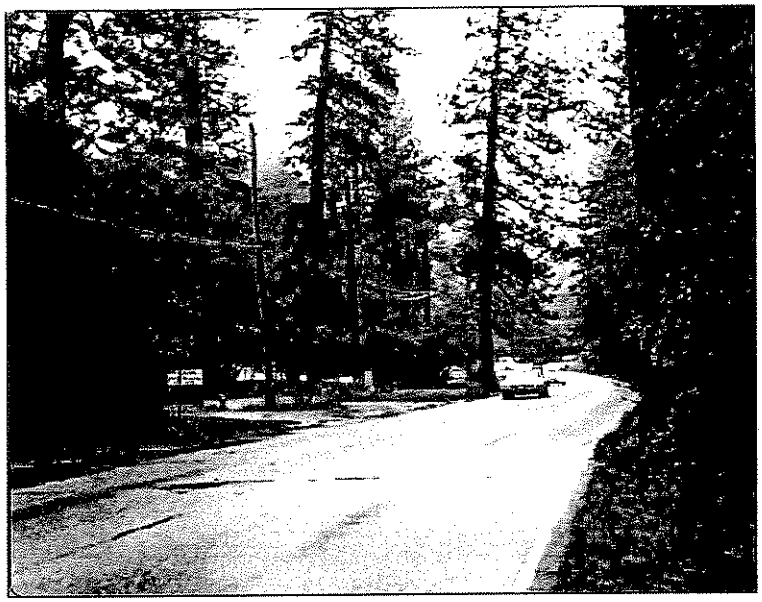
TOWN OF PARADISE
ENGINEERING AND
TRAFFIC SPEED SURVEY

FINAL REVISION – DATED FEBRUARY 27, 2004



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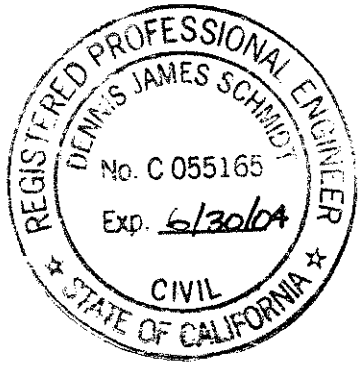
License Expiration Date June 30, 2004



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BACKGROUND:

The Town of Paradise Public Works Department has the responsibility and duty of studying, recommending, constructing and maintaining traffic control measures for public roadways within the Town limits. The Town Council reviews and approves these measures conducted by the Department and legally establishes them through ordinances in concurrence with the California Vehicle Code (CVC). The first reading of the enabling Ordinance, Town Ordinance No. 409 was read by title only at the January 13, 2004 Town Council meeting. The second reading and adoption of the Ordinance occurred at the January 27, 2004 Council meeting. This Ordinance will be in full force and effect 30 days after the date of the adoption (effective date of February 27, 2004).

One traffic control measure is the regulation of the speed limits on public roadways within the Town limits. Roadway design standards for given speeds have been established through many years of research on the State and Federal levels. These design standards are intended to provide safe roadway conditions for reasonable motorists.

The CVC provides a basic speed law that states that no person shall drive at a speed greater than which is reasonable and prudent having due regard for weather, visibility, traffic and the surface and width of the street, and in no event at a speed which endangers the safety of persons or property. The CVC also contains a prima facie speed law that specifies a definite speed limit for very specific conditions. These include such conditions as 25 MPH school zones when children are present and 25 MPH speed zones within defined residential and business districts.

For efficiency, the desired method of enforcing speed ordinances is through the use of radar technology. The use of radar to enforce speed limits is clearly regulated in the State of California by the CVC In order to legally use radar, a local agency must complete an engineering and traffic survey in general accordance with the requirements set out in the CVC and Chapter 8 of the Caltrans Traffic Manual. If the agency determines that the roadway speed limit should be set below that of the 85th percentile, the agency must make a finding that "conditions not readily apparent" to motorists exist. Such conditions would allow enforcement by radar of speeds below the prevailing levels. The Department has studied 62 roadway segments to establish radar enforceable speed zones.

