

FINAL
ENVIRONMENTAL
IMPACT
REPORT

VOLUME III
APPENDICES

LODESTAR

AT

M A M M O T H



PREPARED
FOR
THE
TOWN
OF
MAMMOTH
LAKES

FEBRUARY
1991



EIP
ASSOCIATES

Town of Mammoth Lakes
Community Development Department
Planning Division Library

Catalogue Number [REDACTED]

APPENDIX A.
Notice of Preparation/Initial Study

Notice of Preparation



To: Affected Agencies
(Agency)

(Address)

Subject: Notice of Preparation of a Draft Environmental Impact Report

Lead Agency:

Consulting Firm (If applicable):

Agency Name Town of Mammoth Lakes

Firm Name _____

Street Address P. O. Box 1609

Street Address _____

City/State/Zip Mammoth Lakes, CA 93546

City/State/Zip _____

Contact: William T. Taylor

Contact _____

The Town of Mammoth Lakes will be the Lead Agency and will prepare an environmental impact report for the project identified below. We need to know the views of your agency as to the scope and content of the environmental information which is germane to your agency's statutory responsibilities in connection with the proposed project. Your agency will need to use the EIR prepared by our agency when considering your permit or other approval for the project.

The project description, location, and the potential environmental effects are contained in the attached materials. A copy of the Initial Study (is is not) attached.

Due to the time limits mandated by State law, your response must be sent at the earliest possible date but *not later than 30 days* after receipt of this notice.

Please send your response to William T. Taylor at the address shown above. We will need the name for a contact person in your agency.

Project Title: Lodestar Resort and Country Club

Project Location: Mammoth Lakes Mono
City (nearest) Country

Project Description: (brief)

See Initial Study

Date January 9, 1990

Signature William T. Taylor

Title Associate Planner

Telephone (619) 934-8983



PLANNING DEPARTMENT
=====

P.O. Box 1609, Mammoth Lakes, California 93546
619-934-8983

INITIAL STUDY

This form and the descriptive information supplied by the applicant constitute the initial study pursuant to section 15063 of the state EIR Guidelines.

I. BACKGROUND

Project Title: Lodestar Resort and Country Club

Assessor's Parcel Number: 33-010-06, a portion of
33-010-25, 33-100-19,
33-100-20, and 33-100-22.

Zoning: Resort

General Plan: Resort

Project Applicant: Lodestar Company

Project Characteristics: 1000 residential units on 62 acres; 300 hotel rooms, 400 resort residential units, and 125,000 sq. ft. of resort related commercial on 30 acres; 100 units of employee housing on 4 acres; 114 acres of golf course, open space, and roads; and ski lift and ski-back access to and from Mammoth Mountain.

Existing Site Conditions: 210 acres of forested land, one multi-unit structure, and one underground parking structure.

Surrounding Land Uses: Mixed residential, commercial, and vacant

Surrounding Zoning: North - Commercial Lodging, East - Residential Multiple Family 1 and 2, South - Resort, and West - Residential Single Family and Resort.

II. ENVIRONMENTAL IMPACTS

Does the proposal have the potential to result in a significant adverse impact on one or more of the environmental components listed below? A "YES" indicates a potential for a significant impact. A "NO" indicates no apparent significant adverse environmental impact.

1. YES SOILS/TOPOGRAPHY - The project will require extensive grading, especially in conjunction with the golf course lakes.
2. NO GEOLOGY/SEISMIC - The subject property is not located in an Alquist-Priolo zone.
3. YES WATER QUALITY - The large amount of surface disturbance necessitated by the project and the probable use of pesticides and fertilizers on the golf course may lead to sediment and chemicals being transported off site with storm runoff. There is also the potential for percolation of pesticides and fertilizers into the groundwater.
4. YES WATER SUPPLY - The effect of this development, particularly the golf course, on the Town's water supply needs to be assessed. If reclaimed water is to be used for irrigation, that supply should be evaluated in light of the needs for Laurel Pond, the proposed 2nd nine holes of the Snowcreek golf course, the proposed Sherwin Bowl Ski Area, and the proposed municipal golf course.
5. NO STREAMS AND LAKES - No permanent streams or lakes are affected by this project.
6. YES PLANT AND ANIMAL POPULATIONS AND HABITAT - The property has not been surveyed to determine the presence or absence of sensitive plant or animal species.
7. YES AIR QUALITY - Any increased particulate emissions resulting from this project would add to the current violations of PM-10 standards.
8. YES TRANSPORTATION - This project will result in increased traffic. The proposed golf cart crossing of Meridian Blvd. may be a problem.
9. YES NATURAL RESOURCES - More than 100 acres of forested land will be cleared for this development. A Timberland Conversion Permit from the CDF will be required.

10. YES LAND USE AND PLANNING CONSIDERATIONS - Proposed residential densities and proposed uses are consistent with the Town General Plan and zoning, however, the amount of commercial seems to be high and analysis is needed to show that the commercial could be supported by the project.
11. YES HOUSING - This project may increase the need for employee housing beyond that housing proposed to be provided on site.
12. NO POPULATION - The density of development is consistent with that projected in the Town General Plan. The project does not include extensions of utilities or roads which would induce additional growth.
13. NO PUBLIC SERVICES-UTILITIES - The level of development is consistent with that anticipated by the Town General Plan.
14. YES HEALTH-SAFETY-NUISANCE - There may be some concern over the use of pesticides, and reclaimed waste water on the golf course.
15. YES NOISE - The positioning of interior circulation roads behind existing residential subdivisions may lead to an increase in noise in those subdivisions.
16. NO LIGHT OR GLARE - All exterior lighting will have to comply with the Town Design Review Manual.
17. YES AESTHETICS - There will be a change from the current heavily wooded setting.
18. YES CULTURAL RESOURCES - An archaeological reconnaissance of the property was performed. Archaeological sites were located. Further testing is necessary to determine their significance.
19. NO ENERGY & SCARCE RESOURCES - There are no energy intensive uses proposed and all structures must comply with Town and State standards.
20. NO RECREATION - The project will provide additional recreational opportunities.
21. OTHER -

*Jobs
housing
b/c/om*

Available?

REMARKS:

III. MANDATORY FINDINGS OF SIGNIFICANCE

1. YES Does the project have the potential to degrade the quality of the environment, substantially reduce the habitat of a fish or wildlife species, cause a fish or wildlife population to drop below self sustaining levels, threaten to eliminate a plant or animal community, reduce the number or restrict the range of a rare or endangered plant or animal or eliminate important examples of the major periods of California history or prehistory.
2. YES Does the project have the potential to achieve short-term, to the disadvantage of long-term, environmental goals? (A short-term impact on the environment is one which occurs in a relatively brief, definitive period of time while long-term impacts will endure well into the future.)
3. YES Does the project have impacts which are individually limited, but cumulatively considerable. (A project may impact on two or more separate resources where the impact on each resource is relatively small, but the effect of the total of those impacts on the environment is significant.)
4. YES Does the project have environmental effects which will cause substantial adverse effects on human beings, either directly or indirectly.

IV. ENVIRONMENTAL DETERMINATION

I find that the proposed project could not have a significant effect on the environment, and a Negative Declaration will be prepared.

I find that although the proposed project could have a significant effect on the environment, there will not be a significant effect in this case because the mitigation measures described on an attached sheet have been added to the project. A Negative Declaration will be prepared.

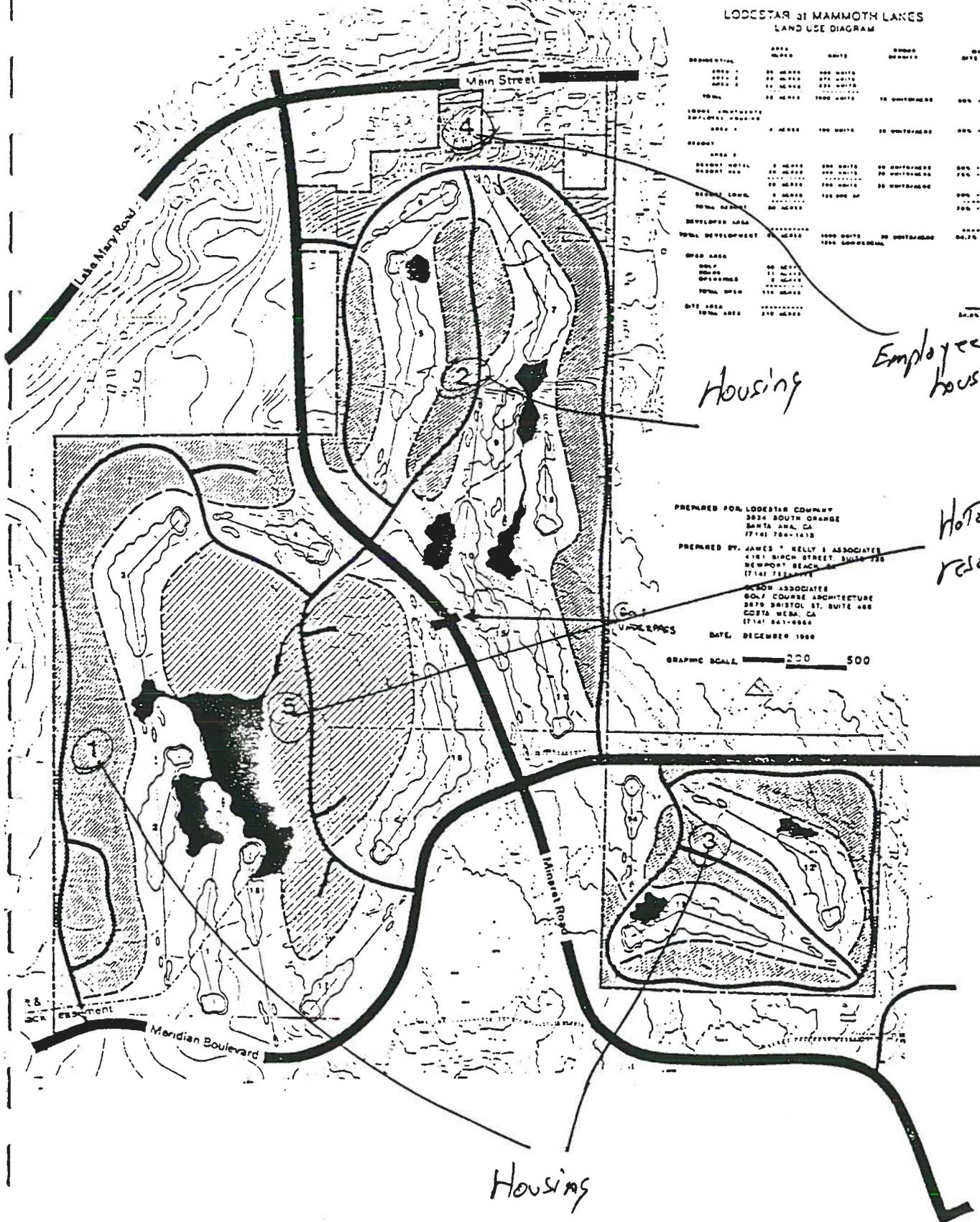
XX I find that the proposed project may have a significant effect on the environment, and an Environmental Impact Report is required.

