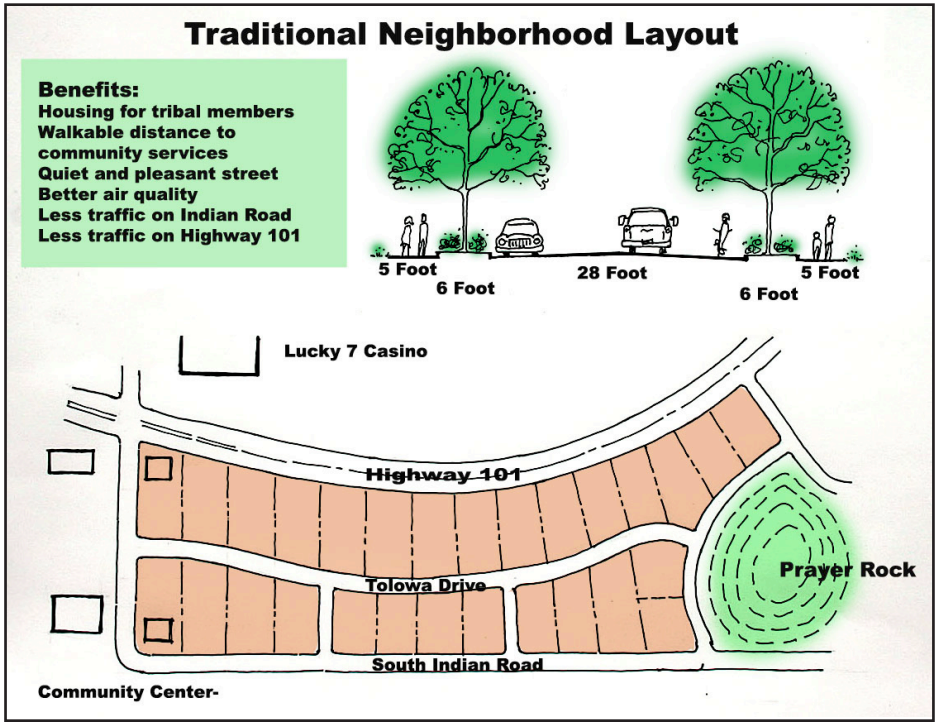
Del Norte County General Plan

- Concentrate most new growth within existing communities.
- Concentrate urban development to maximize use of public transit, walking and bicycling.

These types of communities encourage people to walk more, to interact with their neighbors, and thus to increase the sense of community.

Recommendations:

An opportunity exists to establish a template for a "true village" off of South Indian Road. The Smith River Rancheria Master Plan calls for more housing for tribal members, especially for seniors, in this area. There is adequate space to create a compact neighborhood setting by installing a new road (possibly named Tolowa Drive) between Highway 101 and South Indian Road, connecting with Prince Island Road. Both multi-family and single-family residences could be constructed along this "neighborhood" road which would include sidewalks, a parking strip, on-street parking, and room for bicycles. This area would be in walking and bicycling distance to the community center, health clinic, family services, ceremonial dance house, and parkland. This neighborhood could serve as a template for other residential and commercial development within the Rancheria and the Town of Smith River. The benefits include more housing close to community services, walkable distances, less traffic-related noise, better air quality, and less traffic on South Indian Road. Over time, as traditional neighborhoods and villages replace automobile-dependent sprawl, the concept of village and "sense of place" will replace the concept of automobile-dependent suburbs.



The Traditional Neighborhood will be walkable and bicycle-friendly and close to community services.

Ceremonial Area

The Smith River Rancheria Tribe of Tolowa Indians Mission Statement emphasizes the following:

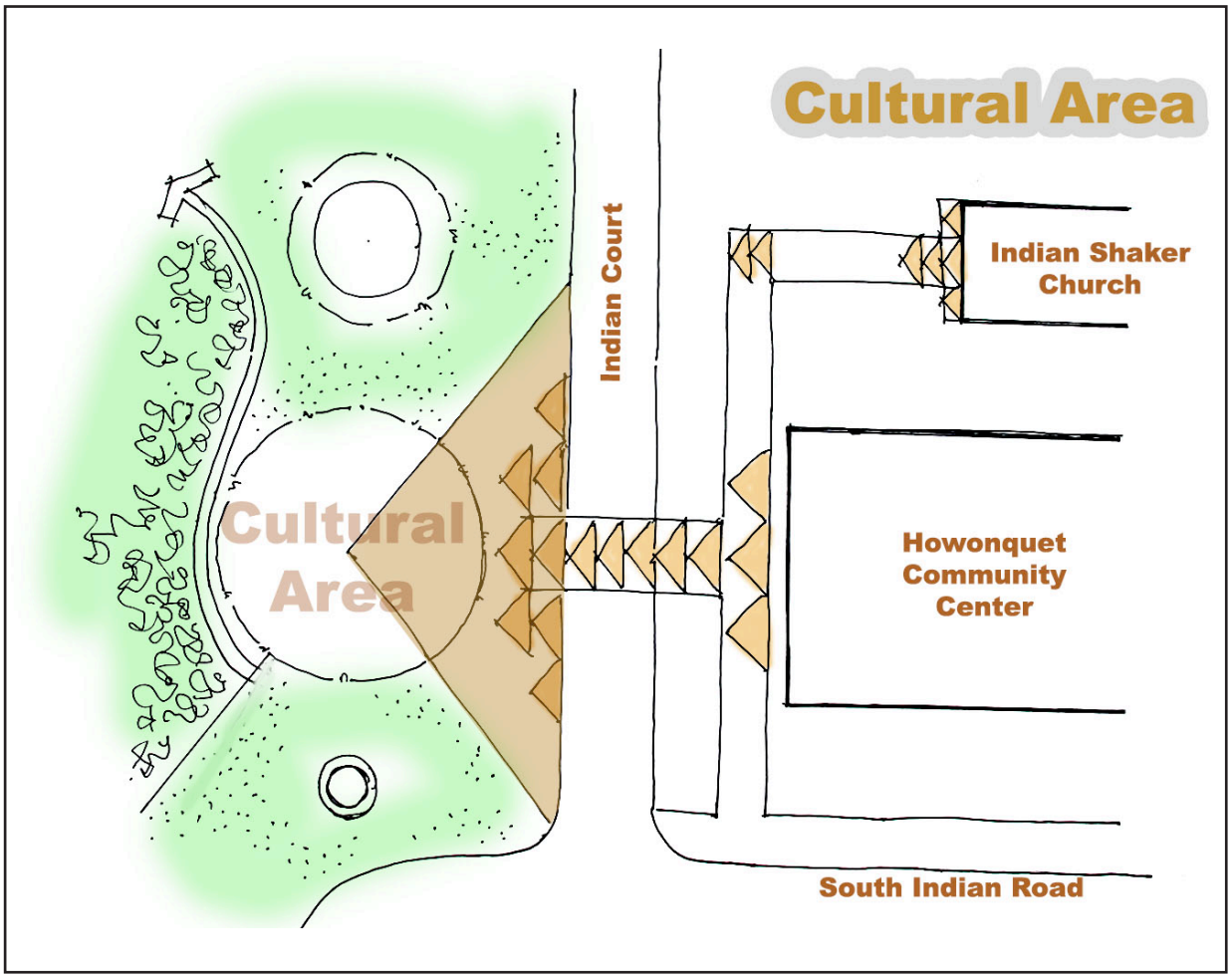
Honoring Our Past
Serving Our Tribal Family
Protecting Our Culture and Independence
And Controlling Our Future

During the workshop, many participants requested an area dedicated to Tribal Ceremonies.

Gathering places allow people to enjoy the setting as well as each other.

Recommendations:

The plan illustrates one possible concept west of the Community Center. This concept simply ties in the activities of the Community Center with adjoining activities of the Native American Church with a ceremonial center or cultural area. The area is adjacent to the proposed ceremonial dance hall and could provide an outdoor venue for ceremonies and dances among other community functions. The location on the bluff of the beach and fishing access to the beach brings together the history and the present day for the Tolowa people. See illustration on next page.



A Ceremonial Area would serve as a gathering place for people participating in tribal activities and ceremonies.

CHAPTER 6: IMPLEMENTATION AND FUNDING

Coordination and Phasing of Recommendations

Coordination among the Smith River Rancheria, Del Norte County and Caltrans will be necessary to implement most of the recommendations proposed in this report.

Traffic calming measures such as striping, colorizing, raised curbs and landscaping, are relatively low in cost and could provide an increase in safety and appearance in the short-term without jeopardizing the longer-term policies set forth in the Route Concept Report.

Roundabouts have been applied to 4-lane state highways elsewhere in California and could be consistent with the Route Concept Report.

Widening of shoulders along Highway 101 is being pursued by Caltrans with projects both proposed and under construction. Much of Highway 101 already has 8 foot shoulders. Installation of sidewalks and pedestrian paths would involve coordination and agreements between the Rancheria and the County for County roads, and Caltrans for Highway 101.

Improvements such as sidewalks, widened shoulders and bicycle lanes, striped crosswalks, pedestrian paths can be incorporated into road improvement projects. Routes to school should be given a high priority.

Creating a “Sense of Arrival” can be accomplished by incorporating gateway features such as colorizing, raised curbs, landscaping, signage, and public art into a roundabout or other intersection treatments or along the shoulders of Highway 101.

Ideas related to Traditional Neighborhoods and a Ceremonial Area are largely subject to Tribal Council direction, at least for tribal trust lands.

Stage 1

Stage 2

Stage 3

Realignment of Rowdy Creek is longer-term and would follow land acquisition and development of the abandoned mill site by the Rancheria. Realignment, if and when it occurs, would require a coordinated effort among the Rancheria, Del Norte County and Caltrans.

Three possible stages of recommended improvements are presented below:

Stage 1 — Widen shoulders to 8 feet, widen striping to 8-inches, colorize shoulders, medians, passing and two-way left turn lanes, and priority sidewalks within the next 1-2 years.

Stage 2 - Raised curb extensions and landscaping can be added to better define intersections, medians and right and left turn lanes (if speeds have been reduced to 40 mph by widening striping and colorizng widened shoulders), priority sidewalks, bicycle lanes, and pedestrian paths could be accomplished in 2-5 years.

Stage 3 - If traffic volumes were to reach a level that would prompt Caltrans to look at safetly and operation improvements at the intersections of Highway 101 with North Indian Road, Mouth of Smith River Road, and Fred Haight Drive, installing a traffic signal or roundabout would be considered. This could occur within 5-8 years depending on the increase in motor vehicle trips and the rate and extent of new development within the Rancheria and the Town of Smith River. Collectively, the traffic calming measures would complete the slower speed zone concepts for the approaches to North Indian Road, Mouth of Smith River Road, and Fred Haight Drive. Gateways can be incorporated into road improvments such as shoulders, parking strips, medians, and roundabouts.

Collectively, the traffic calming measures would complete the slower speed zone concepts for the approaches to North Indian Road and Fred Haight Drive.

This conceptual plan provides a blueprint of opportunities for improvements to the transporation network of the Smith River community. A collaborative effort will be required to refine the conceptual recommendations into engineering designs and construction projects. All participants exhibited a cooperative spirit and willingness to work together toward a common goal throughout the Design Fair process. Momentum toward making transportation improvements a reality is high and should be nurtured.

Project Funding

Eligible Funding Programs

State Transportation Improvement Program (STIP)
The STIP provides funding on a formula basis to the Del Norte County region. The funds are then awarded by the Del Norte Local Transportation Commission (LTC) to eligible projects based on adopted formula and criteria. All funding from the STIP must be used for capital improvement projects.

Categories for potential projects include:

- Highways/Streets/Roads
- Bicycle and Pedestrian
- Transit and Rail

Normally, LTC receives an estimate of new STIP funding available for the region every two years. With LTC as a project sponsor, Smith River could be eligible for some of these.

For more information, visit: www.dnltc.org

BIA Indian Reservation Roads (IRR) Program

The purpose of the IRR Program is to provide safe and adequate transportation and public road access to and within Indian reservations, Indian lands, communities for Native Americans, visitors, recreationists, resource users and others while contributing to economic development, self-determination, and employment of Native Americans. IRR Program funds are authorized as part of the surface transportation authorization acts (currently TEA-21) as part of the Federal Lands Highway Program (FLHP). The program is administered by the BIA Department of Transportation and the Federal Land Highway Office of the FHWA.

Indian Reservation Roads Maintenance Program

These funds are intended for maintenance activities on roads serving the tribes. Unfortunately, the funding levels of the program are exceedingly inadequate for the work needed. Nationally, BIA receives about $26 million per year, with only $700,000 of that earmarked for the entire State of California.

Additional/Secondary Funding Programs

Hazard Elimination Safety (HES)

The purpose of this program is to provide funds for safety improvements on any public road, any public surface transportation facility, any publicly-owned bicycle or pedestrian pathway or trail, and for any traffic calming measure. These funds serve to eliminate or reduce the number and severity of traffic accidents at locations selected for improvement. Smith River could be eligible for these funds if another agency, such as a city, county or state agency, acts as the project sponsor and administers the project on behalf of the Tribe. Exceptions to this requirement will be reviewed on a case-by-case basis. Applicants that do not have representation from a city or county must provide written justification for the exception and attach it to the application.

Safe Routes to School (SR2S)

The purpose of this competitive program is to make grants available to local governmental agencies for safer routes to school. Proposals are rated based on all of the following factors:

1. Demonstrated needs of the applicant
2. Potential of the proposal for reducing child injuries and fatalities.
3. Potential of the proposal for encouraging increased walking and bicycling among students.
4. Identification of safety hazards.

5. Identification of current and potential walking and bicycling routes to school.
6. Consultation and support for projects by school-based associations, local traffic engineers, local elected officials, law enforcement agencies, andofficials.