STUDY PROCEDURE:

The Paradise Police Department, using specially trained Volunteers in Police Service (VIPS) conducted an extensive speed survey. The VIP's were given extensive training in radar usage, and they utilized unmarked vehicles in an inconspicuous location. All data collection was in general conformance with the standard procedures detailed in Chapter 8 of the Caltrans Traffic Manual.

The collected data was then input into an Excel spreadsheet by Engineering Division staff, to calculate the critical and nominal speeds. These data sheets are numbered, and the number corresponds to the particular location shown on the speed survey map.

Once the data was tabulated, accident history for the various roadway segments was reviewed. The StateWide Integrated Traffic Reporting System (SWITRS) data was utilized for this analysis. The accidents per million vehicle miles were calculated for all collectors and major arterials. The accident rate ranged from a low of 0.67 accidents/million vehicle miles to a high of 5.92 accidents per million vehicle miles. These accident rates were then considered during the final analysis of each individual roadway segment.

The 85th percentile, or critical speed, is that speed at or below which 85% of the observed vehicles are traveling. It is a well-recognized fact that most drivers are able to drive at reasonable speeds without the benefit of any speed limits, speed signs or enforcement. In general, the behavior of traffic is a very good indication of the appropriate speed zone which should be applied to a particular roadway section.

A final field check was performed to field verify the calculated results. Dennis J. Schmidt, PE, and Eric Ausmus, PE, both participated in the field review for each roadway segment. Each segment was driven at least twice, once each direction, to verify the appropriateness of the 85th percentile, and to add in the perspective of human judgement to the speed limit setting process. Factors considered during our review included the level of roadside development, driveways, parked vehicles, emergency shoulder areas, schools and playgrounds, pedestrian activity, horizontal and vertical alignment of the roadway, intersection control and visibility (both for roadway traffic and traffic entering roadway from minor side streets or driveways). Additionally, a significant effort was made to minimize changes in speed limits across a particular roadway or class of roadway. This will make it easier for motorists to be aware of the appropriate speed limit, and to drive accordingly. During the course of writing this Engineering and Traffic Speed Survey Report, previous traffic speed surveys (specifically the 1991 and 1996 surveys) were carefully reviewed to insure that all previous concerns were reflected in this new document.

Once the final speed recommendations were completed, these recommendations were then forwarded to the Town of Paradise Police Department for a detailed field review. Upon completion of this review, and resolution of all outstanding issues, the final recommendation was forwarded to the Town of Paradise Town Council for adoption.

DEFINITIONS AND ABBREVIATIONS:

Critical Speed– Prevailing Speed: That speed which is defined as the 85th percentile of speeds which motorists travel on a segment of roadway.

Engineering and Traffic Survey – A survey of highway and traffic conditions in accordance with methods determined by the Department of Transportation for use by state and local authorities. An Engineering and Traffic survey shall include, among other requirements deemed necessary by the department, consideration of all of the following:

1. Prevailing speeds as determined by traffic engineering measurements.
2. Accident records.
3. Highway, traffic and roadside conditions not readily apparent to the driver.

The engineer performing the study may also consider residential density, in accordance with Section 627 of the California Vehicle Code.

Nominal Speed – The five mile per hour increment below the 85th percentile that would normally be the posted speed. Frequently this speed is adjusted by the Engineer (up or down) to account for the particular roadside facilities as a result of an engineering review and study.

NP: Not Posted

SPECIAL NOTES:

The limited availability of plan and profile drawings (due to non-existent AS-BUILT drawings) and budget/staffing limitations placed upon this project did not allow for detailed geometric review of every roadway segment. It is possible, however unlikely, that a speed limiting geometric roadway constraint was overlooked. It is also possible that a condition not readily apparent to the average motorist might also be not readily apparent to the field reviewers.

Additionally, this document has been carefully reviewed for accuracy and consistency between the narrative, the speed limit map, and the enabling ordinance. In the event of a discrepancy between the various parts of this document, Town of Paradise Ordinance No. 409 will prevail.

DISCUSSION OF RECOMMENDED SPEED LIMITS:

Prior to the final speed limit recommendation, the radar survey statistical results were reviewed and preliminary recommended speed limits were chosen. Then, each street section was driven to integrate the environmental factors of the street into the final recommended speed limit. It should be noted that in several cases the 85th percentile speed was felt to be unsafe by the test driver(s). General reasons for this conclusion included the narrowness of the street, lack of shoulders, and obscured side street approaches. Specific factors involved in the speed limit recommendation of the major streets (listed alphabetically) are discussed below.