1/8/90
Date

William T. Taylor
Signature

LODESTAR 31 MAMMOTH LAKES
LAND USE DIAGRAM

DESCRIPTION	AREA ACRES	UNITS	DENSITY UNITS/ACRE	PERCENTAGE OF TOTAL AREA	PERCENTAGE OF TOTAL UNITS
RESIDENTIAL	100.00	1000	10	100%	100%
OFFICE	10.00	100	10	10%	10%
RETAIL	10.00	100	10	10%	10%
INDUSTRIAL	10.00	100	10	10%	10%
EMPLOYEE HOUSING	10.00	100	10	10%	10%
RECREATION	10.00	100	10	10%	10%
OPEN SPACE	10.00	100	10	10%	10%
TOTAL DEVELOPMENT	140.00	1400	10	100%	100%
TOTAL AREA	140.00			100%	



Housing

Employee housing

Hotel and resort complex

PREPARED FOR: LODESTAR COMPANY
3024 SOUTH ORANGE
SANTA ANA, CA
92705-7000-1413

PREPARED BY: JAMES KELLY & ASSOCIATES
4101 BIRCH STREET, SUITE 700
BEVERLY BEACH, CA
92643-7100

ARCHITECTS:
GOLF ASSOCIATES
GOLF COURSE ARCHITECTURE
3870 BRISTOL ST. SUITE 400
COSTA MESA, CA
92626-3800

DATE: DECEMBER 1988

GRAPHIC SCALE: 200 500

LODESTAR DEVELOPMENT PLAN

The following information is being provided along with the new Lodestar Development Plan in order to satisfy the requirements of Town Code Section 19.12.046 and to provide sufficient information regarding the land use regulations that will govern the various sections of the plan.

The proposed Lodestar Development, as depicted on the accompanying plan, is a 210-acre master-planned destination resort which includes the construction of single-family homes, multi-family condominiums, apartments for employee housing, lodges, full-service hotels, a commercial village and an 18-hole golf course. A total of 1,800 units are planned for the 210-acre project, representing an overall density of 8.6 units per acre.

The project is divided up into 5 main development areas.

Areas 1, 2 and 3, totalling approximately 62 acres surrounding the golf course, will include 1,000 residential units consisting of single-family homes, townhomes and condominiums. Lot size minimums for single-family homes will be 6,000 square feet with a 60-foot minimum width. Side yard minimum setbacks will be 5 feet and lot coverage will be a maximum of 50%. All other single-family site requirements will adhere to the Town Code Standards for RSF use. Site coverage for the multiple family uses will conform to the code for RMF-2 Zones with a maximum of 60% coverage. Rear yard setbacks may be reduced to 10 feet when buildings front on the golf course or other open space. Construction may also be within 50 feet of the streams and lakes created within the project. The townhouses and condominiums will be constructed in various building sizes, as permitted in the code, either stacked or in common wall configurations. Maximum building heights will be 35 feet above a parking garage. Designs for all construction will be unified by architectural standards established in the project's master C,C+R's.

Area 4 has been designated for Commercial Lodging (CL). Approximately 4 acres are planned for development of 100 lodge and apartment (employee housing) units. The number of lodge versus apartment units has not yet been determined. Site coverage and building standards will conform to the Town Zoning Code for CL use.

Area 5, totalling approximately 30 acres, is planned for various mixed uses, including one or more hotel sites, retail commercial and resort condominiums. The hotel(s) and resort condominiums will not exceed 700 total units. Amenities which may be provided on-site include swimming pools, spas, tennis courts, a fitness center,

December 19, 1989

Page 1

LODESTAR DEVELOPMENT PLAN (continued)

meeting facilities, movie theatres and ice skating. Also planned is a ski lift connecting to the base of Mammoth Mountain Ski Area, near Chair 15. The commercial village is planned as a pedestrian-oriented multi-use retail, residential and recreational development. Buildings are to be constructed along a central pedestrian street with the design character of a small European village. Residential condominiums may be built over the retail shops. Site coverage for the overall area, including the hotel(s), will be approximately 75%. The hotel(s) will consist of a maximum of 5 floors above subterranean parking with a maximum height of 60 feet as measured from the highest point and not the average of the highest and lowest points under the building. Front setbacks for commercial lots in Area 5 will be a minimum of 10 feet. Side and rear setbacks may be reduced to 0 feet. Parking in the village area may be handled with joint parking facilities, through the formation of a parking district, in order to reduce the cumulative requirements of hotel(s) use, daytime retail uses and nighttime restaurant uses. Where possible, parking will be constructed under the hotel(s) and commercial area.

All signing and lighting in the Lodestar project will be of a uniform design and will be strictly controlled in the C,C+R's.

The village center site and surrounding areas of the Lodestar project are covered by a mature pine forest of Jeffrey and Lodgepole Pines, Red Fir, Aspen, Sagebrush and Manzanita. The main objective of the landscaping and site planning will be to preserve as many trees as possible and replant with native materials in any disturbed areas. Numerous ponds and lakes are planned for the project and will be developed in conjunction with the golf course. They will be fully lined in order to minimize water usage. In addition to being an attractive amenity for golf in the summer and ice skating in the winter, they will be used to control surface runoff in the spring. Grading of the site will be kept to a minimum in order to disturb the fewest trees. The golf course will require forming and grading of the fairways, tees and greens with the edges of the course daylighting to existing trees.

Due to the extensive amount of recreational amenities included in the development, no other requirements for public open space or facility will be required.

The master plan, as it is at this time, represents the overall zoning and land uses that are proposed for the development. Specific site plans will be prepared as each area of the project

December 19, 1989

Page 2

LODESTAR DEVELOPMENT PLAN (continued)

is submitted for approval. In the course of further planning that is to be done on the village center more detailed site planning for development Area 5 will be provided to the town during the master plan approval process. Also as the golf course planning proceeds, more detailed grading plans will be made available.

December 19, 1989

Page 3

Dec 19, 1999

LODESTAR
 Smooth Lakes California

LAND USE DENSITY ANALYSIS

PROPOSED 12/99 SUBMITTAL		AREA ACRES	UNITS	GROSS DENSITY	MAXIMUM % SITE COVERAGE
RESIDENTIAL	Area 1	25 acres	400 units		
	Area 2	20 acres	375 units		
	Area 3	14 acres	225 units		
	Total	62 acres	1000 units	16 units / acre	60% - 37.2 acres
BOULEVARD, APARTMENTS, EMPLOYEE HOUSING	Area 4	4 acres	100 units	25 units / acre	60% - 2.4 acres
	Area 5				
PORT	Resort Hotel	5 acres	300 units	60 units / acre	80% - 4.0 acres
	Resort Residential	20 acres	400 units	20 units / acre	70% - 14.0 acres
		25 acres	700 units	28 units / acre	
	Resort Commercial	5 acres	125,000 sf		90% - 4.5 acres
	Total Resort	30 acres			75% - 22.5 acres
DEVELOPED AREA	Total Developed	95 acres	1900 units 125k commercial	20 units / acre	64.7% 62.1 acres
	AREA				
AREA	Golf	95 acres			
	Roads	11 acres			
	Openspace	8 acres			11 acres
	Total Open	114 acres			
AREA	Total Area	210 acres			34.8% 72.1 acres

"EXHIBIT B-2"

STATEMENT OF PERMITTED USES

A. All uses as forth in the previously approved environmental impact report and the supplement thereto which was certified concurrently with the approval of this Agreement.

B. Temporary and permanent perimeter walls may be constructed around part and/or all of the Project as long as they do not exceed six (6) feet above the existing surface and comply with the Zoning Ordinance. Height may be temporarily increased to compensate for accumulated snow. Architectural features and project identification entry walls containing the Project name shall also be permitted at each corner of all access points to the Project. Height of such entry wall shall be no greater than the maximum height of perimeter walls. Marketing signs may be located anywhere on the Project.

C. No use permits will be required for placement of residential units above commercial facilities, but such units shall be included in the calculation of sleeping areas in the total unit count of the Project.

D. Total units in the Project may be the number of units set forth in the Master Plan so long as they do not exceed a cumulative total of 4,800 sleeping areas, plus a maximum of ^{125,000} square feet of commercial floor space shall be permitted.

E. Only the Town's ordinances and regulations adopted on January 4, 1990 (the date this application was submitted to the Town) shall be applicable to the Project. The railroad set forth in the Master Plan, this Agreement and the Road Agreement, together with timeshare uses shall be permitted so long as Developers obtain standard use permits for said items. With regard to the Transient Occupancy Tax, said tax shall be applicable to owners of timeshare units when they are rented out to other individuals, but shall not be applicable to owners who use their own units. Also, the Parties acknowledge that Developers wish to maintain an architectural design theme throughout the Project. This theme is generally consistent with a Tyrolean Village. Developer shall at all times in connection with design review be permitted to maintain their architectural design theme.

F. Developers shall have the right to provide temporary housing for workers on the Project in the form of portable or mobile homes which meet State health, safety and construction standards.

"EXHIBIT B-2, CONTINUED"

G. Service and storage yards serving the Project and operating within the Project and which maintain a minimum 50-foot setback from existing houses and condominiums are permitted, including areas and facilities for maintenance, repair and storage of equipment and materials used in the development and disposition of property and buildings within the Project, and for operations and activities conducted with the Project.