The applicant must be an incorporated city or a county within the State of California. Exceptions to this requirement will be reviewed on a case-by-case basis. Applicants that do not represent a city or county must provide written justification for the exception and attach it to the application. The applicant should enlist the assistance of other participants in the development and submittal of a SR2S project. Other participants could include school boards, school districts, elected officials, community groups, students, and various city, county, and state agencies.

The success of a project proposal being approved for funding will depend upon the ability of the applicant and participants to develop a comprehensive and unified solution to improving the safety and encouraging the use of pedestrian and/or bicycle routes to and from schools within their jurisdiction.

Funding Matrix

A matrix is included that compares the concept elements by funding sources. It is possible in many instances to "pool" funding sources toward implementing a concept element. For example, sidewalks, and bike lanes could be implemented using combined funding sources from the BIA Indian Reservation Roads Program (IRR), State Transportation Improvement Program (STIP), Transportation Enhancements (TE), Safe Routes to School (SR2S), and Hazard Elimination Safety (HES).

Concept Element	Funding Sources
Sidewalks, Bike Lanes	IRR, STIP, TE, SR2S, HES
Pedestrian crosswalks	IRR, TE, SR2S, HES
Lighting improvements	IRR, TE, SR2S
Landscape Improvements	IRR, IRR Maintenance, TE
Underground Utilities	IRR
Reconfigure Intersections	IRR, STIP, TE, HES

REFERENCES

Main Street: Flexibility in Design and Operations, California Department of Transportation, January 2005

Route Concept Report, Route 101 Corridor, California Department of Transportation, October 2002

Traffic Accident Summary Report for the 7-mile study corridor (2002-2007), California Department of Transportation, June 2008

Project Study Report (PSR), California Department of Transportation, January 24, 2005

Del Norte County and Crescent City 2007 Bicycle Facilities Plan, Planwest Partners, 2007

Streets and Sidewalks, People and Cars, The Citizens' Guide to Traffic Calming, Dan Burden, Local Government Commission, April 2000

Del Norte County 2007 Regional Transportation Plan, Del Norte Local Transportation Commission, 2007

Del Norte County General Plan, Mintier & Associates, January 8, 2003

APPENDIX

Level of Service and Annual Average Daily Traffic

The Design Team attempted to use the most recent data available at the time of this report. It was not within the scope of this project to do a more detailed analysis of the Level of Service (LOS) or Annual Average Daily Traffic (annual ADT, or AADT) for cross streets along Highway 101. The Tribe may wish to pursue additional studies under the IRR to collect data on local streets.

Del Norte County General Plan

GP Policy 8.A.11 - The County shall encourage Caltrans and Regional Transportation Agency to provide for Level of Service D or better on all state highways within the County.

Del Norte County Regional Transportation Plan

LEVEL OF SERVICE

Level of Service (LOS) is a technical term that describes how much traffic congestion exists on a roadway. The level of congestion is expressed in terms of LOS 'A', meaning little or no congestion, through LOS 'F', meaning extreme congestion, or gridlock. LOS definitions generally describe traffic conditions in terms of speed, travel time, freedom to maneuver, traffic interruption, comfort, and convenience. Typically, level of service D is used as the design standard in urban areas and level of service C is used as the design standard in rural areas. Table 3-2 on the next page provides a description of each LOS category.

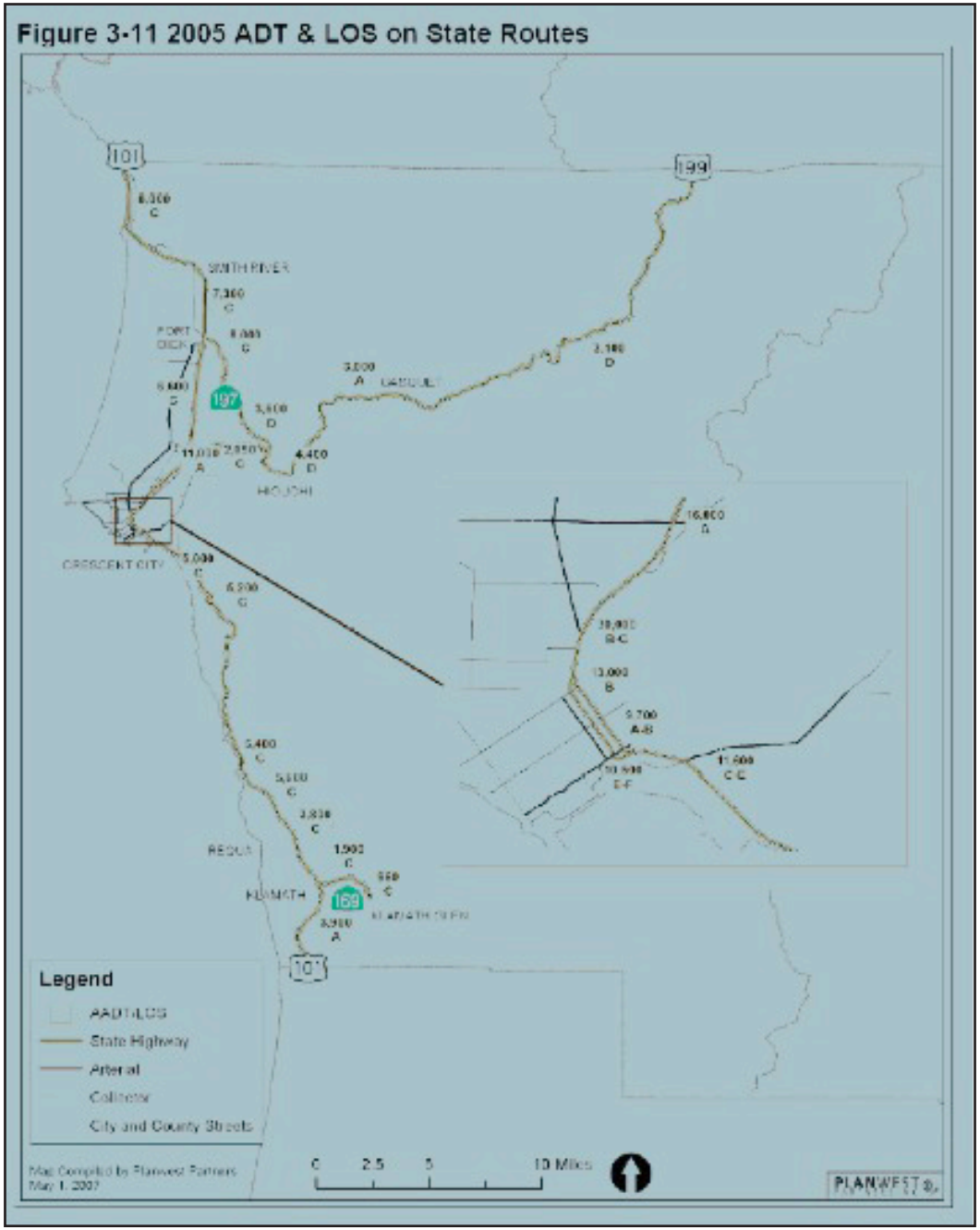
Level of Service	Description
A	Free-flowing conditions with no delay
B	Free-flowing conditions, however speed and maneuverability are slightly restricted due to the presence of other vehicles
C	Stable traffic flow, with less freedom to select speed, change lanes, or pass. Some delay may be experienced
D	A traffic stream approaching unstable flow, with reduced speed and maneuverability
E	Unstable traffic flow with rapidly fluctuating speeds and flow rates
F	Forced traffic flow, where speed and flow may drop to zero with high densities

Table 3-2

ANNUAL AVERAGE DAILY TRAFFIC (ANNUAL ADT)

Annual average daily traffic (annual ADT, or AADT) is the total volume for the year divided by 365 days. Traffic counts are adjusted to an estimate of annual ADT by taking into account seasonal influences, weekly variations or other variables. Annual ADT is needed to present a view of statewide traffic flow, provide trends, congestion, identify accident rates, and for planning and design of highways. The peak month ADT is the average daily traffic for the month of heaviest traffic flow. The peak month ADT data is useful because many routes, such as Del Norte County's highways, experience consistently higher traffic volumes during the peak recreational travel months of summer-fall months. Peak month ADT is more representative of traffic conditions during these periods.

Annual ADT information was obtained from Caltrans Annual ADT data, using peak month totals for the high volume traffic segments of US Highways 199 and 101, and State Routes 197 and 169. ADT and LOS for 2005 and 2025 are shown on the Figures on the following pages.



2005

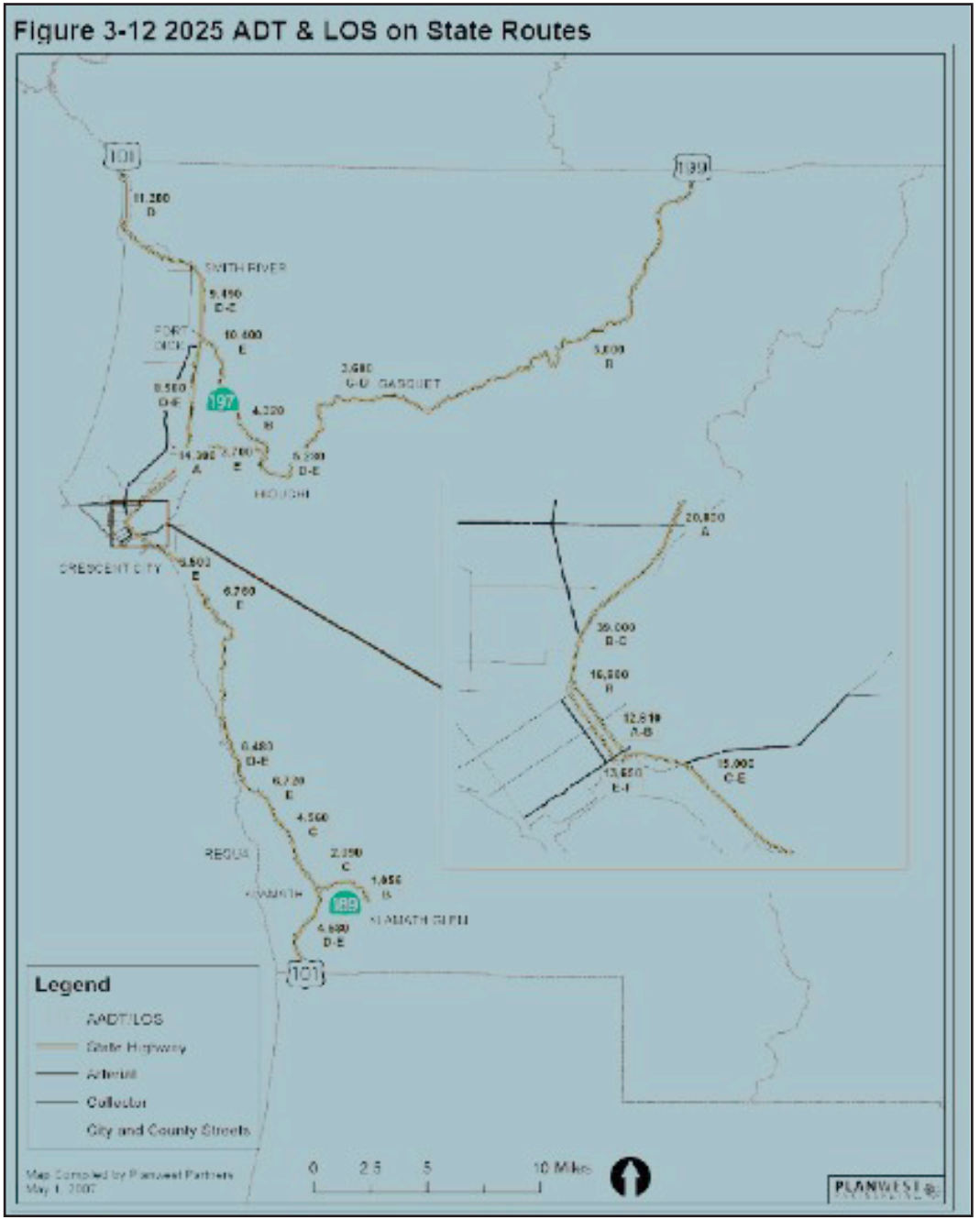
Smith River ADT = 7,300 – 8,000

LOS = C

2025

Smith River ADT = 9,490 – 11,200

LOS = D, E



CHAPTER 300
GEOMETRIC CROSS SECTION

Topic 301 - Traveled Way Standards

Index 301.1 - Traveled Way Width

The traveled way width is determined by the number of lanes demanded by the design hourly volume. The traveled way width does not include curbs, dikes, gutters, or gutter pans. **The basic lane width for new construction on two-lane and multilane highways, ramps, collector roads, and other appurtenant roadways shall be 12 feet.** For roads with curve radii of 300 feet or less, widening due to offtracking should be considered. See Index 404.1 and Table 504.3A. For roads under other jurisdictions, see Topic 308.

301.2 Cross Slopes

(1) General. The purpose of sloping on roadway cross sections is to provide a mechanism to direct water (usually from precipitation) off the traveled way. Undesirable accumulations of water can lead to hydroplaning or other problems which can increase accident potential. See Topics 831 and 833 for hydroplaning considerations.

(2) Standards.

(a) **The standard cross slope to be used for new construction on the traveled way for all types of surfaces shall be 2 percent.**

(b) **For resurfacing or widening when necessary to match existing cross slopes, the minimum shall be 1.5 percent and the maximum shall be 3 percent.** However, the cross slope on 2-lane and multilane AC highways should be increased to 2 percent if the cost is reasonable.

(c) **On unpaved roadway surfaces, including gravel and penetration treated earth, the cross slope shall be 2.5 percent to 5.0 percent.**

On undivided highways with two or more lanes in a normal tangent section, the high point of the crown should be centered on the pavement and the pavement sloped toward the edges on a uniform grade.