ACADEMY DRIVE

Segment 36 runs from Pearson Road to Nunneley Road. This segment has a roadway width of 28 feet, with no pedestrian facilities. The roadway surface is very rough, with a large vertical curve bisecting the segment, and a sharp horizontal curve at the intersection with Nunneley Road. A school zone exists mid-segment (a private school). A finding of conditions not readily apparent was made for this segment. The 85th percentile is 38 and 36 MPH, **the speed limit was held at 25 MPH.**

BILLE ROAD

Bille Road is a two lane east-west collector. It is characterized by a residential land usage, with numerous private driveways and roadways. The roadway is very narrow, with a total street width that varies from 20 to 26 feet.

Segment 56 runs from Cliff Drive to Skyway. The roadway surface is poor with limited site distance from the many private driveways. The roadway has one four-way stop mid-segment at Oliver Road. The roadway has fairly severe topography, with numerous vertical curves. There are no pedestrian or bicycle facilities on this segment. The 85th percentile is 34 and 38 MPH, **the speed limit was held at 30 MPH.**

Segment 27(A) runs from Skyway to the Paradise Memorial Trailway. At the Trailway intersection is an uncontrolled marked crosswalk, which is a potential conflict point for users of the class one bikepath. This segment is also marked by an severe downhill gradient for westbound motorists, with a roadway grade in excess of 12%. Additionally, due to the severe change in grade, the crest vertical curve near the trailway intersections has severely limited site distance. A finding of conditions not readily apparent was made for this segment. The 85th percentile is 41 and 40 MPH, **the speed limit was held at 30 MPH.**

Segment 27(B) runs from the Memorial Trailway to Clark Road. This segment is characterized by numerous private driveways and limited roadway width. This segment has been recently resurfaced. The 85th percentile is 41 and 40 MPH, **the speed limit was increased to 35 MPH.**

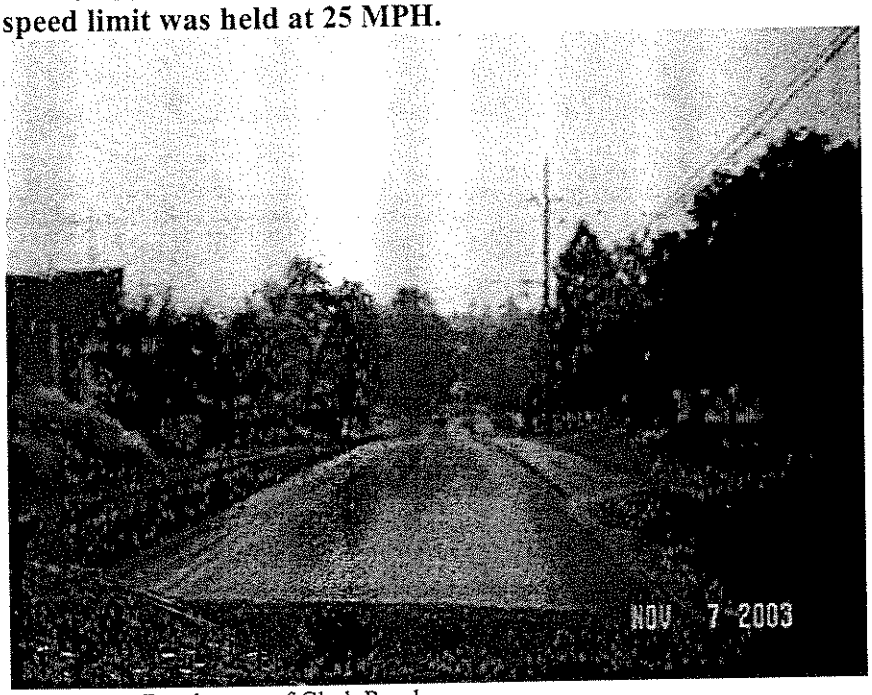
Segment 28 runs from Clark Road to Pentz Road. This segment is characterized by numerous private driveways and limited roadway width, with limited pedestrian facilities

on one side of the roadway. The 85th percentile is 33 and 33, **the speed limit was held at 30 MPH.**