H. Developers shall have the right to construct and maintain on the Project sewage treatment and effluent removal systems to provide reclaimed water for irrigation ponds or streams in the Project, provided such systems meet minimum health and safety requirements of the Mammoth County Water District and the California Water Quality Control Board and provided further, a use permit is obtained from the Town.

I. Drilling and operation of water wells in the Project shall be permitted provided they meet State health and legal requirements, and provided permission is obtained from the Mammoth County Water District.

J. Recordation of final subdivision maps in incremental phases shall be permitted in accordance with the State Subdivision Map Act. Maps for condominium purposes may contain multiple lots for incremental development. Parcel maps for sales or increments of the Project to other developers shall be permitted.

K. Geothermal drilling for heat extraction for the benefit of the Project may be undertaken provided no uncontrolled pollution results from such operations, and the operations meet applicable CEQA requirements.

L. Specific restrictions governing development of the Project shall include the following: (1) Maximum density is those number of units set forth in the Master Plan not to exceed 4,800 sleeping areas and 125,000 square feet of commercial floor space; (2) Maximum height and area for each proposed building will be limited by the Zoning Ordinance except that buildings and theme towers may be permitted subject to the restrictions in the EIR and subject to a use permit up to a height of 65 feet, or such other greater height as is mutually agreed to by both the Town and Developer; (3) All deed restrictions on the Property shall, to the extent permitted by law, impose upon applicable timeshare homeowners associations the obligation to accept on behalf of their members, all public notices sent by Town, and to deliver such notices to their members.

APPENDIX B.
Notice of Preparation Comments

January 18, 1990

MAMMOTH COUNTY WATER DISTRICT

William T. Taylor
Associate Planner
Town of Mammoth Lakes
Post Office Box 1609
Mammoth Lakes, California 93546

PLANNING

Re: Notice of Preparation of a Draft Environmental Impact
Report for the Lodestar Resort and Country Club Project

Dear Mr. Taylor:

The Mammoth County Water District has reviewed the Initial Study for the Lodestar Resort and Country Club Project and being a responsible agency relating to this development has identified the following issues that should be subject to analysis in the environmental impact report.

Water Utilities:

1. Identify new water main distribution pipeline construction that will be required to meet demands for normal domestic use and fire protection within the project.
2. Will the project create a need for a new pressure reducing station to incorporate the project into the existing water distribution system?
3. Is there sufficient water storage tank volume in the area to meet peak demands that may be placed upon the District's distribution system by the project?
4. What is the feasibility of installing a reclaimed water system for the purpose of golf course irrigation?

Sewer Utilities:

1. Identify new sewer main collection system pipeline construction that will be required to meet the demands of normal domestic use within the project.
2. Will the sewage flow generated within the project create a need for expansion of sewage collection facilities outside of the project?
3. Should main line facilities be sized to handle additional flow that could come from the North Village project?
4. If expansion of the sewage collection system outside of the project is necessary, should that expansion occur on Meridian Boulevard or Chateau Road?

Water Supply:

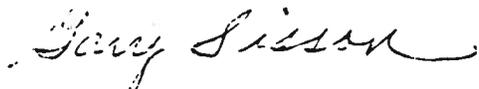
1. What are the projected water usage demands of this project on an annual and seasonal basis?
2. Is the planned density of the project consistent with that established in the existing Town of Mammoth Lakes General Plan thereby keeping within the total projected water demand for the community?
3. What impact will this demand have on existing supplies used by District customers?
4. What impact will this demand have in conjunction with other projects also currently involved in the environmental review process on existing District supplies?
5. What is the projected additional volume of water supply to be derived from sources that have been identified by the District but remain to be developed?
6. What water conservation measures can be taken, in addition to existing District landscape and conservation ordinances, to insure efficient utilization of water?
7. Will there be a sufficient supply of reclaimed water for irrigation purposes if it is determined feasible to use?

Thank you for the opportunity to review the Initial Study on this project and to provide comments regarding issues that should be addressed in the environmental impact report.

If you should have any questions, please contact me at the District offices at (619) 934-2596.

Sincerely,

MAMMOTH COUNTY WATER DISTRICT



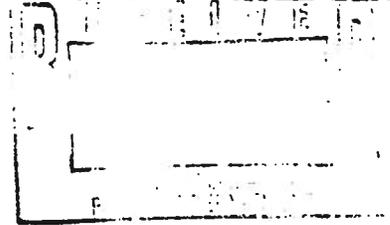
GARY SISSON
Operations and Maintenance Manager

gs/lodestar

January 31, 1990

MAMMOTH COUNTY WATER DISTRICT

Brian Hawley
Planning Department
Town of Mammoth Lakes
Post Office Box 1607
Mammoth Lakes, California 93546



Re: Water Availability Letter; Lodestar Resort and Country Club Project

Dear Mr. Hawley:

The Mammoth County Water District has been requested to prepare a letter confirming water availability for the Lodestar project, exclusive of water requirements related to development of the golf course. This request was made by Rick Liebersbach, representing Lodestar.

Proposed plans for the Lodestar Resort and Country Club Project have recently been reviewed by the District. Based upon the information provided, the total demand for water that would be created by the project, exclusive of the golf course development, is estimated to be 566,000 gallons per day which is the equivalent of 634 acre-feet per year. The most recent data available to the District indicates that there is approximately 3400 acre-feet of water available on an annual basis to serve existing community needs. Total water demand for the year 1989 amounted to 2746 acre-feet.

Future supplies that have been identified by the District include Well No. 11 (located in the Old Mammoth meadow) and wells that have been drilled and pump tested in the Dry Creek area. Well No. 11 has been designed to pump at an annual rate of 500 gallons per minute which would amount to 807 acre-feet per year. This project is in the final stages of approval and should be finalized at any time by the U.S. Forest Service. Construction is planned for the summer of 1990 to connect the well into the District's existing system. Groundwater supplies available for District use from the Dry Creek area are being projected at this time to be approximately 2000 acre-feet.

The District has projected an annual water demand of 5,946 acre-feet at total buildout as described in the Town of Mammoth Lakes General Plan.

Although existing water supply figures indicate that demands from this project could be met, the cumulative impacts from development of other projects that have been proposed such as Juniper Ridge, North Village and the Sherwin Ski Area, would require that

District groundwater supplies referenced above be developed and connected to the distribution system for use in order to meet the total increase in demand that will be created by these projects.

It should be noted that District ordinances state that there cannot be any unconditional guarantee of priority or reservation of capacity regarding water and sewer availability. The developer or subsequent purchaser of the parcel must acquire a water and sewer permit prior to construction of any improvements. Such permits will be issued by the District solely upon a first-come, first-served basis and only to the extent there is then remaining available capacity in the physical facilities for conveyance and treatment. Also, such permits will be issued only upon payment of all applicable fees and charges and in accordance with and subject to all then applicable District rules, regulations and ordinances.

If you should have any questions regarding this letter, please contact me at the District offices at (619) 934-2596.

Sincerely,

MAMMOTH COUNTY WATER DISTRICT



GARY SISSON
Operations and Maintenance Manager

gs/bh-ldstr



P L A N N I N G D E P A R T M E N T
=====

P.O. Box 1609, Mammoth Lakes, California 93546
619-934-8983

April 23, 1990

APR 30 1990

Brent Barnes
EIP Associates
150 Spear St.
San Francisco, Ca. 94105

EIP ASSOCIATES
215 ANGELES ST.

Dear Brent,

Town Staff and the Town Planning Commission have reviewed the responses to the Notice of Preparation for Lodestar at Mammoth. Modifications to the Initial Study are:

1. Item 2, Geology/Seismic. This should now be a "YES." See the comments from the Division of Mines and Geology.
2. Item 7, Air Quality. We need to clarify that particulate emissions include increases in resuspended road dust as a result of increased vehicle miles travelled.
3. Item 8, Transportation. This section should address the possibility of completing Majestic Pines from its northeastern end across the project and connecting with Minaret. Also, the applicant is proposing that all internal roads be private. What, if any, are the public service implications of these roads being private.
4. Item 12, Population. The Planning Commission expressed concern that the project might affect population distribution in the community and would like to have this discussed.
5. Item 13, Public Services/Utilities. Both the Police Department and the Mammoth Unified School District have expressed concern over the possible effect of the project on their operations.

The DEIR should address those concerns raised by the Ca. Integrated Waste Management Board in their response to the NOP.

6. Item 16, Aesthetics. This section should include discussion of the ski lift and ski back from and to the southwest corner of the property to Mammoth Mountain.

7. Item 16, Energy. The Planning Commission wanted the energy impacts of the project to be discussed. They are interested in the effect of use or non-use of wood heat and the energy required to transport visitors from southern California to Mammoth Lakes. The efficiency of propane as opposed to electricity and the possibility of alternate energy sources (e.g., solar and geothermal) should be mentioned as well.

You have received copies of most of the written responses and copies of the other responses are attached.

If you have any questions, please contact me at this office.

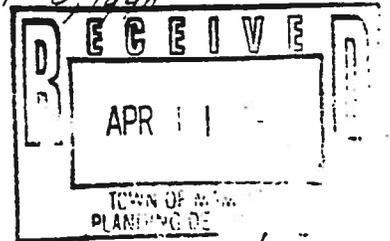
Sincerely,

Bill

William T. Taylor
Associate Planner

248 Calle de Madrid
Redondo Beach, CA 90277
April 8, 1990

Town Planning Department
P.O. Box 1609
Mammoth Lakes, CA 93544



Dear Sirs:

The purpose of this letter is to suggest several areas that should be addressed in the Lodestar at Mammoth E.I.R. These areas are summarized below:

(1) Availability of water for this proposed facility has to be included. Water should be studied in depth since drought conditions now exist and to include an 18 hole golf course where thousands of gallons of water would be used daily is questionable.

(2) Capability of the sewage treatment plant should be included. Recent publications indicate that the plant in Mammoth is operating at capacity. If a new plant is necessary, who is going to pay for it, the developer or county tax payers?

(3) Capability of the sewer line from Mammoth to Laurel ponds. Will a larger or additional line be required and who is to pay for it, the developer or county tax payers?

(4) Availability of a recreation park within the 200 acres should be included. The developer should be required to set aside acreage for a park to contain baseball fields, soccer fields, picnic area and parking area. Getting land from the Forestry (as at Shady Rect) should not continue.