For rehabilitation and widening projects, the maximum algebraic difference in cross slope between adjacent lanes of opposing traffic for either 2-lane or undivided multilane highways should be 6 percent. **For new construction, the maximum shall be 4 percent.**

On divided highway roadbeds, the high point of crown may be centered at, or left of, the center of the traveled way, and preferably over a lane line (tent sections). This strategy may be employed when adding lanes on the inside of divided highways, or when widening an existing "crowned" 2-lane highway to a 4-lane divided highway by utilizing the existing 2-lane pavement as one of the divided highway roadbeds.

The maximum algebraic difference in cross slope between same direction traffic lanes of divided highway roadbeds should be 4 percent.

The maximum difference in cross slope between the traveled way and the shoulder should not exceed 8 percent. This applies to new construction as well as pavement overlay projects.

At freeway entrances and exits, the maximum difference in cross slope between adjacent lanes, or between lanes and gore areas, should not exceed 5 percent.

Topic 302 - Shoulder Standards

302.1 Width

The shoulder widths given in Table 302.1 shall be the minimum continuous usable width of paved shoulder. For new construction, and major reconstruction projects on conventional highways, adequate width should be provided to permit shared use by motorists and bicyclists.

See Index 308.1 for shoulder width requirements on city streets or county roads. See shoulder definition, Index 62.1(7).

See Index 1102.2 for shoulder width requirements next to noise Barriers.

Table 302.1
Standards for Paved Shoulder Width

	Paved Shoulder Width (ft) Left	Right [8]
Freeways & Expressways		
2 lanes (1)	--	8[6]
4 lanes (1)	5	10
6 or more lanes (1)	10	10
Auxiliary lanes	--	10
Freeway-to-freeway connections		
Single and two-lane connections	5	10
Three-lane connections	10	10
Single-lane ramps	4[2]	8
Multilane ramps	4[2]	8[3]
Multilane undivided	--	10
Collector-Distributor	5	10
Conventional Highways		
Multilane divided		
4-lanes	5	8
6-lanes or more	8	8
Urban areas with speeds less than or equal to 45 mph and curbed medians	2[4]	8[7]
Multilane undivided	--	8[7]
2-lane		
RRR	See Index 307.3	
New construction	See Table 307.2	
Slow-moving vehicle lane	--	4[5]
Local Facilities		
Frontage roads	See Index 310.1	
Local facilities crossing State facilities	See Index 308.1	

NOTES:
(1) Total number of lanes in both directions including separate roadways (see Index 305.6). If a lane is added to one side of a 4-lane facility (such as a truck climbing lane) then that side shall have 10 feet left and right shoulders. See Index 62.1.
(2) May be reduced to 2 feet. 4 feet preferred in urban areas and/or when ramp is metered. See Index 504.3.
(3) In restrictive situations, may be reduced to 2 feet or 4 feet (preferred in urban areas) in the 2-lane section of a non-metered ramp which transitions from a single lane. May be reduced to 2 feet in ramp sections having 3 or more lanes. See Index 504.3.
(4) For posted speeds less than or equal to 35 mph, shoulder may be omitted (see Index 303.5(5)) except where drainage flows toward the curbed median.
(5) On right side of climbing or passing lane section only. See Index 1003.2 if bike lanes are present.
(6) 10-foot shoulders preferred.
(7) Where parking is allowed, 10 feet to 12 feet shoulders preferred.
(8) Shoulders adjacent to abutment walls, retaining walls in cut locations, and noise barriers shall be 10 feet wide.

302.2 Cross Slopes

(1) General - **When a roadway crosses a bridge structure, the shoulders shall be in the same plane as the adjacent traveled way**.

(2) Left Shoulders - **In depressed median sections, shoulders to the left of traffic shall be sloped at 2 percent away from the traveled way.**

In paved median sections, shoulders to the left of traffic shall be designed in the plane of the traveled way. Maintenance paving beyond the edge of shoulder should be treated as appropriate for the site, but consideration needs to be given to the added runoff and the increased water depth on the pavement (see discussion in Index 831.4 (5) "Hydroplaning").

(3) Right Shoulders- In normal tangent sections, **shoulders to the right of traffic shall be sloped at 2 percent to 5 percent away from the traveled way.**

The above flexibility in the design of the right shoulder allows the designer the ability to conform to regional needs. Designers shall consider the following during shoulder cross slope design.

- In most areas a 5 percent right shoulder cross slope is desired to most expeditiously remove water from the pavement and to allow gutters to carry a maximum water volume between drainage inlets. The shoulders must have adequate drainage interception to control the "water spread" as discussed in Table 831.3 and Index 831.4. Conveyance of water from the total area transferring drainage and rainwater across each lane and the quantity of intercepting drainage shall also be a consideration in the selection of shoulder cross slope. Hydroplaning is discussed in Index 831.4 (5).
- In locations with snow removal operations it is desirable for right shoulders to slope away from traffic in the same plane as the traveled way. This design permits the snowplowing crew to remove snow from the lanes and the shoulders with the least number of passes.
- If shoulders are Portland cement concrete and the District plans to convert shoulders into through lanes within the 20 years following construction, then shoulders are to be built in the plane of the traveled way and to lane standards for width and structural section. (See Index 603.4).
- If use of the highway by pedestrians is expected in areas where sidewalks are not to be constructed, new shoulder cross slope and drainage design should accommodate pedestrians and consideration should be given to pedestrian and bicycle needs on reconstruction of existing shoulders. This decision should involve the local agency and must be consistent with the design guidance provided in Topic 105 and in Design Information Bulletin 82, "Pedestrian Accessibility Guidelines for Highway Projects" for people with disabilities.

Shoulder slopes for superelevated curves are discussed in Index 202.2.

See Index 307.2 for shoulder slopes on 2-lane roads with 2-foot and 4-foot shoulders.

Topic 303 - Curbs, Dikes, and Side Gutters

303.1 General Policy

Curb (including curb with gutter pan), dike, and side gutter all serve specific purposes in the design of the roadway cross section. Curb is primarily used for channelization, access control, separation between pedestrians and vehicles, and to enhance delineation. Dike is specifically intended for drainage and erosion control where stormwater runoff cannot be cost effectively conveyed beyond the pavement by other means. Curb with gutter pan serves the purpose of both curb and dike. Side gutter is intended to prevent runoff from a cut slope on the high side of a superelevated roadway from running across the pavement and is discussed further in Index 834.3.

Aside from their positive aspects in performing certain functions, curbs and dikes can have undesirable effects. In general, curbs and dikes should present the least potential obstruction, yet perform their intended function. As operating speeds increase, lower curb and dike height is desirable. Curbs and dikes are not considered traffic barriers.

On urban and suburban conventional highways where right of way is costly and/or difficult to acquire, it is appropriate to consider the use of a "closed" highway cross section with curb, or curb with gutter pan. There are also some situations where curb is appropriate in freeway settings. The following criteria describe typical situations where curb or curb with gutter pan may be appropriate:

(a) Where needed for channelization, delineation, or other means of improving traffic flow and safety.

(b) At ramp connections with local streets for the delineation of pedestrians walkways and continuity of construction at a local facility.

(c) As a replacement of existing curb with gutter pan and sidewalk.

(d) On frontage roads on the side adjacent to the freeway to deter vehicular damage to the freeway fence.

(e) When appropriate to conform to local arterial street standards.

(f) Where it may be necessary to solve or mitigate operational deficiencies through control or restriction of access of traffic movements to abutting properties or traveled ways.

(g) In freeway entrance ramp gore areas (at the inlet nose) when the gore cross slope exceeds standards.

(h) At separation islands between a freeway and a collector-distributor to provide a positive separation between mainline traffic and collector-distributor traffic.

(i) Where sidewalk is appropriate.

(j) As a tool for traffic calming where operating speeds are 40 miles per hour or less.

(k) To deter vehicular damage of traffic signal standards.

Dike is appropriate where controlling drainage is not feasible via sheet flow or where it is necessary to contain/direct runoff to interception devices. On cut slopes, dike also protects the toe of slope from erosion. Dike may also be necessary to protect adjacent areas from flooding.

The use of curb should be avoided on facilities with operating speeds greater than 45 miles per hour, except as noted in Table 303.1. For projects where the use of curb is appropriate, it should be the type shown in Table 303.1.

303.2 Curb Types and Uses

Depending on their intended function, one of two general classifications of curb design are selected as appropriate. The two general classifications are vertical and sloped. Vertical curbs are actually nearly vertical (approximate batter of 1:4) and vary in height from 6 inches to 8 inches. Sloped curbs (approximate batter of 2:3 or flatter) vary in height from 8 inches to 6 inches.

Sloped curbs are more easily mounted by motor vehicles than vertical curbs. Since curbs are not generally adequate to prevent a vehicle from leaving the roadway, a suitable traffic barrier should be provided where redirection of vehicles is needed. Where curb is placed to deter vehicles from intentionally entering the area behind the curb (e.g., truck offtracking), in most cases the curb will not prevent an errant vehicle from mounting the curb.

Curb with gutter pan may be provided to enhance the visibility of the curb and thus improve delineation. This is most effective where the adjacent pavement is a contrasting color or material. B2-4 and B4 curbs are appropriate for enhancing delineation. Where curb with gutter pan is intended as delineation and has no drainage function, the gutter pan should be in the same plane as the adjacent pavement.

Table 303.1
Selection of Curb Type

Location	Operating Speeds (mph)		
	≤ 40	45	≥ 50
Freeways and Expressways			
Collector-distributor Roads	See Index 504.3(11)		
Ramps			
Conventional Highways			
- Frontage Roads (1)	A or B-6	B-6	B-4
- Traffic Signals	A or B-6	B-6	B-4
- Raised Traffic & Median Islands(2)	A or B-6	B-6	B-4 or D
- Adjacent to Sidewalks & Pedestrian Refuge Islands	A (3)	A-6	B-6
- Bulb outs/curb extensions	A (3)	NA	NA
- Bridges (4)	H, A3, or B3	H or B3	B3

(1) Based on the operating speed along the frontage road.
(2) See Design Information Bulletin Number 80, "Roundabouts" for information on curbs at roundabouts.
(3) Type A curb includes Types A1-6, A2-6, A1-8, and A2-8.
(4) Type H curb typically used in conjunction with Type A curbs next to sidewalks on approach roadway. Type A3 curbs typically used with corresponding Type A curbs on median island of approach roadway. Type B3 curbs typically used with corresponding Type B curbs on approach roadway.

The curb sections provided on the Standard Plans are approved types to be used as stated below. The following types are vertical curb:

(1) *Types A1-6, A2-6, and A3-6.* These curbs are 6-inches high. Their main function is to provide a more positive deterrent to vehicles than is provided by sloped curb. Specifically, they are used to separate pedestrians from vehicles, to control parking of vehicles, and to deter vehicular damage of traffic signal standards. They may also be used as raised median islands in low speed environments (operating speed ≤ 40 miles per hour). These curbs do not constitute a positive barrier as they can be mounted except at low speeds and flat angles of approach.

(2) *Types A1-8, A2-8, and A3-8.* These 8-inch high curbs may be used in lieu of 6-inch curbs when requested by local authorities, if the curb criteria stated under Index 303.1 are satisfied and operating speeds are 40 miles per hour or less. This type of curb may impede curbside passenger loading and may make it more difficult to comply with curb ramp design (see Design Information Bulletin Number 82, "Pedestrian Accessibility Guidelines for Highway Projects").

(3) *Type H Curb.* This type may be used on bridges with operating speeds less than or equal to 45 miles per hour where it is desired to match the approach roadway curb. Type H curb is often incorporated into bridge barrier/sidewalk combination railings (See Index 208.10(4)).

These types are sloped curbs:

(4) *Types B1, B2, and B3 Curbs and Curbs with Gutter Pan.* Types B1-6, B2-6, and B3-6 are 6 inches high. Type B1-4, B2-4, and B3-4 are 4 inches high. Since all have a 1:1½ slope or

flatter on the face, they are mounted more easily than Type A curbs. Typical uses of these curbs are for channelization including raised median islands. B2 curb with gutter pan also serves as drainage control.

(5) *Type B4 Curb.* Type B4 curb with gutter pan is 3 inches high and is typically used on ramp gores as described in Index 504.3(11). It may also be appropriate where a lower curb is desirable.

(6) *Type D Curb.* Type D curb is 4 inches or 6 inches high and is typically used for raised traffic islands, collector-distributor separation islands, or raised medians when operating speeds equal or exceed 50 miles per hour.

(7) *Type E Curb*. This essentially is a rolled gutter used only in special drainage situations.

Curbs with gutter pans, along with the shoulder, may provide the principal drainage system for the roadway. Inlets are provided in the gutter pan or curb, or both.

Gutter pans are typically 2 feet wide but may be 1 foot to 4 feet in width, with a cross slope of typically 8.33 percent to increase the hydraulic capacity. Gutter pan cross slopes often need to be modified at curb ramps in order to meet accessibility requirements. See Design Information Bulletin Number 82, "Pedestrian Accessibility Guidelines for Highway Projects" for accessibility standards. Warping of the gutter pan should be limited to the portion within 2 feet to 3 feet of the gutter flow line to minimize adverse driving effects.

Curbs and gutter pans are cross section elements considered entirely outside the traveled way, see Index 301.1.

Where bicycles are permitted and the shoulder width is 4 feet, gutter pan width should be reduced to 1 foot, so 3 feet is provided between the traffic lane and the longitudinal joint at the gutter pan. For mandatory requirements regarding drainage inlet grates for bicycles, see Index 1003.6(3).

303.3 Dike Types and Uses

Use of dike is intended for drainage control and should not be used in place of curb. Dikes placed adjoining the shoulder, as shown in Figures 307.2, 307.4, and 307.5, provide a paved triangular gutter within the shoulder area. The dike sections provided on the Standard Plans are approved types to be used as stated below. Dikes should be selected as illustrated in Figure 303.3. Dikes should be designed so that roadway runoff is contained within the limits specified in Index 831.3. For most situations Type E dike is the preferred dike type as discussed below.