BUSCHMANN ROAD

Buschmann Road is an east-west collector. It varies in width from 20 feet to 28 feet. Segment 45(A) runs from Foster Road to Scottwood Road. Due to the topography, site distance is limited in many locations, both at private driveways and at the public road intersection with Scottwood. This segment does have a sidewalk on one side of the roadway. The 85th percentile is 36 and 35 MPH, **the speed limit was increased to 30 MPH.**

Segment 45(B) runs from Scottwood Road to Clark Road (State Hwy 191). This segment is adjacent to the Paradise Aquatic Park, as well as the elementary school and new gymnasium. Additionally two senior housing developments connect to this segment. With the sidewalk only on one side of the street, many pedestrians are required to cross the street without the benefit of a controlled intersection. A finding of conditions not readily apparent was made for this segment. The 85th percentile is 36 and 35 MPH, **the speed limit was held at 25 MPH.**



Buschmann Road, west of Clark Road

CENTRAL PARK DRIVE

Central Park Drive is an east-west collector. It is approximately 20 feet wide, with no pedestrian facilities. Segment 29 runs from Maxwell Drive to Clark Road. Due to the limited site distance (both at private driveways and private street intersections) a finding of conditions not readily apparent was made for this segment. The 85th percentile is 38 and 36 MPH, **the speed limit was increased to 30 MPH.**

CLARK ROAD

Clark Road is the second major arterial street in the Town. It serves the central business district in the middle section of Town, and provides a direct route for motorists that commute between the Paradise and locations to the south such as Oroville.

Clark Road ranges from a narrow, two-lane roadway at the north end of Town, to a four-lane roadway with curb and gutter in the lower section of Town. Below Pearson Road, the roadway becomes a state highway and transitions back to a two-lane roadway. Analysis of the State highway section was completed independently by Caltrans and is outside the scope of this report.

Segment 12, from Skyway to Wagstaff Road, is a narrow two-lane roadway with numerous private driveways. Many of the driveways have limited site distance. This segment also has a challenging vertical/horizontal alignment near the intersection with Cypress Lane and Forest Service Road. The roadway has no pedestrian facilities, no shoulders, and abrupt drop-offs at the edge of pavement. The 85th percentile is 38 and 40 MPH, **the speed limit was held at 35 MPH.**

Clark Road, southbound at Forest Service (Segment 12)

Segment 13 runs from Wagstaff to Bille Road. This segment is a standard four-lane roadway, with curb, gutter, and occasional sidewalk. The area is heavily developed (commercial and retail), with some on-street parking and occasional two way left turn lanes. The 85th percentile is 38 and 40 MPH**, the speed limit was held at 35 MPH.**

Segment 14 runs from Bille Road to Elliott Road. The geometrics are similar to Segment 13. The 85th percentile is 37 and 38 MPH, **the speed limit was held at 35 MPH.**

Segment 15 runs from Elliott Road to Pearson Road. Similar geometrics as described above, heavy commercial traffic. The 85th percentile is 37 and 38 MPH, **the speed limit was held at 35 MPH.**

CRESTVIEW DRIVE

Segment 59 runs between Valley View Drive and Nottingham Drive. It is a collector roadway with a residential land use. The roadway width is 20 feet, with no shoulders, and no pedestrian facilities. The roadway has numerous private driveways, some with limited site distance. Additionally, the intersection with Oakmore Drive has a site distance of less than 150 feet, due to heavy vegetation outside of the road right of way, along with horizontal and vertical curvature. A finding of "conditions not readily apparent" was made for this segment, due to limited site distance, the residential nature of the surrounding land use and the lack of pedestrian facilities. The 85th percentile is 31 and 33 MPH, **the speed limit was held at 25 MPH.**

CRESTWOOD DRIVE

Segment 61 runs between Crestview Drive and Crestview Drive. It is a residential roadway with a residential land use. The roadway width is 20 feet, with no shoulders, and no pedestrian facilities. The roadway has numerous private driveways, some with limited site distance. Additionally, the roadway has a 15 MPH curve mid-segment. The 85th percentile is 30 and 25 MPH, **the speed limit was held at 25 MPH.**