(5) Capacity of roads within Mammoth and leading to Mammoth should be included. If you end up with grid locks as in d.A., you probably would not be able to fill the proposed hotels.

We do not own property in Mammoth, but we do own property in Mono County and any development that increases our property taxes will be opposed by us. Also the continual development ruins this beautiful area.

Please consider the above.

Yours truly,
Barrett M. Stone, Jr.



POLICE DEPARTMENT

Box 2799, Mammoth Lakes,

California 93546

518-934-2011

INTER-DEPARTMENTAL MEMORANDUM

DATE: January 30, 1990
TO: Bill Taylor, Planning Department
FROM: Michael J. Donnelly, Police Lieutenant *MJD*
SUBJECT: LODESTAR RESORT & COUNTRY CLUB EIR

Since this project will have a significant impact on current levels of police services, it is requested that police services and protection be addressed in the Project EIR.

MJD:dm

THE TOWN OF MAMMOTH LAKES
THE DEPARTMENT OF PUBLIC WORKS

MEMORANDUM

January 24, 1990

TO: Bill Taylor
FROM: Charles Karoly
COPIES: Gary
SUBJECT: Lodestar DEIR comments on content

The Department of Public Works has the following comments as to the content/issues in the proposed Lodestar DEIR. Numbers refer to the numbers in your initial study.

- 1, 3, 4, 6, 7: These should all be addressed.
8. Transportation should be extensively studied. What is the effect on the existing street system, traffic generation, signals, contribution for mitigation of these effects, etc. Widening of Minaret to four lanes (and other streets).
8. Golf cart crossing and effect of slow golf carts on traffic when they conflict in the street. I am not sure how they plan to handle this.
8. Internal roads: Should they be public or private and to what standards.
11. Housing. Providing their own employee housing needs for their project should be examined carefully. On page 1 of Exhibit B-1, Area 4, says, "100 lodge and apartment (employee housing) units. I take this to mean a combination and there will be less than 100 employee housing units because some will be lodge units (which I presume are not employee housing).
- XX. The Initial Study does not mention drainage and runoff, Lahontan Regional Water Quality Control Board, etc. See Exhibit B-1, page 2, third paragraph.

STATEMENT OF PERMITTED USES, EXHIBIT B-2

GENERAL: I think this whole thing is premature. The EIR should explore the necessity of a Specific Plan; the Department thinks it should be required.

- A. Without the EIP, this is meaningless and shouldn't be permitted. We have the cart before the horse.
- B. Temporary and permanent perimeter walls? How high, etc. Roadside encroachment in water? Architectural features and

project identification shall not be on any public right of way.

E. Only Ordinances in effect to 1-1-1903

F. Is the use consistent with the Zoning Ord. and the

G. Does this conform to the Zoning Ord? Byron should comment on this. I don't know what it means completely.

H. I don't think so. Sewage and sewerage should conform to RCUH Ordinances.

I. No. See H above.

J. I don't completely understand what this means. If it is in compliance with the Map Act and Local Ordinance, then it probably is OK and doesn't even have to be said here.

We need a better Map of the Master Plan. If they think this is going to approve things like private streets without a better master plan/detailed layout plans, they have another thing coming.

This whole thing is typical. They are going to dictate to us what they want and all we have to do is bend over.

THE TOWN OF MAMMOTH LAKES
THE DEPARTMENT OF PUBLIC WORKS

MEMORANDUM

February 27, 1990

TO: Bill Taylor
FROM: Charles Karoly
COPIES: Gary
SUBJECT: Lodestar DEIR comments on content; # 2

The Department of Public Works has the following additional comments as to the content/issues in the proposed Lodestar DEIR.

TRANSPORTATION.

- A. The EIR Traffic Study should address the possibility of extending Majestic Pines Drive (now ending at Big Wood) to Minaret Road through the Lodestar Property.
- B. It should also address the possibility of closing Majestic Pines Drive between Pinehurst and Kelley Rd./Silver Tip Lane in order to discourage through traffic taking the Majestic Pines/Kelley Road route to Lake Mary Road and encourage the use of Minaret Road.
- C. It should also address the possibility of a second access to Hidden Valley Road.
- D. It should also address signalization of Minaret and Meridian including mitigation dollars.

STORM WATER AND DRAINAGE

- E. Check the Storm Drain Master Plan for drainage courses and facilities. Investigate the need for easements for the existing drainage courses. Require an overall Storm Drain Master Plan for the project including hydrology and facilities. To be submitted with the first development proposal (Tentative Map or Use Permit Application, etc.)
- F. Conform to Lahontan Regional Water Quality Control Board requirements.

WATER SUPPLY AND SEWAGE DISPOSAL

- G. Investigate adequacy of water supply for irrigation of Golf Course.

GONDOLA/LIFT AND SKI BACK

- H. Investigate the timing for the gondola or ski lift. This Department believes they should go in with the first phase of development due to the potential impact on Base 7 facilities. The Juniper Ridge S.F. cites 42 added bus trips during the peak hour from this project alone if the gondola/lift facility is not available.
- I. Investigate the ski back easement: its crossing of Majestic Pines Drive including the legality within the road right of way.



POLICE DEPARTMENT

Box 2799, Mammoth L.

California 93546

513-934-2011

INTER-DEPARTMENTAL MEMORANDUM

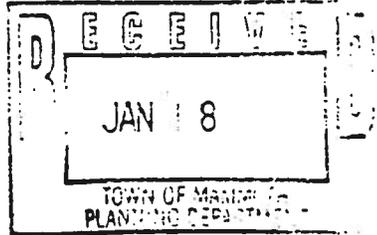
DATE: January 30, 1990
TO: Bill Taylor, Planning Department
FROM: Michael J. Donnelly, Police Lieutenant *MJD*
SUBJECT: LODESTAR RESORT & COUNTRY CLUB EIR

Since this project will have a significant impact on current levels of police services, it is requested that police services and protection be addressed in the Project EIR.

MJD:dm

MAMMOTH UNIFIED SCHOOL DISTRICT

UPERINTENDENT
CHARD A. MCATEER



BOARD OF TRUSTEES
NANCY O'KELLY
KEN COULTER
MICHAEL BERGER
LAUREEN AGEE
R. GARY JONES

January 16, 1990

Mr. Bill Taylor, Associate Planner
Town of Mammoth Lakes
Post Office Box 1609
Mammoth Lakes, CA 93546

Dear Bill:

Please accept this letter as the Mammoth Unified School District response to the initial study of the Lodestar Resort and Country Club project.

Under Section 13 Public Services, I believe this project would have a significant impact on the school district. The increased number of students generated will significantly impact the need for land, buildings and additional transportation needs for the school district.

I hereby support your environmental determination that an E.I.R. be required and that the above noted impacts and any others determined in the study be required to be mitigated for this project to be approved.

Sincerely,

Richard A. McAteer
Superintendent

RAM:st

DEPARTMENT OF CONSERVATION

DIVISION OF ADMINISTRATION
 DIVISION OF MINES AND GEOLOGY
 DIVISION OF OIL AND GAS
 DIVISION OF RECYCLING



1416 Ninth Street
 SACRAMENTO, CA 95814
 TDD (916) 324-2555
 ATSS 454-2555

February 15, 1990

(916) 445-8733

Mr. William T. Taylor
 P.O. Box 1609
 Mammoth Lakes, CA 93546

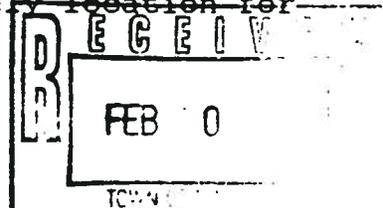
Dear Mr. Taylor:

Subject: Notice of Preparation (NOP) of a Draft Environmental
 Impact Report (EIR) for the Lodestar Resort and Country
 Club, SCH# 90020042

Thank you for forwarding the NOP for the Town of Mammoth Lakes' Lodestar Resort and Country Club project. The Department of Conservation's Division of Mines and Geology (DMG) has special expertise in evaluating geologic and seismic hazards, and will review the relevant information and analysis when we receive your document from the State Clearinghouse. DMG Note 46, enclosed, is used as a guide by DMG staff when reviewing Draft EIRs. It contains a checklist of potential environmental impacts you should consider in preparing the EIR.

The Initial Study for the NOP indicates on Page 2, item II - 2, that there are no apparent significant adverse environmental impacts expected from geologic/seismic hazards, given that the project is not located within an Alquist-Priolo Special Studies Zone (A-P Zone). Although the site is not within an A-P Zone and, consequently, the potential for damage on the site due to surface fault rupture is considered low, there are other potentially serious geologic and seismic hazards which could have significant impacts on the project and should be addressed in the Draft EIR.

The site, as well as the entire Mammoth Lakes area, is located in a geologically very active area. Earthquakes and volcanic eruptions have occurred in the area in the recent past, and can be expected to occur again in the future. An earthquake swarm, including four earthquakes of magnitude 6+, occurred in the Mammoth Lakes vicinity during May 1980. The epicenter of the closest magnitude 6 event was only 1-1/2 miles southeast of the site. The most recent volcanic eruptions in the area took place beneath Mono Lake in the 1890s. The closest volcanic eruption happened about 500 years ago, approximately 1-1/2 miles northwest of Mammoth Lakes (Sherburne, 1980). Based on the pattern of seismic activity monitored during the 1980 earthquake swarm, the U.S. Geological Survey determined the most likely location for



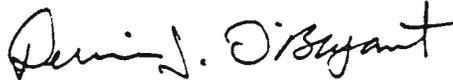
Mr. William T. Taylor
February 15, 1990
Page Two

the next eruption in the Long Valley Caldera will be approximately 1-1/2 miles southeast of Mammoth Lakes (Miller, 1989). Although the more recent volcanic eruptions in the Mammoth Lakes area have been relatively small, the Long Valley Caldera still has the potential to produce larger eruptions similar to those that occurred at Mount St. Helens, Washington, in 1980, which killed approximately 60 people. The hazards of very strong ground shaking and of volcanic eruptions of various kinds should be addressed in the Draft EIR, along with proposed mitigation measures to minimize the impacts from these hazards.

Selected publications containing information relevant to identifying and mitigating potential geologic hazards affecting the site are listed below.

If you have any questions regarding these comments, please contact Zoe McCrea, Division of Mines and Geology Environmental Review Officer, at (916) 322-2562.