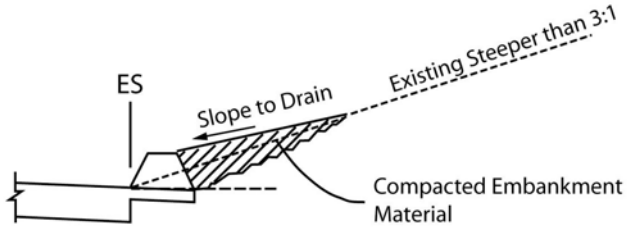
(1) *Type A Dike.* The use of Type A dike should be avoided. For RRR projects, Type A dike may be used in cut sections with slopes steeper than 3:1 and where existing conditions do not allow for construction of the wider Type D or E dikes. Compacted embankment material should be placed behind the back of dike as shown in Figure 303.3.

(2) *Type C Dike.* This low dike, 2 inches in height, may be used to confine small concentrations of runoff. The capacity of the shoulder gutter formed by this dike is small. Due to this limited capacity, the need for installing an inlet immediately upstream of the beginning of this dike type should be evaluated. This low dike can be traversed by a vehicle and allows the area beyond the surfaced shoulder to be used as an emergency recovery and parking area. The Type C dike is the only dike that may be used in front of guardrail. In such cases, it is not necessary to place compacted embankment material behind Type C dike.

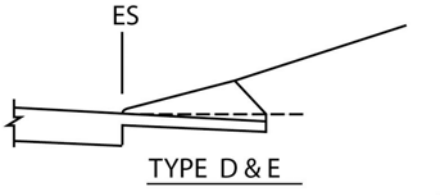
(3) *Type D Dike.* This 6-inch high dike provides about the same capacity as the Type A dike but has the same shape as the Type E dike. The quantity of material in the Type D dike is more than twice that of a Type E dike. It should only be used where there is a need to contain higher volumes of drainage. Compacted embankment material should be placed behind the back of dike as shown in Figure 303.3. For RRR projects that do not widen pavement, compacted embankment material may be omitted on existing fill slopes steeper than 3:1 when there is insufficient room to place the embankment material.

Figure 303.3
Dike Type Selection and Placement(1)

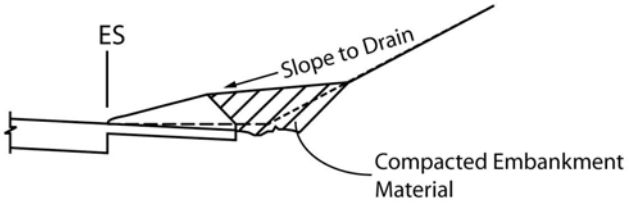
CUT SECTIONS



TYPE A
RRR PROJECTS (Restrictive Conditions Only)(2)

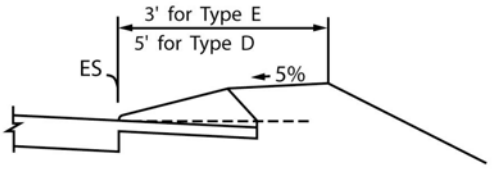


TYPE D & E

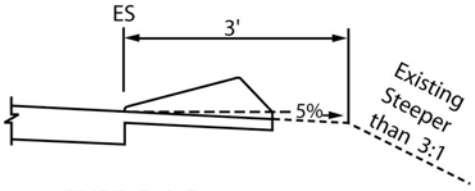


TYPE D & E
ALTERNATIVE

FILL SECTIONS

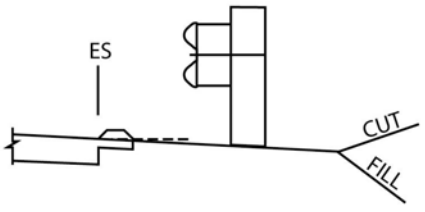


TYPE D & E

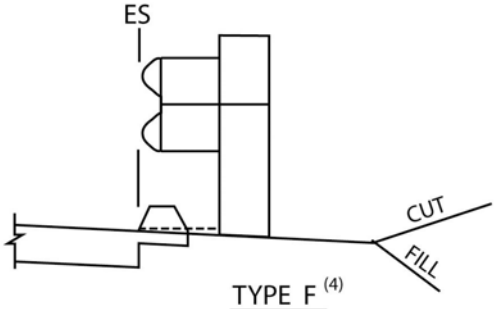


TYPE D & E
RRR PROJECTS (Restrictive Conditions Only) (3)

CUT/FILL SECTIONS



TYPE C



TYPE F (4)

Notes: **(1) See Standard Plans for additional information and details.**
(2) See Index 303.3(1) for restrictive conditions.
(3) See Index 303.3(3) and Index 303.3(4) for restrictive conditions for Type D and Type E respectively.
(4) Use under MBGR when dike is necessary for drainage control.

(4) *Type E Dike.* This 4-inch high dike provides more capacity than the Type C dike. Because Type E dike is easier to construct than Type D dike, and has greater drainage capacity than Type C dike, it is the preferred dike type for most installations. Compacted embankment material should be placed behind the back of dike as shown in Figure 303.3. For RRR projects that do not widen pavement, compacted embankment material may be omitted on existing fill slopes steeper than 3:1 where there is insufficient room to place the embankment material.

(5) *Type F Dike.* This 4-inch high dike is to be used where dike is necessary for drainage underneath a guardrail installation. This dike is placed directly under the face of metal beam guardrail installations.

303.4 Side Gutters

For information on side gutters, see Index 834.3.

303.5 Position of Curbs and Dikes

Curbs located at the edge of the traveled way may have some effect on lateral position and speed of moving vehicles, depending on the curb configuration and appearance. Curbs with low, sloped faces may encourage drivers to operate relatively close to them. Curbs with vertical faces may encourage drivers to slow down and/or shy away from them and, therefore, it may be desirable to incorporate some additional roadway width.

All dimensions to curbs (i.e., offsets) are from the near edge of traveled way to bottom face of curb. All dimensions to dikes are from the near edge of traveled way to flow line. Curb and dike offsets should be in accordance with the following:

(1) *Through Lanes.* The offset from the edge of traveled way to the face of curb or dike flow line should be no less than the shoulder width, as set forth in Table 302.1.

(2) *Channelization.* Island curbs used to channelize intersection traffic movements should be positioned as described in Index 405.4.

(3) *Separate Turning Lanes.* Curb offsets to the right of right-turn lanes in urban areas may be reduced to 2 feet if design exception approval for nonstandard shoulder width has been obtained in accordance with Index 82.2. No curb offset is required to the left of left-turn lanes in urban areas unless there is a gutter pan.

(4) *Median Openings.* Median openings (Figure 405.5) should not be separated with curb unless necessary to delineate areas occupied by traffic signal standards.

(5) *Urban Conventional Highways.* When the posted speed is less than or equal to 35 miles per hour, no median curb offset is required if there is no gutter pan.

(6) *Structure Approach Slabs.* When a dike is required to protect the side slope from erosion, it should be placed on the structure approach and sleeper slabs as well as aligned to tie into the end of the structure railing. The guardrail alignment and edge of shoulder govern the positioning of the dike.

When the Type 14 structure approach slab is used, concrete dikes are preferred. Hot mixed asphalt dike will inevitably crack due to expansion and contraction at the approach/sleeper slab joint. A metal dike insert is used to carry the flow across the sealed joint. The insert acts as a water barrier to minimize erosion of the fill slope. Details of the metal dike insert are shown in the structure approach plans provided by the Division of Engineering Services, (DES).

(7) *Bridges and Grade Separation Structures.* When both roadbeds of a curbed divided highway are carried across a single structure, the median curbs on the structure should be in the same location as on adjacent roadways.

(8) *Approach Nose.* The approach nose of islands should also be designed utilizing a parabolic flare, as discussed in Index 405.4.

303.6 Curbs and Dikes on Frontage Roads and Streets

Continuous curbs or dikes are not necessarily required on all frontage roads. Where curbs or dikes are necessary for drainage control or other reasons, they should be consistent with the

guidelines established in this topic and placed as shown on Figure 307.4. Local curb standards should be used when requested by local authorities for roads and streets that will be relinquished to them.

Topic 304 - Side Slopes

304.1 Side Slope Standards

Slopes should be designed as flat as is reasonable. For new construction, widening, or where slopes are otherwise being modified, embankment (fill) slopes should be 4:1 or flatter. Factors affecting slope design are as follows:

(a) Safety. Flatter slopes provide better recovery for errant vehicles that may run off the road. A cross slope of 6:1 or flatter is suggested for high speed roadways whenever it is achievable. Cross slopes of 10:1 are desirable.

Recoverable slopes are embankment slopes 4:1 or flatter. Motorists who encroach on recoverable slopes can generally stop their vehicles or slow them enough to return to the traveled way safely.

A slope which is between 3:1 and 4:1 is considered traversable, but not recoverable. Since a high percentage of vehicles will reach the toe of these slopes, the recovery area should be extended beyond the toe of slope. The AASHTO Roadside Design Guide should be consulted for methods of determining the preferred extent of the runout area.

Embankment slopes steeper than 3:1 are considered non-recoverable and non-traversable. District Traffic, and the AASHTO Roadside Design Guide should be consulted for methods of determining the preferred treatment.

Regardless of slope steepness, it is desirable to round the top of slopes so an encroaching vehicle remains in contact with the ground. Likewise, the toe of slopes should be rounded to prevent vehicles from nosing into the ground.

(b) Erosion Control. Slope designs steeper than 4:1 must be approved by the District Landscape Architect in order to assure compliance with the regulations affecting Stormwater Pollution contained in the Federal Clean Water Act (see Index 82.4). Slope steepness and length are two of the most important factors affecting the erodability of a slope. Slopes should be designed as flat as possible to prevent erosion. However, since there are other factors such as soil type, climate, and exposure to the sun, District Landscape Architecture and the District Stormwater Coordinator must be contacted for erosion control requirements.

A Storm Water Data Report (SWDR) documents project information and considerations pertaining to Storm Water Best Management Practices (BMPs) and Erosion Control methods. The SWDR is prepared and signed by key personnel (including the District Landscape Architect) at the completion of each phase of a project. By signing the SWDR, the District Landscape Architect approves compliance with the proposed slope designs.

(c) Structural Integrity. Slopes steeper than 2:1 require approval of District Maintenance. The Geotechnical Design Report (See Topic 113) will recommend a minimum slope required to prevent slope failure due to soil cohesiveness, loading, slip planes and other global stability type failures. There are other important issues found in the Geotechnical Design Report affecting slope design such as the consistency of the soil likely to be exposed in cuts, identification of the presence of ground water, and recommendations for rock fall.

(d) Economics. Economic factors such as purchasing right of way, imported borrow, and environmental impacts frequently play a role in the decision of slope length and steepness. In some cases, the cost of stabilizing, planting, and maintaining steep slopes may exceed the cost of

additional grading and right of way to provide a flatter slope.

(e) Aesthetics. Flat, gentle, and smooth, well transitioned slopes are visually more satisfying than steep, obvious cuts and fills. In addition, flatter slopes are more easily revegetated, which helps visually integrate the transportation improvement within its surrounding environment. Contact the District Landscape Architect when preparing a contour grading plan.

In light grading where normal slopes catch in a distance less than 18 feet from the edge of the shoulder, a uniform catch point, at least 18 feet from the edge of the shoulder, should be used. This is done not only to improve errant vehicle recovery and aesthetics, but also to reduce grading costs. Uniform slopes wider than 18 feet can be constructed with large production equipment thereby reducing earthwork costs.

Transition slopes should be provided between adjoining cuts and fills. Such slopes should intersect the ground at the uniform catch point line.

In areas where heavy snowfall can be expected, consideration should be given to snow removal problems and snow storage in slope design. It is considered advisable to use flatter slopes in cuts on the southerly side of the roadway where this will provide additional exposure of the pavement to the sun.

304.2 Clearance From Slope to Right of Way Line

The minimum clearance from the right of way line to catch point of a cut or fill slope should be 10 feet for all types of cross sections. When feasible, at least 15 feet should be provided.

Following are minimum clearances recommended for cuts higher than 30 feet:

(a) Twenty feet for cuts from 30 feet to 50 feet high.

(b) Twenty-five feet for cuts from 50 feet to 75 feet high.

(c) One-third the cut height for cuts above 75 feet, but not to exceed a width of 50 feet.

The foregoing clearance standards should apply to all types of cross sections.

304.3 Slope Benches and Cut Widening

The necessity for benches, their width, and vertical spacing should be finalized only after an adequate materials investigation. Since greater traffic benefits are realized from widening a cut than from benching the slope, benches above grade should be used only where necessary. Benches above grade should be used for such purposes as installation of horizontal drains, control of surface erosion, or intercepting falling rocks. Design of the bench should be compatible with the geotechnical features of the site.

Benches should be at least 20 feet wide and sloped to form a valley at least 1 foot deep with the low point a minimum of 5 feet from the toe of the upper slope. Access for maintenance equipment should be provided to the lowest bench, and if feasible to all higher benches.

In cuts over 150 feet in height, with slopes steeper than 1½:1, a bench above grade may be desirable to intercept rolling rocks. The Division of Engineering Services – Geotechnical Services (DES-GS) should be consulted for assistance in recommending special designs to contain falling and/or rolling rocks.

Cut widening may be necessary:

(a) To provide for drainage along the toe of the slope.

(b) To intercept and store loose material resulting from slides, rock fall, and erosion.

(c) For snow storage in special cases.

(d) To allow for planting.

Where the widened area is greater than that required for the normal gutter or ditch, it should be flush with the edge of the shoulder and sloped upward or downward on a gentle slope, preferably 20:1 in areas of no snow; and downward on a 10:1 slope in snow areas.