ELLIOTT ROAD

Elliott Road is an east-west collector. It varies in width from less than 20 feet, to over 34 feet in the commercial sections of Town. Segment 31 runs from Skyway to Clark Road. This segment is characterized by steep rolling terrain, which severely limits the site distance at many intersections and private driveways. This segment also is a major pedestrian route to Paradise High School, which is located on Maxwell Drive. A finding of conditions not readily apparent was made for this roadway segment, due to limited site distance and the heavy pedestrian activity. The 85th percentile is 41 and 35 MPH, **the speed limit was held at 30 MPH.**

Segment 33 runs from Clark Road to Sawmill Road. This segment is also characterized by steep rolling terrain, which severely limits the site distance at many intersections and private driveways. . A finding of conditions not readily apparent was made for this roadway segment. The 85th percentile is 40 and 41 MPH, **the speed limit was held at 30 MPH.**

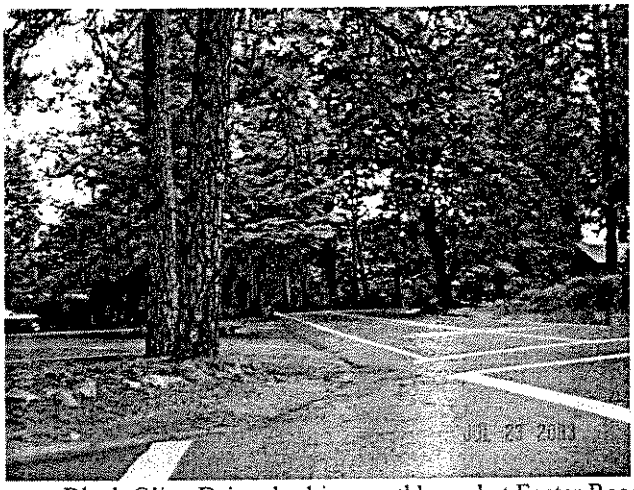
FIR STREET

Segment 34 runs from Skyway to Black Olive Drive. This segment is characterized by a commercial land usage, with a roadway in very poor condition. There is on street parking, both parallel and "head-in". A finding of conditions not readily apparent was made for this roadway segment. Traffic on Fir is stop controlled at the intersection with Almond. The 85th percentile is 35 and 34 MPH, **the speed limit was held at 25 MPH.**

FOSTER ROAD

Foster Road is a north-south collector that runs from Skyway to Wayland Road. Segment 46 runs from Pearson Road southerly to Roe Road. This segment is characterized by heavy residential usage, with numerous private driveways with limited site distance.

Additionally, the intersection with Black Olive Drive has limited site distance. This segment has an overall roadway width of approximately 21 feet, with very limited pedestrian facilities, no shoulders and steep drop-offs at the edge of pavement.



Black Olive Drive, looking northbound at Foster Road.

A finding of conditions not readily apparent was made for this segment, due primarily to the limiting site distance at both the roadway intersections and private driveways. The 85th percentile for this segment is 37 and 40 MPH, **the speed limit was held at 30 MPH.**

Segment 52 runs from Roe Road to Wayland. This segment is characterized by residential land use, with numerous private driveways with limited site distance. The roadway width is approximately 21 feet, with no pedestrian facilities. The 85th percentile for this segment is 39 and 40 MPH, **the speed limit held at 30 MPH.**

Foster Road, south of Roe Road

GRAHAM ROAD

Section 55 Runs between Wagstaff Road and Bille Road. It is a north-south collector, with a residential land use. The roadway width is 20 feet, with no shoulders, and no

pedestrian facilities. The roadway has numerous private driveways, some with limited site distance. A finding of "conditions not readily apparent" was made for this segment, due to limited site distance at driveways, the residential nature of the surrounding land use and the lack of pedestrian facilities. The 85th percentile is 33 and 33 MPH, **the speed limit was held at 25 MPH.**

HONEY RUN ROAD

Segment 62 runs between Skyway and Honey-View Terrace (a private street). It is a collector roadway with a residential land use. The roadway width varies from 28 feet down to 10 feet wide, with no shoulders and no pedestrian facilities. The roadway has numerous private driveways, some with limited site distance. A finding of "conditions not readily apparent" was made for this segment, due to limited site distance, the residential nature of the surrounding land use and the lack of pedestrian facilities. The 85th percentile is 30 and 27 MPH, **the speed limit was held at 25 MPH.**