Sincerely,



Dennis J. O'Bryant
Environmental Program Coordinator

DJO:JS:efh
Enclosure

cc: Zoe McCrea, Division of Mines and Geology
John Schlosser, Division of Mines and Geology

Relevant Publications:

Hart, Earl W., Bryant, William A., and Smith, Theodore C., 1984, Summary Report: Fault Evaluation Program, 1983 Area - Sierra Nevada Region, California; California Division of Mines and Geology Open File Report 84-52.

Miller, C. Dan, Mullineaux, Donal R., Crandell, Dwight R., and Bailey, Roy A., 1982, Potential Hazards from Future Volcanic Eruptions in the Long Valley - Mono Lake Area, East-Central California and Southwest Nevada - A Preliminary Assessment; U.S. Geological Survey Circular 877.

Miller, C. Dan, 1989, Potential Hazards from Future Volcanic Eruptions in California; U.S. Geological Survey Bulletin 1847.

Sherburne, Roger W. (Editor), 1980, Mammoth Lakes, California Earthquakes of May 1980; California Division of Mines and Geology Special Report 150.

DEPARTMENT OF TRANSPORTATION

500 SOUTH MAIN STREET
P.O. BOX 347
BISHOP, CA 93515



February 22, 1990

File: Mno-203-4.782
SCH #90020042

Town of Mammoth Lakes
Planning Department
P. O. Box 1609
Mammoth Lakes, CA 93546

Attn: Mr. William Taylor

NOP of a DEIR for the Lodestar Resort and Country Club
SCH #90020042

We have reviewed the above referenced document and have the following comments:

We agree that an Environmental Impact Report should be prepared for this development. The DEIR should contain a traffic study which includes existing and future average daily traffic (ADT) volumes, traffic generation (including peak hour), traffic distribution, intersection capacity analysis, along with current and projected capacities of local roads and the state highways that might be impacted.

The signal installation at Minaret Road and State Highway Route 203 may require some modification when Minaret Road is completed between Meridian Blvd. and Main Street (Route 203). The traffic study should include a capacity analysis of this intersection considering a "Worst case" viewpoint. Mitigation of Potential traffic impacts should be addressed. Costs related to any transportation improvements, potential for funding, and sources of those funds should be discussed.

In view of the California Transportation Commission's policy that the cost of any infrastructure improvements to the state highway for mitigation will be the developer's responsibility, we recommend that the City take the lead in developing a fair-share mechanism in which the project(s) can fund improvements commensurate with the decrease in level of service for which it is responsible.

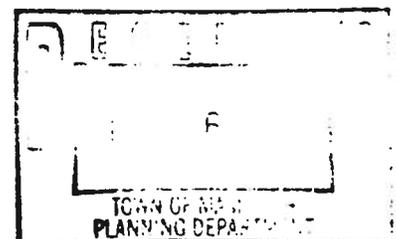
If you have any questions regarding these comments, please call me at (619) 872-0693.

Very truly yours,

A handwritten signature in cursive script that reads "A. J. Zeilman".

Andrew J. Zeilman, Chief
Transportation Planning Branch

AJZ:ac
cc: SCH



Memorandum

te : 11 15 1990

To :

1. Gordon F. Snow, Ph.D.
Assistant Secretary for Resources
2. Mammoth Lakes, Planning Department
P. O. Box 1609
Mammoth Lakes, CA 93546
Attention: William T. Taylor

m : Department of Water Resources
Los Angeles, CA 90055

Subject : DEIR for Lodestar Resort and Country Club for 1,500 Units, Hotel and Other Appurtenances, dated January 1990, SCH 90020042

Your subject document has been reviewed by our Department of Water Resources staff. Recommendations, as they relate to water conservation and flood damage prevention, are attached.

After reviewing your report, we also would like to recommend that you further consider implementing a comprehensive program to use reclaimed water for irrigation purposes in order to free fresh water supplies for beneficial uses requiring high quality water supplies.

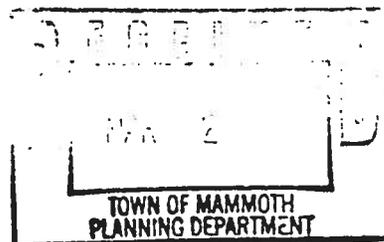
For further information, you may wish to contact John Pariewski at (213) 620-3951. Thank you for the opportunity to review and comment on this report.

Sincerely,



Charles R. White, Chief
Planning Branch
Southern District

Attachments



**DEPARTMENT OF WATER RESOURCES RECOMMENDATIONS
FOR WATER CONSERVATION AND WATER RECLAMATION**

To reduce water demand, implement the water conservation measures described here.

Required

The following State laws require water-efficient plumbing fixtures in structures:

- o Health and Safety Code Section 17021.3 requires low-flush toilets and urinals in virtually all buildings as follows:

"After January 1, 1983, all new buildings constructed in this state shall use water closets and associated flushometer valves, if any, which are water-conservation water closets as defined by American National Standards Institute Standard A112.19.2, and urinals and associated flushometer valves, if any, that use less than an average of 1-1.2 gallons per flush. Blowout water closets and associated flushometer valves are exempt from the requirements of this section."
- o Title 20, California Administrative Code Section 1604(f) (Appliance Efficiency Standards) establishes efficiency standards that give the maximum flow rate of all new showerheads, lavatory faucets, and sink faucets, as specified in the standard approved by the American National Standards Institute on November 16, 1979, and known as ANSI A112.18.1M-1979.
- o Title 20, California Administrative Code Section 1606(b) (Appliance Efficiency Standards) prohibits the sale of fixtures that do not comply with regulations. No new appliance may be sold or offered for sale in California that is not certified by its manufacturer to be in compliance with the provisions of the regulations establishing applicable efficiency standards.
- o Title 24 of the California Administrative Code Section 2-5307(b) (California Energy Conservation Standards for New Buildings) prohibits the installation of fixtures unless the manufacturer has certified to the CEC compliance with the flow rate standards.
- o Title 24, California Administrative Code Sections 2-5352(i) and (j) address pipe insulation requirements, which can reduce water used before hot water reaches equipment or fixtures. These requirements apply to steam and steam-condensate return piping and recirculating hot water piping in attics, garages, crawl spaces, or unheated spaces other than between floors or in interior walls. Insulation of water-heating systems is also required.

- o Health and Safety Code Section 4047 prohibits installation of residential water softening or conditioning appliances unless certain conditions are satisfied. Included is the requirement that, in most instances, the installation of the appliance must be accompanied by water conservation devices on fixtures using softened or conditioned water.
- o Government Code Section 7800 specifies that lavatories in all public facilities constructed after January 1, 1985, be equipped with self-closing faucets that limit flow of hot water.

To be implemented where applicable

Interior:

1. Supply line pressure: Water pressure greater than 50 pounds per square inch (psi) be reduced to 50 psi or less by means of a pressure-reducing valve.
2. Drinking fountains: Drinking fountains be equipped with self-closing valves.
3. Hotel rooms: Conservation reminders be posted in rooms and restrooms.* Thermostatically controlled mixing valve be installed for bath/shower.
4. Laundry facilities: Water-conserving models of washers be used.
5. Restaurants: Water-conserving models of dishwashers be used or spray emitters that have been retrofitted for reduced flow. Drinking water be served upon request only.*
6. Ultra-low-flush toilets: 1-1/2-gallon per flush toilets be installed in all new construction.

Exterior:*

1. Landscape with low water-using plants wherever feasible.
2. Minimize use of lawn by limiting it to lawn-dependent uses, such as playing fields. When lawn is used, require warm season grasses.
3. Group plants of similar water use to reduce overirrigation of low-water-using plants.
4. Provide information to occupants regarding benefits of low-water-using landscaping and sources of additional assistance.

*The Department of Water Resources or local water district may aid in developing these materials or providing other information.

5. Use mulch extensively in all landscaped areas. Mulch applied on top of soil will improve the water-holding capacity of the soil by reducing evaporation and soil compaction.
6. Preserve and protect existing trees and shrubs. Established plants are often adapted to low-water-using conditions and their use saves water needed to establish replacement vegetation.
7. Install efficient irrigation systems that minimize runoff and evaporation and maximize the water that will reach the plant roots. Deep irrigation, soil moisture sensors, and automatic irrigation systems are a few methods of increasing irrigation efficiency.
8. Use pervious paving material whenever feasible to reduce surface water runoff and to aid in ground water recharge.
9. Grade slopes so that runoff of surface water is minimized.
10. Investigate the feasibility of using reclaimed waste water, stored rainwater, or grey water for irrigation.
11. Encourage cluster development, which can reduce the amount of land being converted to urban use. This will reduce the amount of impervious paving created and thereby aid in ground water recharge.
12. Preserve existing natural drainage areas and encourage the incorporation of natural drainage systems in new developments. This aids ground water recharge.
13. To aid in ground water recharge, preserve flood plains and aquifer recharge areas as open space.

FLOOD DAMAGE PREVENTION

In flood-prone areas, flood damage prevention measures required to protect a proposed development should be based on the following guidelines:

1. It is the State's policy to conserve water; any potential loss to ground water should be mitigated.
2. All building structures should be protected against a 100-year flood.
3. In those areas not covered by a Flood Insurance Rate Map or Flood Boundary and Floodway Map, issued by the Federal Emergency Management Agency, the 100-year flood elevation and boundary should be shown in the Environmental Impact Report.
4. At least one route of ingress and egress to the development should be available during a 100-year flood.
5. The slope and foundation designs for all structures should be based on detailed soils and engineering studies, especially for hillside developments.
6. Revegetation of disturbed or newly constructed slopes should be done as soon as possible (utilizing native or low-water-using plant material).
7. The potential damage to the proposed development by mudflow should be assessed and mitigated as required.
8. Grading should be limited to dry months to minimize problems associated with sediment transport during construction.

OFFICE OF PLANNING AND RESEARCH

TENTH STREET

SACRAMENTO, CA 95814



DATE: January 17, 1990

TO: Reviewing Agencies

RE: The Town of Mammoth Lake's NOP for
Lodestar Resort And Country Club
SCH#90020042

Attached for your comment is the Town of Mammoth Lake's Notice of Preparation of a draft Environmental Impact Report (EIR) for the Lodestar Resort And Country Club.