304.4 Contour Grading and Slope Rounding

Smooth, flowing contours that tie gracefully into the existing roadside help make highway improvements compatible with the surrounding environment. Contour grading is an important factor in roadside design, safe vehicle recovery (see Index 304.1), erosion control, planting, and maintenance of planting and vegetation. Contour grading plans should be prepared to facilitate anticipated roadside treatment. These plans should show flattening of slopes where right of way permits. The tops and ends of all cut slopes should be rounded where the material is other than solid rock. A layer of earth overlying a rock cut also should be rounded.

304.5 Stepped Slopes

Stepped cut slopes should be used to encourage material revegetation from the adjacent plants. Stepped slopes are a series of small benches 1 foot to 2 feet wide. Generally, stepped slopes can be used in rippable material on slopes 2:1 or steeper. Steps may be specified for slopes as flat as 3:1. Steps are provided to capture loose material, seed, and moisture. Topsoil should be reapplied to stepped slopes to encourage revegetation.

For appearance, steps on small cuts viewed from the roadway should be cut parallel to the road grade. Runoff is minimized on steps cut parallel to roads with grades up to 10 percent, as long as the natural ravel from construction is left on the steps. Steps less than one-half full should not be cleaned.

High cuts viewed from surrounding areas should be analyzed before a decision is made to form steps parallel to the roadway or horizontal. In some cases, horizontal steps may be more desirable. Special study is also necessary when a sag occurs in the vertical alignment within the cut. In all cases at the ends of cuts, the steps should wrap around the rounded transition.

The detail or contract special provisions should allow about a 20 percent variation, expressed in terms of millimeters. Some irregularity will improve the appearance of the slope by making it appear more natural.

In designing step width, the material's weathering characteristics should generally be considered. Widths over approximately 2 feet should be avoided because of prominence and excessive time to achieve a weathered and natural appearance. Contact the DES-GS and the District Landscape Architect for more information about the width of steps.

Topic 305 - Median Standards

305.1 Width

Median width is expressed as the dimension between inside edges of traveled way, including the inside shoulder. This width is dependent upon the type of facility, costs, topography, and right of way. Consideration may be given to the possible need to construct a wider median than prescribed in Cases (1), (2), and (3), below, in order to provide for future expansion to accommodate:

(a) Other modes of transportation.

(b) Traffic needs more than 20 years after completion of construction.

Any recommendation to provide additional median width should be identified and documented as early as possible and must be justified in a Project Study Report and/or Project Report. Attention should be given to such items as initial costs, future costs for outside widening, the likelihood of future needs for added mixed flow or High-Occupancy Vehicle (HOV) lanes, traffic interruption, future mass transit needs and right of way considerations. (For instance, increasing median width may add little to the cost of a project where an entire city block must be acquired in any event.)

If additional width is justified, the minimum median widths provided below should be increased accordingly.

Minimum median widths for the design year (as described below) should be used in order to accommodate the ultimate highway facility (type and number of lanes):

(1) Freeways and Expressways.

(a) Urban Areas. Where HOV lanes or transit facilities are planned, the minimum median width should be 62 feet. Where

there is little or no likelihood of HOV lanes or transit facilities planned for the future, the minimum median width should be 46 feet. However, where physical and economic limitations are such that a 46-foot median cannot be provided at reasonable cost, the minimum median width for freeways and expressways in urban areas should be 36 feet.

(b) Suburban Areas. The minimum median width for freeways and expressways in suburban areas should be 62 feet. Suburban areas can be described as those where there is a strong possibility that the surrounding properties will be converted into urban type development during or beyond the design year. The additional median width will provide for construction of mixed-flow lanes, HOV lanes, or transit facilities.

(c) Rural Areas. The minimum median width for freeways and expressways in rural areas should be 62 feet.

(2) Conventional Highways. Appropriate median widths for non-controlled access highways vary widely with the type of facility being designed. In city street conditions the minimum median width for multilane conventional highways should be 12 feet. This median width will provide room for left-turn pockets at intersections, and/or the construction of two-way left-turn lanes. Where medians are provided for proposed future two-way left-turn lanes, median widths up to 14 feet may be provided to conform to local agency standards (see Index 405.2). **In rural areas the minimum median width for multilane conventional highways shall be 12 feet.** This provides the minimum space necessary to accommodate a median barrier and 5-foot shoulders. Whenever possible, and where it is appropriate, this minimum width should be increased to 30 feet or greater.

At locations where a climbing or passing lane is added to a 2-lane conventional highway, a 4-foot median (or "soft barrier") between opposing traffic lanes should be used.

(3) Facilities under Restrictive Conditions. Where certain restrictive conditions, including steep mountainous terrain, extreme right of way costs, and/or significant environmental factors are encountered, the basic median widths above may not be attainable. Where such conditions exist, a narrower median, down to the limits given below, may be allowed with adequate justification. (See Index 307.5.)

(a) Freeways and Expressways. **In areas where restrictive conditions prevail the minimum median width shall be 22 feet.**

(b) Conventional Highways. Median widths should be consistent with requirements for two-way left-turn lanes or the need to construct median barriers (as discussed in Index 305.1(2)), but may be reduced or eliminated entirely in extreme situations.

The above stated minimum median widths should be increased at spot locations to accommodate the construction of bridge piers or other planned highway features while maintaining standard cross section elements such as inside shoulder width and horizontal clearance. If a bridge pier is to be located in a tangent section, the additional width should be developed between adjacent horizontal curves; if it is to be located in a curve, then the additional width should be developed within the limits of the curve. Provisions should be made for piers 6 feet wide or wider. Median widths in areas of multilevel interchanges or other major structures should be coordinated with the Division of Engineering Services, Structures Design (DES-SD).

Consideration should also be given to increasing the median width at unsignalized intersections on expressways and divided highways in order to provide a refuge area for large trucks attempting to cross the State route.

In any case, the median width should be the maximum attainable at reasonable cost based on site specific considerations of each project.

See Index 613.5(2)(b) for paved median pavement structure requirements.

305.2 Median Cross Slopes

Unsurfaced medians up to 65 feet wide should be sloped downward from the adjoining shoulders to form a shallow valley in the center. Cross slopes should be 10:1 or flatter; 20:1 being preferred. Slopes as steep as 6:1 are acceptable in exceptional cases when necessary for drainage, stage construction, etc. Cross slopes in medians 60 feet and wider should be treated as separate roadways (see Index 305.6).

Paved medians, including those bordered by curbs, should be crowned at the center, sloping towards the sides at the slope of the adjacent pavement.

305.3 Median Barriers

See Chapter 7 of the Traffic Manual.

305.4 Median Curbs

See Topic 303 for curb types and usage in medians and Index 405.5(1) for curbs in median openings.

305.5 Paved Medians

(1) Freeways.

(a) 6 or More Lanes--Medians 30 feet wide or less should be paved.

(b) 4 Lanes--Medians 22 feet or less in width should be paved. Medians between 22 feet and 30 feet wide should be paved only if a barrier is installed. With a barrier, medians wider than 30 feet should not normally be paved.

Where medians are paved, each half generally should be paved in the same plane as the adjacent traveled way.

(2) Nonfreeways. Unplanted curbed medians generally are to be surfaced with minimum 0.15 foot of Portland cement concrete.

For additional information on median cross slopes see Index 305.2.

305.6 Separate Roadways

(1) General Policy. Separate grade lines are not considered appropriate for medians less than 65 feet wide (see Index 204.7).

(2) Median Design. The cross sections shown in Figure 305.6 with a 23-foot graded area left of traffic are examples of median treatment to provide maneuvering room for out-of-control vehicles. This optional treatment may be used where extra recovery area is desired (see Index 307.6).

See Index 302.1 for shoulder widths and Index 302.2 for shoulder cross slopes.

Topic 306 - Right of Way

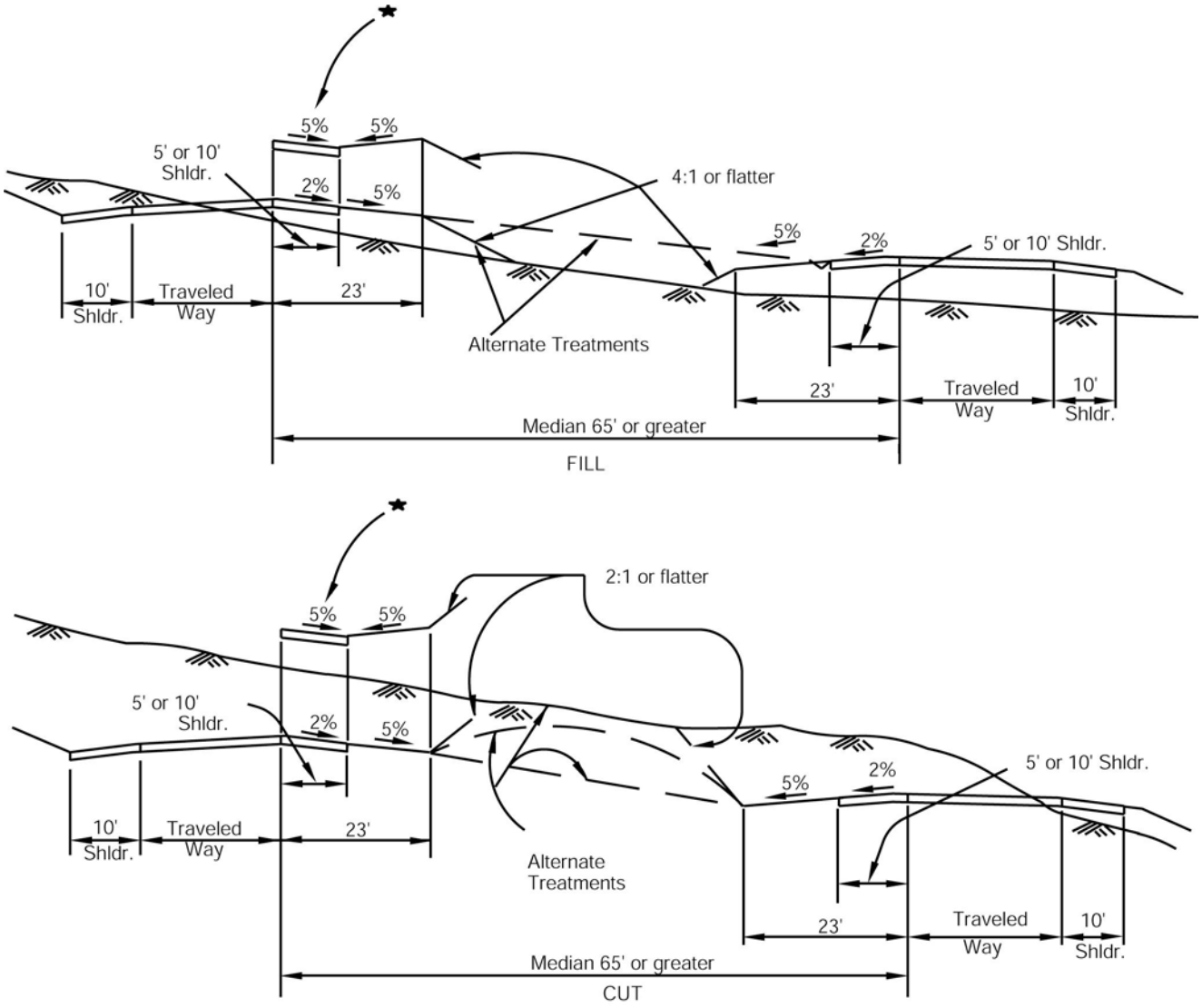
306.1 General Standards

The right of way widths for State highways, including frontage roads to be relinquished, should provide for all cross section elements including median, traffic lanes, outside shoulders, recovery areas, slopes, outer separations, ramps, walls, and other essential highway appurtenances. For minimum clearance from the right of way line to the catch point of a cut or fill slope, see Index 304.2. Fixed minimum widths of right of way, except for 2-lane highways, are not specified because dimensions of cross-sectional elements may require narrow widths, and right of way need not be of constant width. The minimum right of way width on new construction for 2-lane highways should be 130 feet.

306.2 Right of Way Through the Public Domain

Right of way widths to be obtained or reserved for highway purposes through lands of the United States Government or the State of California are determined by laws and regulations of the agencies concerned.

Figure 305.6
Optional Median Designs for Freeways with Separate Roadways



NOTES:

Left Paved Shoulder Width
- 10' for 6-lane and 8-lane roadways
- 5' for 4-lane roadways

Side Slopes
- See Index 304.1

★ Superelevated section

Topic 307 - Cross Sections for State Highways

307.1 Warrants

The selection of a cross section is based upon traffic, terrain, safety, and other considerations. For 2-lane roads the roadbed width is influenced by the factors discussed under Index 307.2. The roadbed width for multilane facilities should be adequate to provide capacity for the design hourly volume based upon capacity considerations discussed under Index 102.1.

307.2 Two-lane Cross Sections for New Construction

These standards are to be used for highways on new alignment as well as on existing highways where the width, alignment, grade, or other geometric features are being upgraded.

A 2-lane, 2-way roadbed consists of a 24-foot wide traveled way plus paved shoulders. **In order to provide structural support, the minimum paved width of each shoulder shall be 2 feet.** Development and maintenance of 4-foot paved shoulders should be considered when bicyclists are present. See Topic 1003 for information on bicycle design criteria and Figure 307.2 for typical 2-lane cross sections.

Shoulder widths based on design year traffic volumes shall conform to the standards given in Table 307.2.

On 2-lane roads with 4-foot shoulders, the shoulder slope may be increased to 7 percent for additional drainage capacity where a dike is used. With 2-foot shoulders the shoulder slope should be 2 percent without a dike, but may be increased to a maximum of 9 percent for additional drainage capacity with a dike.

Shoulder widths of 4 feet or less should be constructed in accordance with the "All Paved Cross Section" of Figure 307.2 in order to provide essentially the same structural section throughout the full roadbed width.

Minimum width of 2-lane State highways functionally classified as collectors may be as given in Exhibit 6-5 of AASHTO, A Policy on Geometric Design of Highways and Streets. Up-to-date information on the functional classification of State highways may be obtained from Headquarters Office of Highway System Engineering.