INGALLS ROAD

Segment 39 runs from Elliott Road to Nunneley. This segment is characterized by residential land usage, a rough roadway surface, with a roadway width of 18 feet. This segment has no pedestrian facilities. The 85th percentile is 27 and 32 MPH, **the speed limit was held at 25 MPH.**

KIBLER ROAD

Segment 41 runs from Nunneley north to Young Avenue. This segment is characterized by residential land usage, with a roadway width of 18 feet. This segment has no pedestrian facilities, and has numerous driveways with some visibility limitations. The 85th percentile is 30 and 34 MPH, **the speed limit was raised to 30 MPH.**

MAXWELL DRIVE

Segment 32 runs from Elliott Road north to Central Park Drive. The Paradise High School School Zone is mid-segment, which creates a large volume of pedestrian and vehicular activity. The street is less than 20 feet wide, with poor surface condition, no pedestrian facilities and on-street parallel and diagonal parking in many areas. A finding of conditions not readily apparent was made for this roadway segment. The 85th percentile is 37 and 34 MPH, **the speed limit was held at 25 MPH.**

MIDDLE LIBBY ROAD

Segment 42 runs from Pearson north to Nunneley. This segment is characterized by residential land usage, with a roadway width of 20 feet. This segment has no pedestrian facilities, and has numerous driveways with some visibility limitations. A finding of conditions not readily apparent was made for this roadway segment. The 85th percentile is 33 and 32 MPH, **the speed limit was held at 25 MPH.**

NEAL ROAD

Neal Road is a collector street, running from Skyway in the north, to the south town limits. The roadway is two lanes, with no pedestrian facilities and no shoulders. The roadway has a heavy truck traffic component, as it is the main route to the County

Landfill. The land use is characterized as residential, with numerous private driveways and private roadways with limited site distance. A finding of "conditions not readily apparent" was made for both Neal Road segments, due to limited site distance at driveways and private roadways.

Northbound Neal Road (Segment 49)

Segment 49 runs from Skyway to Roe Road. The 85th percentile for this segment is 41 and 43 MPH, the **speed limit was increased to 35 MPH.**

Segment 51 runs from Roe Road to the south town limits. The 85th percentile for this segment is 41 and 42 MPH. **The speed limit was held at 35 MPH.**

NOTTINGHAM DRIVE

Segment 60 runs between Crestview Drive and Yorkshire Drive. The roadway width is 33 feet. The roadway has numerous private driveways, some with limited site distance. The 85th percentile is 32 and 30 MPH, **the speed limit was held at 25 MPH.**

NUNNELEY ROAD

Nunneley Road is an east-west collector. It varies in width from less to 20 feet at the east side of town, to 40 feet west of Clark Road.

Segment 38 runs from Academy to Clark Road. This segment is 40 feet wide, with on-street parking and rolling terrain. Both a very active senior center, as well as the Paradise Performing Arts building is sited on this segment. Portions of the roadway have

formalized pedestrian facilities. The 85th percentile is 42 and 42 MPH, **the speed limit was increased to 35 MPH.**

View from Academy/Nunneley Intersection (Segment 38)

Segment 40 runs from Clark Road to Kibler Road. This segment is much narrower, with a total roadway width of 22 feet. This segment also has rolling terrain, with no roadway shoulders and no pedestrian facilities. The 85th percentile is 37 and 38 MPH, **the speed limit was held at 30 MPH.**

OLIVER ROAD

Segment 54 runs between Wagstaff Road and Bille Road. It is a north-south collector, with a residential land use. The roadway width is 23 feet, with no shoulders, and no pedestrian facilities. The roadway has numerous private driveways, some with limited site distance. A finding of "conditions not readily apparent" was made for this segment, due to limited site distance at driveways, the residential nature of the surrounding land use and the lack of pedestrian facilities. The 85th percentile is 38 and 37 MPH, **the speed limit was held at 25 MPH.**

Segment 57 runs between Skyway and Bille Road. It varies in width from 23 to 28 feet, with no shoulders and no pedestrian facilities. This segment is bisected by Valley View Drive mid-segment, with limited site distance for entering traffic. A finding of "conditions not readily apparent" was made for this segment, due to limited site distance,