Responsible agencies must transmit their concerns and comments on the scope and content of the EIR, focusing on specific information related to their own statutory responsibility, within 30 days of receipt of this notice. We encourage commenting agencies to respond to this notice and express their concerns early in the environmental review process.

Please direct your comments to:

William T. Taylor
P.O. Box 1609
Mammoth Lakes, CA 93546

with a copy to the Office of Planning and Research. Please refer to the SCH number noted above in all correspondence concerning this project.

If you have any questions about the review process, call John Keene at (916) 445-0613.

Sincerely,

A handwritten signature in black ink, appearing to read 'David C. Nunenkamp'.

David C. Nunenkamp
Deputy Director, Permit Assistance

Attachments

cc: William T. Taylor

S: Sent by Lead X: Sent by SCII

Bob Fickler
Air Resources Board
1102 O Street
Sacramento, CA 95814
916932 8267

Karen Cagle
Dept. of Flooding & Watersheds
1629 S Street
Sacramento, CA 95814
916945 6281

Gary L. Hollway
California Coastal Commission
611 Howard Street, 4th Floor
San Francisco, CA 94105
4159543 8555

Terry Maderson
California Energy Commission
1516 Ninth Street, Rm. 200
Sacramento, CA 95814
916932A-3227

Sandy Hernandez
California - Division of Aeronautics
P.O. Box 942874
Sacramento, CA 94274 0001
916932A-1833

Green Smith
Caltrans - Planning
P.O. Box 942874
Sacramento, CA 94274 0001
9169445 5310

Dennis W. Bryant
Dept. of Conservation
1416 Ninth Street, Room 1336-2
Sacramento, CA 95814
9169322 5813

Div. of Mines and Technology
 Div. of Oil and Gas
 Land Resources Project Unit

Vadek Ferehaha
Dept. of Food and Agriculture
1320 N Street, Room 104
Sacramento, CA 95814
916932-3227

Douglas W. Kitzler
Dept. of Forestry
1416 Ninth Street, Room 1516-2
Sacramento, CA 95814
916922-0128

Robert Steffy
Dept. of General Services
400 P Street, Suite 3460
Sacramento, CA 95814
916932A 0214

Aileen Chance
Dept. of Health
714 P Street, Room 1253
Sacramento, CA 95814
1 6111

Sgt. Jim Verdell
California Highway Patrol
Long Range Planning Section
Training and Analysis Division
2555 First Avenue
Sacramento, CA 95818
9169445-1981

William A. Johnson
Native American Heritage Comm.
935 Capitol Mall, Room 208
Sacramento, CA 95814
916922-1791

Janet Kreuthner
Office of Historic Preservation
P.O. Box 942906
Sacramento, CA 94296-0001
916932 9621

Mike Doyle
Dept. of Parks and Recreation
P.O. Box 942896
Sacramento, CA 94286-0001
916932A 6421

George Herch
Public Utilities Commission
503 Van Ness Avenue
San Francisco, CA 94102
415557-1375 (R-597)

Anna Leena Riemson
Reclamation Board
1416 Ninth Street, Room 706
Sacramento, CA 95814
916932-3140

North Hilliken
S.F. Bay Conservation A. Dev't. Comm.
30 Van Ness Avenue, Room 2011
San Francisco, CA 94102
415557 3466

Jeanette Blakette
Calif. Wash Management Board
1020 Ninth Street, Room 300
Sacramento, CA 95814
916932-0454

Ted Fukuhina
State Lands Commission
1807 - 13th Street
Sacramento, CA 95814
916932-7813

Nadeh Geyra
Dept. of Water Resources
1416 Ninth Street, Room 213-4
Sacramento, CA 95814
9169445-7416

Reed Haddeman
State Coastal Conservancy
1330 Broadway, Suite 1000
Oakland, CA 94612
415464-103

DIST/SCD:

Department of Transportation
District Contacts

Brent Snails
Caltrans, District 1
1656 Union Street
Furka, CA 95301
707/445 6320 (R-538)

Michelle Gallagher
Caltrans, District 2
1637 Riverside Drive
Redding, CA 96001
916922-3259 (R-442)

Brian J. Smith
Caltrans, District 3
703 B Street
Marysville, CA 95901
916/741-4277 (R-457)

Gary Adams
Caltrans, District 4
P.O. Box 7310
San Francisco, CA 94120
415957 8371 (R-597)

Jerry Laumer
Caltrans, District 5
P.O. Box 8114
San Luis Obispo, CA 93403 8114
805/540-3161 (R-629)

Nathan Smith
Caltrans, District 6
P.O. Box 12616
Fresno, CA 93718
209/488 4088 (R-422)

Gary M. Swerney
Caltrans, District 7
120 Smith Spring Street
Los Angeles, CA 90012
213/620-2376 (R-640)

Harvey Sawyer
Caltrans, District 8
247 West Third Street
San Bernardino, CA 92403
714/983-4808 (R-670)

Andy Zellman
Caltrans, District 9
500 South Main Street
Bishop, CA 94314
619/932-0693 (R-637)

Al Johnson
Caltrans, District 10
P.O. Box 2048
Stockton, CA 95201
209/948-7838 (R-425)

Jim Ehrlich
Caltrans, District 11
P.O. Box 83406
2829 Juan Street
San Diego, CA 92138-5406
619/237-6355 (R-631)

Robert Joseph
Caltrans, District 12
2501 Pullman St.
Santa Ana, CA 92705
714/724-2061 (R-652)

Fish and Game - Regional Offices

A. Taylor, Regional Manager
Department of Fish and Game
601 Laurel
Redding, CA 96001
916/225 2300 (R-442)

Jim Albersmith, Regional Manager
Department of Fish & Game
1701 Nimbus Road, Suite A
Rancho Cordova, CA 95670
916/935-0922 (R-438)

B. Hunter, Regional Manager
Department of Fish and Game
P.O. Box 47
Yountville, CA 94599
707/944-2801 (R-577)

G. Nohke, Regional Manager
Department of Fish and Game
1224 East Shaw Avenue
Fresno, CA 93710
209/222 3761 (R-421)

Fred A. Worthy, Jr., Reg. Manager
Department of Fish and Game
330 Golden Shore, Suite 50
Long Beach, CA 90802
213/590-3113 (R-635)

Roll F. Hall
Native Resources Region
330 Golden Shore, Suite 50
Long Beach, CA 90802
213/590-3155 (R-635)

State Water Resources Control Board

Allan Dalton
State Water Resources Control Board
Division of Lakes & Streams
P.O. Box 944212
Sacramento, CA 94244-2120
916/739 4414

E.A. Anton
State Water Resources Control Board
Division of Water Quality
P.O. Box 100
Sacramento, CA 95801
916/445-9532

Dave Reinger
State Water Resources Control Board
Delta Unit
P.O. Box 2000
Sacramento, CA 95810
916/225 9870

Mille Falkenberg
State Water Resources Control Board
Division of Water Rights
90 P Street
Sacramento, CA 95814
916932A-5636

OTH/PR:

Regional Water Quality Control Board

NOR CAL COAST REGION (1)
1400 Gateway Blvd.
Santa Rosa, CA 95401
707/576-2220 (R-598)

SAN FRANCISCO BAY REGION (2)
1111 Jackson Street, Room 6400
Oakland, CA 94607
415/464-1253 (R-561)

CENTRAL COAST REGION (3)
1102-A Laurel Lane
San Luis Obispo, CA 93401
805/549-3147 (R-629)

LOS ANGELES REGION (4)
107 South Broadway, Room 4027
Los Angeles, CA 90012
213/20-4460 (R-640)

CENTRAL VALLEY REGION (5)
3443 Router Road, Suite A
Sacramento, CA 95827-3098
916/961-5600

Fresno Branch Office
3374 First Shields Avenue, Room 18
Fresno, CA 93726
209/445-5116 (R-421)

Redding Branch Office
100 East Cypress Avenue
Redding, CA 96002
916/225-2045 (R-442)

LAHONTAN REGION (6)
2092 Lake Tahoe Boulevard
P.O. Box 9428
South Lake Tahoe, CA 95131
916/944 3481

Victorville Branch Office
15126 Creech Lake, Suite 100
Victorville, CA 92392 2359
619/241 6583

COLORADO RIVER BASIN REGION (7)
73-271 Highway 111, Suite 21
Twin River, CA 92260
619/746-7491

SANTA ANA REGION (8)
6099 Indiana Avenue, Suite 200
Riverside, CA 92506
714/782-4130 (R-632)

SAN DIEGO REGION (9)
9771 Chalmers Mesa Blvd., Suite B
San Diego, CA 92124-1351
619/265-5114 (R-636)

GREAT BASIN

January 18, 1990

MAMMOTH COUNTY WATER DISTRICT

William T. Taylor
Associate Planner
Town of Mammoth Lakes
Post Office Box 1609
Mammoth Lakes, California 93546

Re: Notice of Preparation of a Draft Environmental Impact
Report for the Lodestar Resort and Country Club Project

Dear Mr. Taylor:

The Mammoth County Water District has reviewed the Initial Study for the Lodestar Resort and Country Club Project and being a responsible agency relating to this development has identified the following issues that should be subject to analysis in the environmental impact report.

Water Utilities:

1. Identify new water main distribution pipeline construction that will be required to meet demands for normal domestic use and fire protection within the the project.
2. Will the project create a need for a new pressure reducing station to incorporate the project into the existing water distribution system?
3. Is there sufficient water storage tank volume in the area to meet peak demands that may be placed upon the District's distribution system by the project?
4. What is the feasibility of installing a reclaimed water system for the purpose of golf course irrigation?

Sewer Utilities:

1. Identify new sewer main collection system pipeline construction that will be required to meet the demands of normal domestic use within the project.
2. Will the sewage flow generated within the project create a need for expansion of sewage collection facilities outside of the project?
3. Should main line facilities be sized to handle additional flow that could come from the North Village project?
4. If expansion of the sewage collection system outside of the project is necessary, should that expansion occur on Meridian Boulevard or Chateau Road?