Table 307.2

Shoulder Widths for Two-lane Roadbed New Construction Projects

Two-way ADT (Design Year)	Shoulder Width[1] (ft)
Less than 400	2 or 4[2]
Over 400	8

Notes:

(1) See Index 1003.2 for shoulder requirements when bike lanes are present.

(2) Minimum bridge width is 32 feet (see Index 208.1).

307.3 Two-lane Cross Sections for RRR Projects

Standards and guidelines for two-lane cross sections on RRR projects are found in Design Information Bulletin Number 79 (DIB 79), "Geometric Design Criteria for Resurfacing, Restoration, and Rehabilitation (RRR) and Certain Safety, Storm Damage, Protective Betterment, and Operational Improvement Projects." DIB 79 can be found on the HQ Division of Design website under Design Information Bulletins.

The purpose of RRR (also known as roadway rehabilitation) projects is to preserve and extend the design life of existing highways for a minimum of ten years and enhance highway safety. DIB 79 focuses on geometric design criteria developed for RRR projects. The designer must always emphasize implementation of cost-effective safety improvements where practical.

RRR design criteria apply to all structure and roadway RRR projects on two-lane conventional highways and three-lane conventional highways not classified as multilane conventional highways.

RRR design criteria also apply to certain storm damage, protective betterment, operational, and

safety nonfreeway improvement projects that are considered spot locations as described in detail in DIB 79.

RRR criteria apply to geometric design features such as lane and shoulder widths, horizontal and vertical alignment, stopping sight distance, structure width, cross slope, superelevation, side slope, clear recovery zone, and intersections. They may also apply to such features as curb ramps, pavement edge drop, dike, curb and gutter, sidewalk, and drainage.

307.4 Multilane Divided Cross Sections

The general geometric features of multilane divided cross sections are shown in Figure 307.4.

Divided highways may be designed as two separate one-way roads where appropriate to fit the terrain. Economy, pleasing appearance, and safety are factors to be considered in this determination. The alignment of each roadway may be independent of the other (see Indexes 204.8 and 305.6). Optional median designs may be as shown on Figure 305.6.

307.5 Multilane All Paved Cross Sections with Special Median Widths

A multilane cross section with a narrow median is illustrated in Figure 307.5. This section is appropriate in special circumstances where a wider median would not be justified. It should not be considered as an alternative to sections with the median widths set forth under Index 305.1. It may be used under the following conditions:

(a) Widening of existing facilities.

(b) Locations where large excavation quantities would result if a multilane roadway cross section with a basic median width were used. Examples are steep mountainous terrain and unstable mountainous areas.

(c) As an alternate cross section on 2-lane roads having frequent sight distance restrictions.

The median width should be selected in accordance with the criteria set forth in Index 305.1(3).

In general, the outside shoulder should be 8 feet wide (10 feet on freeways and expressways) as mandated in Table 302.1. Where large excavation quantities or other factors generate unreasonable costs, 4-foot shoulders may be considered. However, a design exception is required except where 4-lane passing sections are constructed on 2-lane highways. Where the roadbed width does not contain 8-foot shoulders, emergency parking areas clear of the traveled way should be provided by using daylighted cuts and other widened areas which develop during construction.

307.6 Multilane Cross Sections for RRR Projects

RRR projects on freeways, expressways, and multilane conventional highways are generally required to meet new construction standards.

For additional information, see Design Information Bulletin Number 79, "Geometric Design Criteria for Resurfacing, Restoration, and Rehabilitation (RRR) and Certain Safety, Storm Damage, Protective Betterment, and Operational Improvement Projects."

Topic 308 - Cross Sections for Roads Under Other Jurisdictions

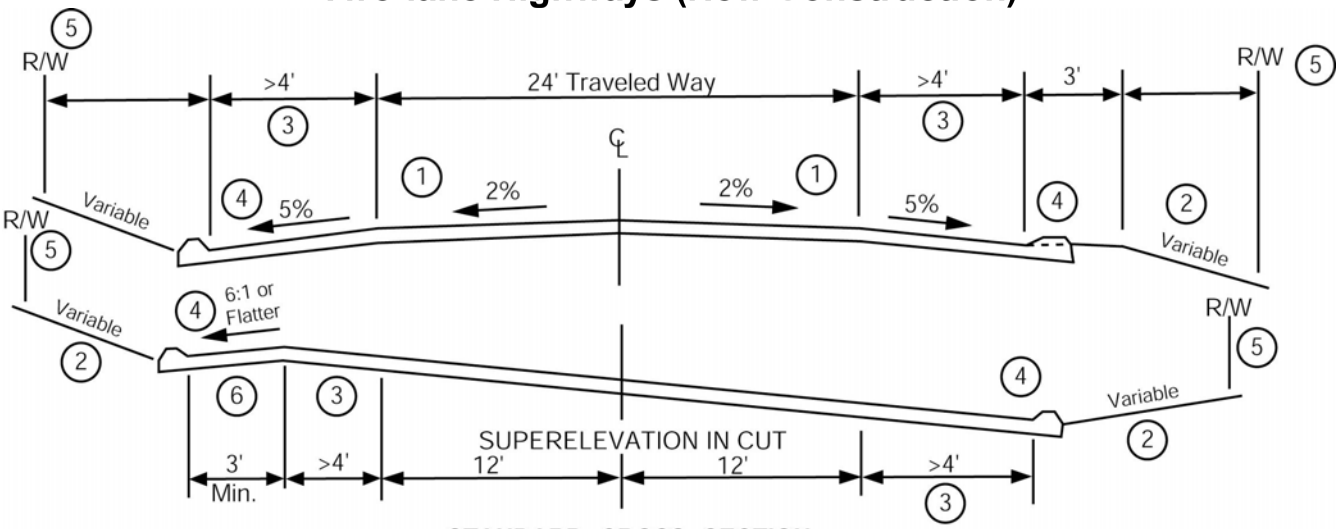
308.1 City Streets and County Roads

The width of local roads and streets that are to be reconstructed as part of a freeway project should conform to AASHTO standards if the local road or street is a Federal-aid route. Otherwise the cross section should match the width of the city street or county road adjoining the reconstructed portion, or the cross section should satisfy the local agency's minimum standard for new construction.

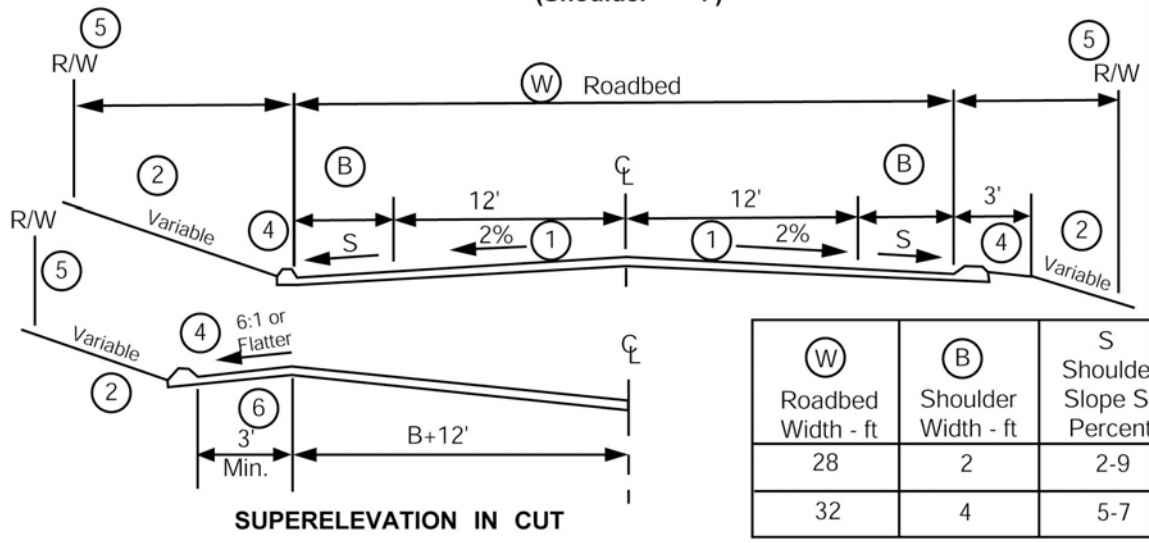
Where a local facility within the State right of way crosses over or under a freeway or expressway but has no connection to the State facility, the minimum design standards for the cross section of the local facility within the State's right of way shall be those found in AASHTO. If the local agency has standards that exceed AASHTO standards, then the local agency standards should apply.

AASHTO standards for local roads and streets are given in AASHTO, A Policy on Geometric Design of Highways and Streets.

Figure 307.2
Geometric Cross Sections for
Two-lane Highways (New Construction)



STANDARD CROSS SECTION
(Shoulder > 4')



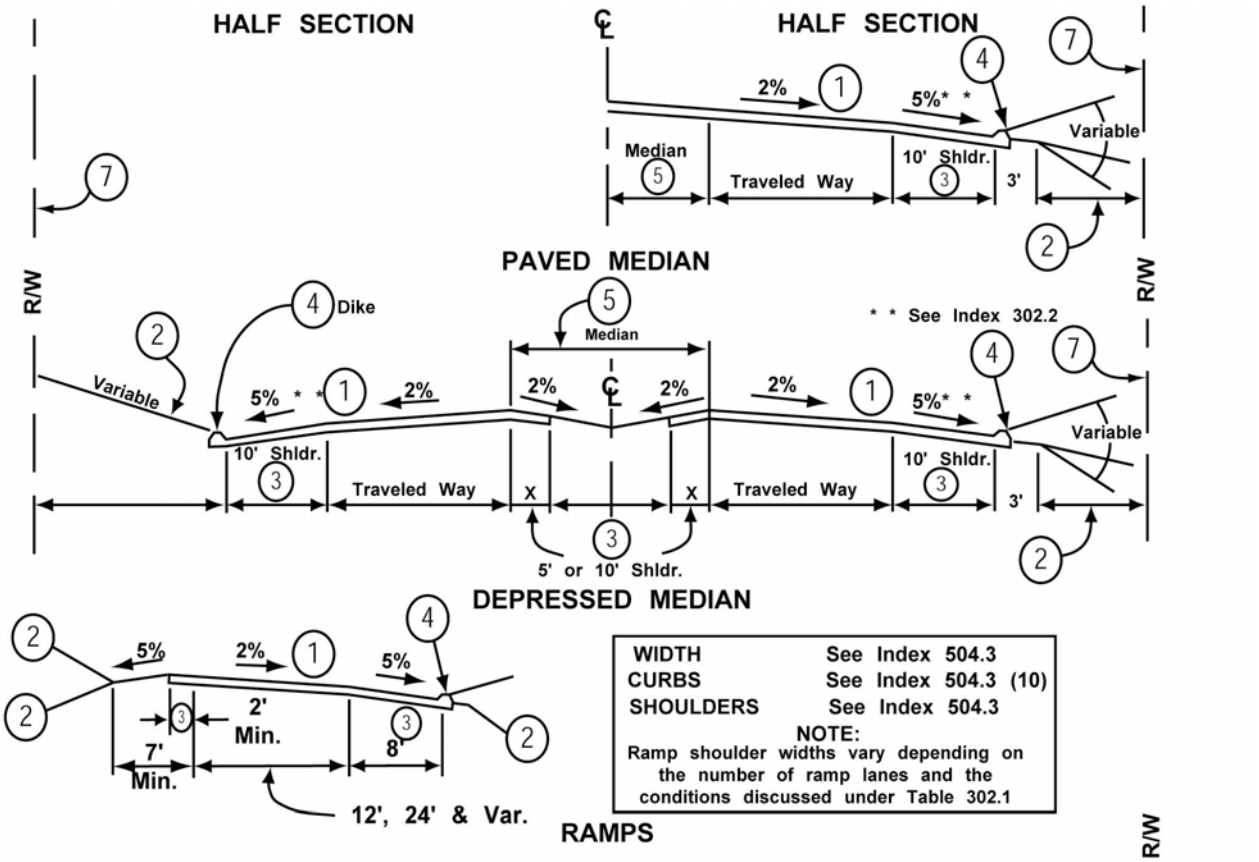
W Roadbed Width - ft	B Shoulder Width - ft	S Shoulder Slope S-Percent
28	2	2-9
32	4	5-7

SUPERELEVATION IN CUT

ALL PAVED CROSS SECTION
(Shoulder ≤ 4')

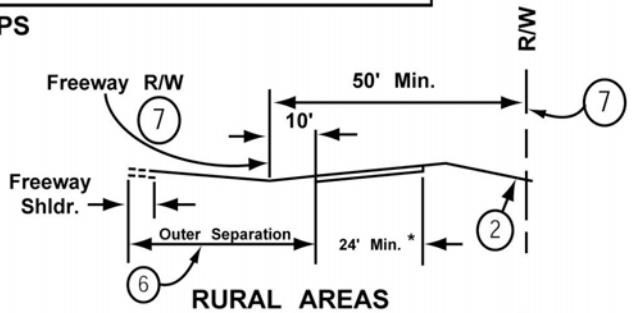
NOTES		
1	CROSS SLOPES	See Index 302.2
2	SIDE SLOPES	See Index 304.1
3	SHOULDER WIDTH	See Index 302.1
4	DIKES	See Index 303.3
5	RIGHT OF WAY	See Index 306.1
6	SIDE GUTTERS	See Index 834.3(3)

Figure 307.4
Geometric Cross Sections for Freeways and Expressways



NOTES

1	CROSS SLOPES	See Index 302.2
2	SIDE SLOPES	See Index 304.1 and Index 304.2
3	SHOULDERS	
	WIDTH	See Index 302.1
	PAVING	See Index 613.5(2)
4	DIKES	See Index 303.3
5	MEDIANS	
	WIDTH	See Index 305.1
	SLOPES	Depressed Median 10:1 or flatter 20:1 preferred See Index 305.2
	PAVING	See Index 305.5
	SEPARATE ROADWAYS	See Index 305.6
6	OUTER SEPARATION	
	WIDTH	See Index 310.2
7	RIGHT OF WAY	
	WIDTH	See Index 306.1
8	FRONTAGE ROADS	See Index 310.1