Water Supply:

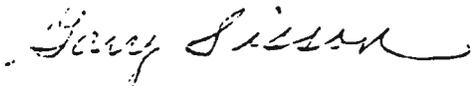
1. What are the projected water usage demands of this project on an annual and seasonal basis?
2. Is the planned density of the project consistent with that established in the existing Town of Mammoth Lakes General Plan thereby keeping within the total projected water demand for the community?
3. What impact will this demand have on existing supplies used by District customers?
4. What impact will this demand have in conjunction with other projects also currently involved in the environmental review process on existing District supplies?
5. What is the projected additional volume of water supply to be derived from sources that have been identified by the District but remain to be developed?
6. What water conservation measures can be taken, in addition to existing District landscape and conservation ordinances, to insure efficient utilization of water?
7. Will there be a sufficient supply of reclaimed water for irrigation purposes if it is determined feasible to use?

Thank you for the opportunity to review the Initial Study on this project and to provide comments regarding issues that should be addressed in the environmental impact report.

If you should have any questions, please contact me at the District offices at (619) 934-2596.

Sincerely,

MAMMOTH COUNTY WATER DISTRICT



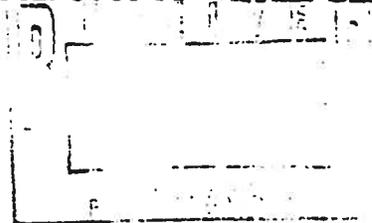
GARY SISSON
Operations and Maintenance Manager

gs/lodestar

January 31, 1990

MAMMOTH COUNTY WATER DISTRICT

Brian Hawley
Planning Department
Town of Mammoth Lakes
Post Office Box 1607
Mammoth Lakes, California 93546



Re: Water Availability Letter; Lodestar Resort and Country Club Project

Dear Mr. Hawley:

The Mammoth County Water District has been requested to prepare a letter confirming water availability for the Lodestar project, exclusive of water requirements related to development of the golf course. This request was made by Rick Liebersbach, representing Lodestar.

Proposed plans for the Lodestar Resort and Country Club Project have recently been reviewed by the District. Based upon the information provided, the total demand for water that would be created by the project, exclusive of the golf course development, is estimated to be 566,000 gallons per day which is the equivalent of 634 acre-feet per year. The most recent data available to the District indicates that there is approximately 3400 acre-feet of water available on an annual basis to serve existing community needs. Total water demand for the year 1989 amounted to 2746 acre-feet.

Future supplies that have been identified by the District include Well No. 11 (located in the Old Mammoth meadow) and wells that have been drilled and pump tested in the Dry Creek area. Well No. 11 has been designed to pump at an annual rate of 500 gallons per minute which would amount to 807 acre-feet per year. This project is in the final stages of approval and should be finalized at any time by the U.S. Forest Service. Construction is planned for the summer of 1990 to connect the well into the District's existing system. Groundwater supplies available for District use from the Dry Creek area are being projected at this time to be approximately 2000 acre-feet.

The District has projected an annual water demand of 5,946 acre-feet at total buildout as described in the Town of Mammoth Lakes General Plan.

Although existing water supply figures indicate that demands from this project could be met, the cumulative impacts from development of other projects that have been proposed such as Juniper Ridge, North Village and the Sherwin Ski Area, would require that

District groundwater supplies referenced above be developed and connected to the distribution system for use in order to meet the total increase in demand that will be created by these projects.

It should be noted that District ordinances state that there cannot be any unconditional guarantee of priority or reservation of capacity regarding water and sewer availability. The developer or subsequent purchaser of the parcel must acquire a water and sewer permit prior to construction of any improvements. Such permits will be issued by the District solely upon a first-come, first-served basis and only to the extent there is then remaining available capacity in the physical facilities for conveyance and treatment. Also, such permits will be issued only upon payment of all applicable fees and charges and in accordance with and subject to all then applicable District rules, regulations and ordinances.

If you should have any questions regarding this letter, please contact me at the District offices at (619) 934-2596.

Sincerely,

MAMMOTH COUNTY WATER DISTRICT

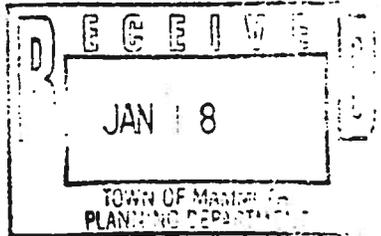


GARY SISSON
Operations and Maintenance Manager

gs/bh-ldstr

MAMMOTH UNIFIED SCHOOL DISTRICT

SUPERINTENDENT
RICHARD A. MCATEER



BOARD OF TRUSTEES
NANCY O'KELLY
KEN COULTER
MICHAEL BERGER
LAUREN AGEE
R. GARY JONES

January 16, 1990

Mr. Bill Taylor, Associate Planner
Town of Mammoth Lakes
Post Office Box 1609
Mammoth Lakes, CA 93546

Dear Bill:

Please accept this letter as the Mammoth Unified School District response to the initial study of the Lodestar Resort and Country Club project.

Under Section 13 Public Services, I believe this project would have a significant impact on the school district. The increased number of students generated will significantly impact the need for land, buildings and additional transportation needs for the school district.

I hereby support your environmental determination that an E.I.R. be required and that the above noted impacts and any others determined in the study be required to be mitigated for this project to be approved.

Sincerely,

Richard A. McAteer
Superintendent

RAM:st

"QUALITY EDUCATION"

PO BOX 1320, MAMMOTH LAKES, CALIFORNIA 93546

413-231-1800

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

TORVILLE BRANCH OFFICE
28 CIVIC DRIVE, SUITE 100
TORVILLE, CA 92392-2359
(619) 241-6583



To: Town of Mammoth Lakes

Att: William T. Taylor

P.O. Box 1609

Mammoth Lakes, CA 93546

(619) 241-6583

RE: Lodestar Resort & Country Club - N.O.P. E.I.A.

Please refer to the items checked for our comments on the above-referenced project.

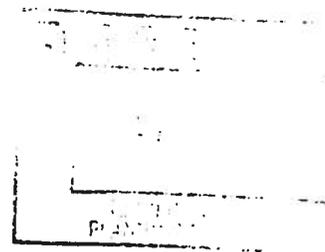
- If the proposed project will utilize a community sewer system, we have no comments.
- Discharge of any material other than domestic wastewater to a septic tank wastewater disposal system is generally prohibited.
- The proposed project could allow development which would exceed the Regional Board's 500 gallon per acre per day limitation on the discharge to septic tank wastewater disposal systems. The county will have to identify the septage disposal site where periodic pumpings from the project will be disposed of.
- The proposed development is in an area where septic tank wastewater disposal systems are prohibited.
- The proposed project is located in an area containing surface waters which could be impacted by the off site discharge of earthen materials and stormwater runoff.
- The proponent should contact Regional Board staff to provide additional information regarding this project.
- A Report of Waste Discharge will be requested of the proponent to evaluate the threat to water quality posed by this project.
- Please require written clearance from the Regional Board before approving this project.
- The Regional Board has determined that this project will not have a significant effect on water quality as proposed. No further Regional Board action will be taken.
- If a proposed industrial facility would generate wastes other than domestic sewage, waste discharge requirements may be imposed to include, but not limited to, industrial pretreatment of wastewater and special handling for solid waste.
- OTHER _____

Sincerely,

Anthony J. Sandoval
Anthony J. Sandoval
WQC Engineer

Date

2-1-90



January 30, 1977

Town of Mammoth Lakes
Planning Department
P.O. Box 1609
Mammoth Lakes, CA 93546

Attention: William T. Taylor

Re: Lodestar Initial Study

Dear Mr. Taylor:

The Mammoth Lakes Fire Protection District has reviewed the Initial Study for Lodestar Resort and Country Club. The District has determined that until we receive more detail on this project, we cannot reach a firm decision on what type of mitigation will be necessary to minimize the impact of this project on the District.

The District over the years has had little contact with the Lodestar developers. However, at one time the District was in negotiation for a fire station site.

The District must review the site plan for this project to determine the need and location of a fire station site. The District may determine upon review that the project may be better mitigated by the purchase of fire apparatus rather than a station site.

The Fire District has the following comments for the preparation of the E.I.R.:

1. Access to all structures shall comply with Mammoth Lakes Fire Protection District Ordinance #85-02.

Access roads shall be of an approved hard all-weather surface and shall have a minimum clear unobstructed width of 20 feet. All access roads shall have a minimum vertical clearance of 15 feet. Access roads shall have a grade of not more than 10%.

To provide for aerial ladder access to building roof tops, a minimum 20 foot wide access road shall be provided for each structure located not more than 25 feet from the structure, but no closer than one foot for every 3 feet of building height. This access road shall have a grade of not more than 3% and shall be clearly posted "No Parking - Fire Lane".

A high-rise structure is identified by this Department as any structure which exceeds 3 stories or 35 feet in height (55 feet for residential condominiums or apartment buildings) measured from Fire Department access. High-rise structures shall be required to have approved Fire Department access roads to at least 2 sides of the structure. One of these access roads shall be on the side of the building with the longest continual roof line.

Fire Department access roads that are 150 feet or more in length shall be provided with approved fire apparatus turn-arounds. The required width and height clearances for Fire Department access roads shall be maintained - this includes parking of private vehicles.

If a smoke tower or stairway is used as a required exit for a structure, that exit must have an unobstructed passage of not less than 6 feet in width to Fire Department access, and then not less than 3 feet in width from that point to the public way.

2. An approved water supply system capable of supplying required fire flow for fire protection purposes shall be provided to all premises upon which buildings or portions of buildings are constructed. The establishment of gallons-per-minute requirements for fire flow shall be based on the "Guide for Determination of Required Fire Flow" published by the Insurance Service Office.

Fire hydrants shall be located and installed per Department standards, and approved by the Fire Chief. On-site fire hydrants shall be provided when any portion of the building protected is in excess of 150 feet from a water supply on a public street, or as required by the Fire Chief.

Fire hydrants and access roads shall be installed and made serviceable prior to and during time of construction. They shall be properly identified per Department standards.

3. An approved automatic fire extinguishing system is required for all covered parking areas and other structures having:

- A. A foundation footprint of 5000 square feet or more.
- B. A height of more than 35 feet (50 feet for residential condominiums or apartment buildings).
- C. A height of more than 3 stories.
* The existence of fire separation walls, floors, or ceilings shall not effect the requirements stated in Items A, B or C.
- D. All other occupancies as identified in the Uniform Fire and Uniform Building Code, or as special hazard occupancies as outlined in the appropriate National Fire Protection Association pamphlet.
- E. Fire standpipe systems shall be installed in conformance with National Fire Protection Association Standards and the Uniform Fire Code.