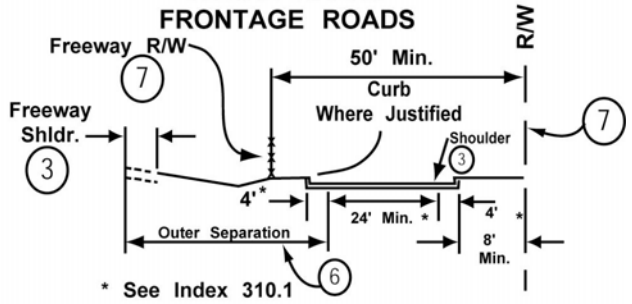
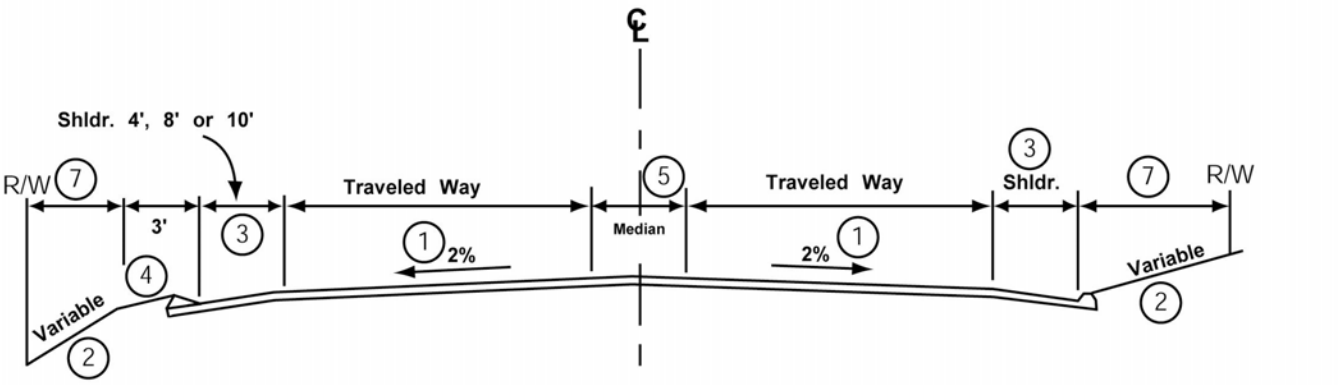
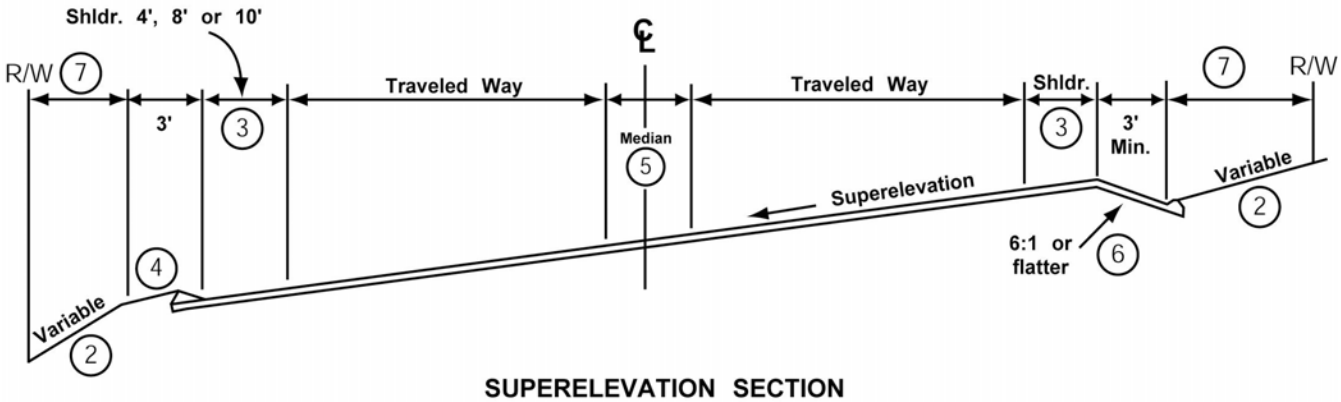


Figure 307.5
Geometric Cross Sections for
All Paved Multilane Highways



TANGENT SECTION



SUPERELEVATION SECTION

NOTES		
1	CROSS SLOPES	See Index 302.2
2	SIDE SLOPES	See Index 304.1
3	SHOULDERS	See Index 307.5
4	DIKES	See Index 303.3
5	MEDIANS	See Index 305.1 (3)
6	SIDE GUTTERS	See Index 834.3 (3)
7	RIGHT OF WAY	See Index 306.1

It is important to note that AASHTO, A Policy on Geometric Design of Highways and Streets, standards are based on functional classification and not on a Federal-aid System.

Chapter 1 of AASHTO, A Policy on Geometric Design of Highways and Streets, list standards for the following six functional classes:

- Local rural roads
- Local urban streets
- Rural collectors
- Urban collectors
- Rural arterials
- Urban arterials

AASHTO, A Policy on Geometric Design of Highways and Streets, gives minimum lane and shoulder widths. When selecting a cross section, the effects on capacity of commercial vehicles and grades should be considered as discussed under Topic 102 and in the Transportation Research Board, Highway Capacity Manual.

The minimum width of 2-lane overcrossing structures shall not be less than 28 feet curb to curb. Also see Index 208.1(2) and Index 307.3.

If the local agency has definite plans to widen the local street either concurrently or within 5 years following freeway construction, the reconstruction to be accomplished by the State should generally conform to the widening planned by the local agency. Stage construction should be considered where the planned widening will occur beyond the 5-year period following freeway construction or where the local agency has a master plan indicating an ultimate width greater than the existing facility. Where an undercrossing is involved, the initial structure construction should provide for ultimate requirements.

Where a local facility crosses over or under a freeway or expressway and connects to the State facility (such as ramp terminal intersections), the minimum design standards for the cross section of the local facility shall be at least equal to those for a conventional highway with the exception that the outside shoulder width shall match the approach roadway, but not less than 4 feet (shoulder width should not be less than 5 feet where curbs with 2-foot gutter pans are proposed and bicycle use is expected). **The minimum width for two-lane overcrossings at interchanges shall be 40 feet curb-to-curb.**

Topic 309 - Clearances

309.1 Horizontal Clearances

(1) General. The horizontal clearance to all roadside objects should be based on engineering judgment with the objective of maximizing the distance between roadside objects and the edge of traveled way. Engineering judgment should be exercised in order to balance the achievement of horizontal clearance objectives with the prudent expenditure of available funds.

Certain yielding objects, such as sand filled barrels, metal beam guardrail, breakaway wood posts, etc. may encroach within the clear recovery zone (see Index 309.1(2)). While these objects are designed to reduce the severity of accidents, efforts should be made to maximize the distance between any object and the edge of traveled way.

Clearances are measured from the edge of the traveled way to the nearest point on the obstruction (usually the bottom). **Horizontal clearances greater than those cited below under subsection (3) - "Minimum Clearances" shall be provided where necessary to meet horizontal stopping sight distance requirements.** See discussion on ".. technical reductions in design speed .." under Topic 101.

(2) Clear Recovery Zone (CRZ). The roadside environment can and should be made as safe as practical. A clear recovery zone is an unobstructed, relatively flat (4:1 or flatter) or gently sloping area beyond the edge of the traveled way which affords the drivers of errant vehicles the opportunity to regain control. The AASHTO Roadside Design Guide provides detailed design guidance for creating a forgiving roadside environment. See also Index 304.1 regarding side slopes.

The following clear recovery zone widths are the minimum desirable for the type of facility

indicated. Consideration should be given to increasing these widths based on traffic volumes, operating speeds, terrain, and costs associated with a particular highway facility:

- Freeways and Expressways – 30 feet
- Conventional Highways – 20 feet*

* On conventional highways with posted speeds less than or equal to 40 mph and curbs, clear recovery zone widths do not apply. See minimum horizontal clearance, Index 309.1(3)(c).

Fixed objects including bridge piers, abutments, retaining walls, and noise barriers closer to the edge of traveled way than the distances listed above should be eliminated, moved, redesigned to be made yielding, or shielded in accordance with the following guidelines:

(a) Fixed objects should be eliminated or moved outside the clear recovery zone to a location where they are unlikely to be hit.

(b) If sign posts six inches or more in any dimension or light standards cannot be eliminated or moved outside the clear recovery zone, they should be made yielding with a breakaway feature.

(c) If a fixed object cannot be eliminated, moved outside the clear recovery zone, or modified to be made yielding, it should be shielded by guardrail or a crash cushion.

Shielding must be in conformance with the guidance found in Chapter 7 of the Traffic Manual. For input on the need for shielding at a specific location, consult District Traffic Operations.

When the planting of trees is being considered, see the additional discussion and standards in Chapter 900.

Where compliance with the above stated clear recovery zone guidelines are impractical, the minimum horizontal clearance cited below shall apply to the unshielded fixed object. These minimum horizontal clearances apply to yielding objects as well.

(3) Minimum Clearances. **The following minimum horizontal clearances shall apply to all objects that are closer to the edge of traveled way than the clear recovery zone distances listed above:**

(a) **The minimum horizontal clearance to all objects, such as bridge rails and safety-shaped concrete barriers, as well as sand-filled barrels, metal beam guardrail, etc., on all freeway and expressway facilities, including auxiliary lanes, ramps, and collector roads, shall be equal to the standard shoulder width of the highway facility as stated in Table 302.1. A minimum clearance of 4 feet shall be provided where the standard shoulder width is less than 4 feet.** Approach rail connections to bridge rail may require special treatment to maintain the standard shoulder width.

(b) **The minimum horizontal clearance to walls, such as abutment walls, retaining walls in cut locations, and noise barriers on all freeway and expressway facilities, including auxiliary lanes, ramps and collector roads, shall not be less than 10 feet.**

(c) **On conventional highways, frontage roads, city streets and county roads (all without curbs), the minimum horizontal clearance shall be the standard shoulder width as listed in Tables 302.1 and 307.2, except that a minimum clearance of 4 feet shall be provided where the standard shoulder width is less than 4 feet.** For RRR projects, widths are provided in DIB 79.

On conventional highways with curbs, typically in urban conditions, a minimum horizontal clearance of 1 feet 6 inches should be provided beyond the face of curbs to any obstruction. On curbed highway sections, a minimum clearance of 3 feet should be provided along the curb returns of

intersections and near the edges of driveways to allow for design vehicle offtracking (see Topic 404). Where sidewalks are located immediately adjacent to curbs, fixed objects should be located beyond the back of sidewalk to provide an unobstructed area for pedestrians.

In areas without curbs, the face of Type 60 concrete barrier should be constructed integrally at the base of any retaining, pier, or abutment wall which faces traffic and is 15 feet or less from the edge of traveled way (right or left of traffic and measured from the face of wall). See Index 1102.2 for the treatment of noise barriers.

The minimum width of roadway openings between Temporary Railing (Type K) on bridge deck widening projects should be obtained from the District Permit Engineer.

The Regional Permit Manager should be consulted on the use of the route by overwidth loads.

See Chapter 7 of the Traffic Manual for other requirements pertaining to clear recovery zone, guardrail at fixed objects and embankments, and crash cushions.

309.2 Vertical Clearances

(1) Major Structures.

(a) Freeways and Expressways, All construction except overlay projects – **16 feet 6 inches shall be the minimum vertical clearance over the roadbed of the State facility (e.g., main lanes, shoulders, ramps, collector-distributor roads, speed change lanes, etc.).**

(b) Freeways and Expressways, Overlay Projects – **16 feet shall be the minimum vertical clearance over the roadbed of the State facility.**

(c) Conventional Highways, Parkways, and Local Facilities, All Projects – **15 feet shall be the minimum vertical clearance over the traveled way and 14 feet 6 inches shall be the minimum vertical clearance over the shoulders of all portions of the roadbed.**

(2) Minor Structures. **Pedestrian over-crossings shall have a minimum vertical clearance 2 feet greater than the standard for major structures for the State facility in question.**

Sign structures shall have a vertical clearance of 18 feet over the roadbed of the State facility.

(3) Rural Interstates and Single Routing in Urban Areas: This subset of the Interstate System is composed of all rural Interstates and a single routing in urban areas. Those routes described in Table 309.2B and Figure 309.2 are given special attention in regards to minimum vertical clearance as a result of agreements between the FHWA and the Department of Defense. **Vertical clearance for structures on this system shall meet the standards listed above for freeways and expressways.** In addition to the standards listed above, vertical clearances of less than 16 feet over any portion of this system will be subjected to extensive review by FHWA and must be approved by the Military Traffic Management Command Traffic Engineering Agency (MTMCTEA) in Washington D. C. Documentation in the form of a Design Exception Fact Sheet must be submitted to FHWA to obtain approval for less than 16 feet of vertical clearance. Vertical clearances of less than 16 feet over any Interstate will require FHWA/MTMCTE notification. See Robert L. Buckley's memo dated March 30, 2000 to District Directors for more information on this subset of the Interstate system.

(4) General Information. The standards listed above and summarized in Table 309.2A are the minimum allowable on the State Highway system for the facility and project type listed. For the purposes of these vertical clearance standards, all projects on the freeway and expressway system other than overlay projects shall be considered to be covered by the "new construction" standard.

When approved by a design exception (see HDM Index 82.2) clearances less than the

values given above may be allowed on a case by case basis given adequate justification based upon engineering judgment, economic, environmental or right of way considerations. Typical instances where lesser values may be approved are where the structure is protected by existing lower structures on either side or where a project includes an existing structure that would not be feasible to modify to the current standard. In no case should vertical clearance be reduced below 15 feet over the traveled way or 14 feet 6 inches over the shoulders over any portion of a State highway facility.

Efforts should be made to avoid decreasing the existing vertical clearance whenever possible and consideration should be given to the feasibility of increasing vertical clearance on projects involving structural section removal and replacement. Any project that would reduce vertical clearances below 16 feet 6 inches or lead to an increase in the vertical clearance should be brought to the attention of the Design Coordinator, the District Permit Engineer and the Regional Permit Manager at the earliest possible date.

The Regional Permit Manager should be informed of any changes (temporary or permanent) in vertical clearance.

(5) Federal Aid Participation. Federal-aid participation is normally limited to the following maximum vertical clearances unless there are external controls such as the need to provide for falsework clearance or the vertical clearance is controlled by an adjacent structure in a multi-structure interchange:

(a) Highway Facilities.

- 17 feet over freeways and expressways.
- 15 feet 6 inches over other highways (15 feet over shoulders).
- For pedestrian structures, 2 feet greater than the above values.

(b) Railroad Facilities.

- 23 feet over the top of rails for non-electrified rail systems.
- 24 feet 3 inches over the top of rails for existing or proposed 25 kv electrification.
- 26 feet over the top of rails for existing or proposed 50 kv electrification.

These clearances include an allowance for future ballasting of the rail facility. The cost of reconstructing or modifying any existing railroad-highway grade separation structure solely to accommodate electrification will not be eligible for Federal-aid highway fund participation. Where a rail system is not currently electrified, the railroad must have a plan adopted which specifies the intent to electrify the subject rail segment within a reasonable time frame in order to provide clearances in excess of 23 feet.

Any exceptions to the clearances listed above should be reviewed with the FHWA early in the design phase to ensure that they will participate in the structure costs. All excess clearances should be documented in the project files as to reasons and appropriate concurrences.

309.3 Tunnel Clearances

(1) Horizontal Clearances. Tunnel construction is so infrequent and costly that the width should be considered on an individual basis. For the minimum width standards for freeway tunnels see Index 309.1.

Normally, the minimum horizontal clearance on freeways should include the full roadbed width of the approaches.

In one-way tunnels on conventional highways the minimum side clearance from the edge of the traveled way shall be 4 feet 6 inches on the left and 6 feet on the right. For two-way tunnels, this clearance shall be 6 feet on each side.

Table 309.2A
Vertical Clearances

	Traveled Way	Shoulder
Freeways and Expressways, New Construction, Lane Additions, Reconstruction and Modification	16½ ft	16½ ft
Freeways and Expressways, Overlay Projects	16 ft	16 ft
All Projects on Conventional Highways and Local Facilities	15 ft	14½ ft
Sign Structures	18 ft	18 ft
Pedestrian and Minor Structures	Standard + 2 ft See 309.2(2)	
Structures on the Rural and Single Interstate Routing System	See 309.2(3)	

Figure 309.2
Department of Defense
Rural and Single Interstate Routes

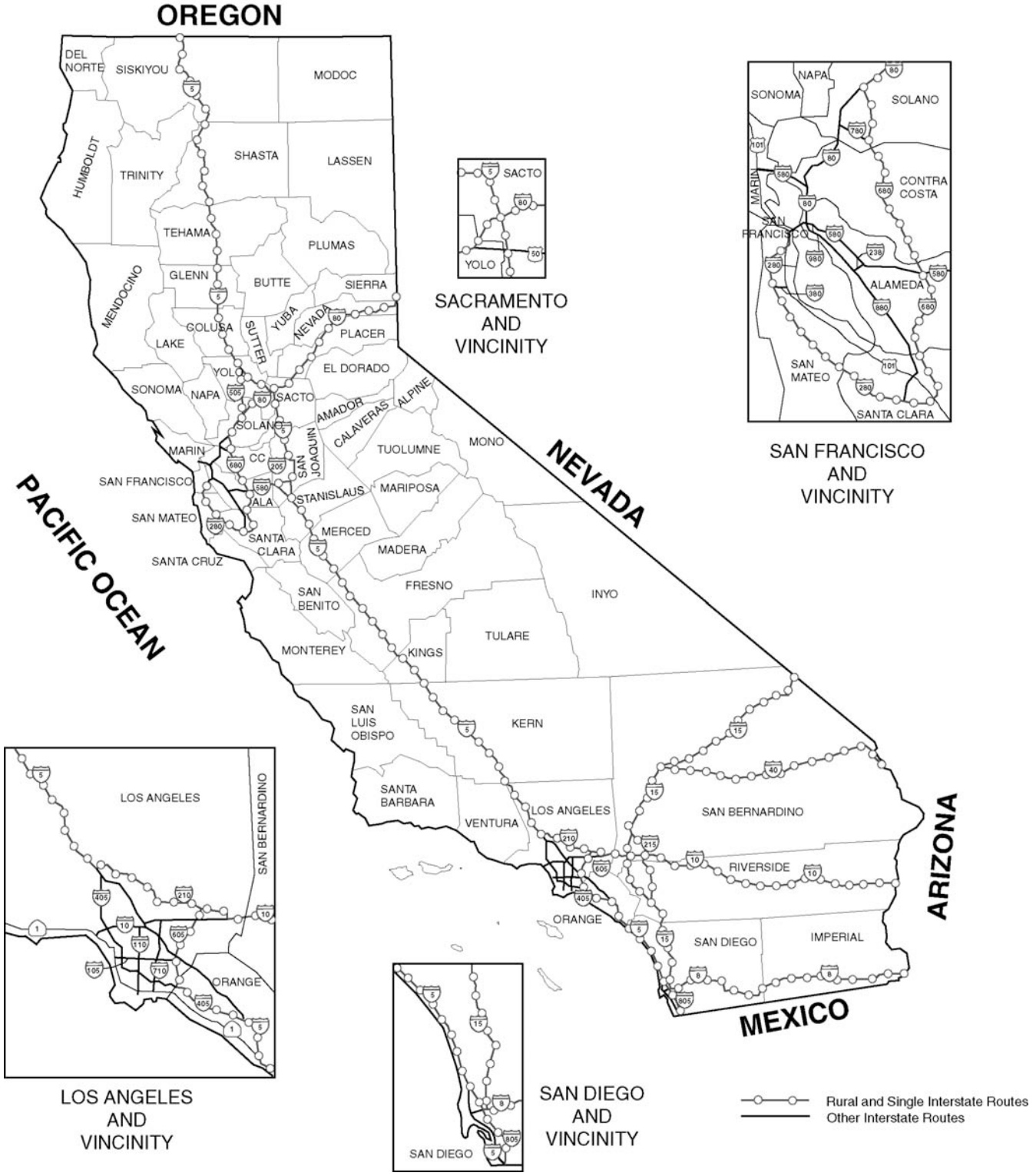


Table 309.2B
California Routes on the Rural and Single Interstate Routing System

ROUTE	FROM	TO
I-5	U. S. Border	I-805 just N. of U. S. Border
I-5	I-805 N. of San Diego	I-405 near El Toro
I-5	I-210 N. of Los Angeles	Oregon State Line
I-8	I-805 near San Diego	Arizona State Line
I-10	I-210 near Pomona	Arizona State Line
I-15	I-8 near San Diego	Nevada State Line
I-40	Junction at I-15 near Barstow	Arizona State Line
I-80	I-680 near Cordelia	Nevada State Line
I-205	Junction at I-580	Junction at I-5
I-210	I-5 N. of Los Angeles	I-10 near Pomona
I-215	I-15 near Temecula	I-15 near Devore
I-280	Junction at I-680 in San Jose	At or near south city limits of San Francisco to provide access to Hunter's Point
I-405	I-5 near El Toro	Palo Verde Avenue just N. of I-605
I-505	Junction at I-80	Junction at I-5
I-580	I-680 near Dublin	Junction at I-5
I-605	I-405 near Seal Beach	I-210
I-680	Junction at I-280 in San Jose	I-80 near Cordelia
I-805	I-5 just N. of U. S. Border	I-5 N. of San Diego

(2) Vertical Clearances. **The minimum vertical clearance shall be 15 feet measured at any point over the traveled way and 14 feet 6 inches above the gutter at the curb line. On freeways and expressways, the vertical clearance listed in Index 309.2(1)(a) shall be used.** Cost weighed against the probability of over-height vehicles will be the determining factors.

309.4 Lateral Clearance for Elevated Structures

Adequate clearance must be provided for maintenance, repair, construction, or reconstruction of adjacent buildings and of the structure; to avoid damage to the structure from a building fire or to buildings from a vehicle fire; to permit operation of equipment for fire fighting and other emergency teams. **The minimum horizontal clearance between elevated highway structures, such as freeway viaducts and ramps, and adjoining buildings or other structures, shall be 15 feet for single-deck structures and 20 feet for double-deck structures. Spot encroachments on this clearance shall be approved in accordance with Index 82.2.**

309.5 Structures Across or Adjacent to Railroads

Regulations governing clearances on railroads and street railroads with reference to side and overhead structures, parallel tracks, crossings of public roads, highways, and streets are established by the PUC.

(1) Normal Horizontal and Vertical Clearances. Although General Order No. 26-D specifies a minimum vertical clearance of 22 feet 6 inches above tracks on which freight cars not exceeding a height of 15 feet 6 inches are transported, a minimum of 23 feet should be used in design to allow for reballasting and normal maintenance of track. Railroads on which freight cars are not operated, should have a minimum vertical clearance of 19 feet. In establishing the grade line, the District should consult the DES to obtain the depth of structures and false work requirements, if any (see Index 204.6(4)).

At underpasses, General Order No. 26-D establishes a minimum vertical clearance of 14 feet above any public road, highway or street. **However, the greater clearances specified under Index 309.2 shall be used.**

All curbs, including median curbs, should be designed with 10 feet of clearance from the track centerline measured normal thereto.

The principal clearances which affect the design of highway structures and curbs are summarized in Tables 309.5A and B. It should be noted that collision walls may be required for the clearances given in Columns (3) and (4) of Table 309.5B. Usually, no collision walls are required if the clearance 10 feet or more on tangent track and 11 feet or more on curved track.

(2) Off-track Maintenance Clearance. The 18-foot horizontal clearance is intended for sections of railroad where the railroad company is using or definitely plans to use off-track maintenance equipment. This clearance is provided on one side of the railroad right of way.

Table 309.5A
Minimum Vertical Clearances Above Highest Rail

Type of Structure	Type of Operation	
	Normal Freight	No Freight Cars Operated
Highway overhead and other structures including through railroad bridges.	23' – 0"	19' – 0"

On Federal-aid projects, where site conditions are such that off-track maintenance clearance at an overpass is obtained at additional cost, Federal-aid funds may participate in the costs of such overhead designs that provide up to 18 feet horizontal clearance on one side of the track. In such cases, the railroad is required to present a statement that off-track maintenance

equipment is being used, or is definitely planned to be used, along that section of the railroad right of way crossed by the overhead structure.

(3) *Walkway Clearances Adjacent to Railroads.* All plans involving construction adjacent to railroads should be such that there is no encroachment on the walkway adjoining the track. Walkway requirements are set forth in General Order No. 118 of the PUC. Where excavations encroach into walkway areas, the contractor is required to construct a temporary walkway with handrail as set forth in the contract special provisions.

(4) *Approval.* All plans involving clearances from a railroad track must be submitted to the railroad for approval as to railroad interests. Such clearances are also subject to approval by the PUC.

To avoid delays, early consideration must be given to railroad problems when design is started on a project.

Topic 310 - Frontage Roads

310.1 Cross Section

Frontage roads are normally relinquished to local agencies. When Caltrans and a county or city enter into an agreement (cooperative agreement, freeway agreement, or other type of binding agreement), the CTC may relinquish to the county or city any frontage or service road or outer highway within that city or county. The relinquished right of way (called a collateral facility) should be at least 40 feet wide and have been constructed as part of a State highway project, but not as a part of the main State highway. Index 308.1 gives width criteria for city streets and county roads. These widths are also applicable to frontage roads. **However, the minimum paved cross section for urban frontage roads shall be two 12-foot lanes with 4-foot outside shoulders.** See Chapter 1000 for shoulder requirements when bicycles are present. **The minimum paved cross section for rural frontage roads shall be 24 feet.**

310.2 Outer Separation

In urban areas and in mountainous terrain, the width of the outer separation should be a minimum of 26 feet from edge of traveled way to edge of traveled way. A greater width may be used where it is obtainable at reasonable additional cost, for example, on an urban highway centered on a city block and paralleling the street grid.

In rural areas, other than mountainous terrain, the outer separation should be a minimum of 40 feet wide from edge of traveled way to edge of traveled way.

See Figure 307.4 for cross sections of outer separation and frontage road.

310.3 Headlight Glare

Care should be taken in design of new frontage roads to avoid the potential for headlight glare interfering with the vision of motorists traveling in opposite directions on the frontage roads and in the outer freeway lanes. The preferred measures to prevent headlight glare interference on new construction are wider outer separations, revised alignment and raised or lowered profiles.

Table 309.5B

Minimum Horizontal Clearances to Centerline of Nearest Track

Type of Structure	Off-track Maintenance Clearance	Tangent Track Clearance	Normal Curved Track [1] Clearance	Curved Track Clearances When Space is Limited[1]	
				Curves of 0° to 12°	Curves of 12° or more
Through railroad bridge	None	8' – 0"[2][4]	9' – 0"[2][4]		
Highway overhead and other structures	18' – 0" clear to face of pier or abutment on side railroad requires for equipment road.	8' – 6"[4]	9' – 6"[4]	8' – 6" (Min.)[3]	8' – 6" + ½"[3] per degree of curve.
Curbs		10' – 0"			

Notes:

(1) The minimum, in general, is one foot greater than for tangent track.

(2) With approval of P.U.C.

(3) Greater clearance necessary if walkway is required.

(4) Collision walls may be required. See Index 309.5(1).