3.

Other special fire protection methods may be necessary in underground parking garages and high-rise structures based upon building construction, size, and adjoining occupancy types. This will be determined upon formal plan submission.

4. All vehicular bridges and tunnels, and pedestrian bridges shall comply with fire apparatus access road requirements in regards to minimum width and height clearances.

5. Liquid petroleum gas storage and system installation shall comply with Mammoth Lakes Fire Protection District Ordinance #85-02, which establishes and regulates the storage of L.P. gases.

6. The Lodestar complex will impact the Fire District financially. The fire and life safety hazard will increase dramatically. The District will require new and improved equipment to handle this task.

This impact on the District must be mitigated during the environmental review process.

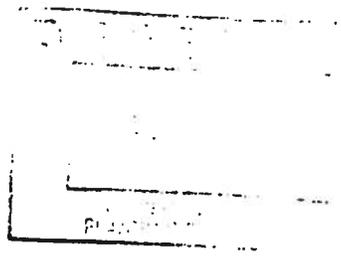
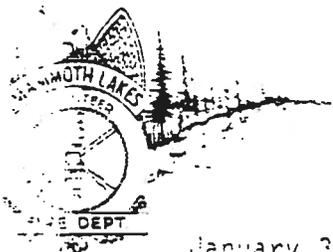
The Mammoth Lakes Fire Protection District reserves the right to impose further requirements upon further plan submission.

Sincerely,


John A. Sweeny
Fire Chief
Mammoth Lakes Fire Protection District

JAS/blc

LODESTAR
FP9091



January 30, 1977

Town of Mammoth Lakes
Planning Department
P.O. Box 1609
Mammoth Lakes, CA 93546

Attention: William T. Taylor

Re: Lodestar Initial Study

Dear Mr. Taylor:

The Mammoth Lakes Fire Protection District has reviewed the Initial Study for Lodestar Resort and Country Club. The District has determined that until we receive more detail on this project, we cannot reach a firm decision on what type of mitigation will be necessary to minimize the impact of this project on the District.

The District over the years has had little contact with the Lodestar developers. However, at one time the District was in negotiation for a fire station site.

The District must review the site plan for this project to determine the need and location of a fire station site. The District may determine upon review that the project may be better mitigated by the purchase of fire apparatus rather than a station site.

The Fire District has the following comments for the preparation of the E.I.R.:

1. Access to all structures shall comply with Mammoth Lakes Fire Protection District Ordinance #85-02.

Access roads shall be of an approved hard all-weather surface and shall have a minimum clear unobstructed width of 20 feet. All access roads shall have a minimum vertical clearance of 15 feet. Access roads shall have a grade of not more than 10%.

To provide for aerial ladder access to building roof tops, a minimum 20 foot wide access road shall be provided for each structure located not more than 25 feet from the structure, but no closer than one foot for every 3 feet of building height. This access road shall have a grade of not more than 3% and shall be clearly posted "No Parking - Fire Lane".

A high-rise structure is identified by this Department as any structure which exceeds 3 stories or 35 feet in height (55 feet for residential condominiums or apartment buildings) measured from Fire Department access. High-rise structures shall be required to have approved Fire Department access roads to at least 2 sides of the structure. One of these access roads shall be on the side of the building with the longest continual roof line.

Fire Department access roads that are 150 feet or more in length shall be provided with approved fire apparatus turn-arounds. The required width and height clearances for Fire Department access roads shall be maintained - this includes parking of private vehicles.

If a smoke tower or stairway is used as a required exit for a structure, that exit must have an unobstructed passage of not less than 6 feet in width to Fire Department access, and then not less than 3 feet in width from that point to the public way.

2. An approved water supply system capable of supplying required fire flow for fire protection purposes shall be provided to all premises upon which buildings or portions of buildings are constructed. The establishment of gallons-per-minute requirements for fire flow shall be based on the "Guide for Determination of Required Fire Flow" published by the Insurance Service Office.

Fire hydrants shall be located and installed per Department standards, and approved by the Fire Chief. On-site fire hydrants shall be provided when any portion of the building protected is in excess of 150 feet from a water supply on a public street, or as required by the Fire Chief.

Fire hydrants and access roads shall be installed and made serviceable prior to and during time of construction. They shall be properly identified per Department standards.

3. An approved automatic fire extinguishing system is required for all covered parking areas and other structures having:

- A. A foundation footprint of 5000 square feet or more.
- B. A height of more than 35 feet (50 feet for residential condominiums or apartment buildings).
- C. A height of more than 3 stories.
* The existence of fire separation walls, floors, or ceilings shall not effect the requirements stated in Items A, B or C.
- D. All other occupancies as identified in the Uniform Fire and Uniform Building Code, or as special hazard occupancies as outlined in the appropriate National Fire Protection Association pamphlet.
- E. Fire standpipe systems shall be installed in conformance with National Fire Protection Association Standards and the Uniform Fire Code.

3.

Other special fire protection methods may be necessary in underground parking garages and high-rise structures based upon building construction, size, and adjoining occupancy types. This will be determined upon formal plan submission.

4. All vehicular bridges and tunnels, and pedestrian bridges shall comply with fire apparatus access road requirements in regards to minimum width and height clearances.

5. Liquid petroleum gas storage and system installation shall comply with Mammoth Lakes Fire Protection District Ordinance #85-02, which establishes and regulates the storage of L.P. gases.

6. The Lodestar complex will impact the Fire District financially. The fire and life safety hazard will increase dramatically. The District will require new and improved equipment to handle this task.

This impact on the District must be mitigated during the environmental review process.

The Mammoth Lakes Fire Protection District reserves the right to impose further requirements upon further plan submission.

Sincerely,


J. A. Sweeny
Fire Chief
Mammoth Lakes Fire Protection District

JAS/blc

LODESTAR
FP9091

DEPARTMENT OF FORESTRY AND FIRE PROTECTION

DAVID J. DRISCOLL, RANGER UNIT CHIEF

SAN BERNARDINO RANGER UNIT

3800 SIERRA WAY

SAN BERNARDINO CA 92405

(714) 832-1226



January 22, 1990

Mr. William T. Taylor
Town of Mammoth Lakes
P.O. Box 1609
Mammoth Lakes, CA 93546

SUBJECT: LODESTAR RESORT AND COUNTRY CLUB
NOTICE OF PREPARATION

Dear Mr. Taylor,

The Resource Management section of the California Department of Forestry and Fire Protection offers the following points for consideration during the environmental review of the above project:

1. The proposed project is to take place on timberland as defined by the Public Resource Code (Section 4526). A Timberland Conversion Permit, the type as indicated below, may be required from this department. The Conversion Permit indicated below may only be required if the timber to be removed is done within the definition of "timber operations" as defined by the Public Resource Code 4527.
 - [X] Timberland Conversion Permit (RM-53)
 - [X] Notice of Exemption from Timberland Conversion Permit for Subdivision (RM-91)

A Notice of Determination from the Office of Planning and Research, State Clearinghouse is required before the California Department of Forestry and Fire Protection can process either one of these permits.

2. Removal of trees from the project site may require one or more of the following permits prior to ground breaking activity:
 - [X] Timber Operators Permit
 - [X] Timber Harvest Plan
 - [] Exemption Notice
3. The native vegetation (trees) in the proposed project area have evolved in a wet-dry cycle and establishing irrigation for landscaping beneath these trees is harmful. If the soil is irrigated and kept excessively wet year round, an ideal environment for water borne diseases results, thus creating health stress on the remaining trees. This, in turn, allows the ever-present bark beetles to attack with eventual tree mortality. Irrigation systems and water application should be kept well outside the dripline of retained

trees if long-term survival is desired.

4. Activities associated with development near trees, such as soil compaction, grade changes, and trenching can result in tree health decline from mechanical damage to living tissue and root loss/disturbance. A reduction in health renders the tree highly susceptible to disease and insect pests (particularly bark beetles). Therefore, protection of remaining vegetation from disturbance should be evaluated and addressed in the EIR.
5. Construction activity within the dripline of retained trees should be discouraged. The design features of the proposed project should not enter the root zone.
6. Landscaping material should be used that is consistent with the intention to retain native trees. The use of non-native landscape material may induce conditions that will encourage the development of pest conditions.
7. All coniferous slash (limb, trunk and stump residue from tree removal) should be treated by chipping, disposal in an appropriate solid waste facility, or chemical application within 15 days of its creation in order to preclude the attraction of bark beetles to the material. Untreated coniferous slash becomes perfect breeding habitat for the destructive insects.
8. To ensure that all the above points above are properly addressed, a State of California Registered Professional Forester (RPF) should be consulted during the earliest possible phase of environmental review.
9. Fire Safe Guidelines for development that is occurring in or near forest, brush, and/or grassland should be considered. Specific measures should be incorporated into the project plan as specified by the Government Code, Sections 12038, 65402(a), 65302(i), 65303, 65451, 65560, 66418, 66411, 66424, 66474, 66455.5. A copy of Fire Safe Guides For Residential Development in California is available through the California Department of Forestry and Fire Protection, 3800 Sierra Way, San Bernardino, CA 92405.

Thank you for this opportunity to review and comment on the proposed project. If you have any questions or comments, please contact me at the above office location.

Cordially,


Doug Forrest
Resource Planning Officer

APPENDIX C.
Guidelines for Erosion Control in the Mammoth Lakes Area

CALIFORNIA REGIONAL WATER QUALITY CONTROL BOARD
LAHONTAN REGION

RESOLUTION 83-5

Adopting An Amendment to the Water Quality Control Plan
for the South Lahontan Basin Incorporating Specific
Erosion Control Guidelines for the Mammoth Creek
Watershed
Mono County

WHEREAS, the California Regional Water Quality Control Board, Lahontan Region finds.

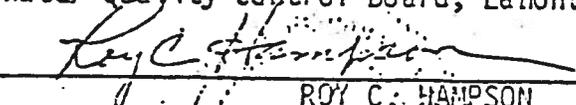
1. It is the responsibility of the Regional Board to regulate the activities and factors which affect or may affect the quality of waters of the region in order to achieve the highest water quality consistent with maximum benefit to the people of the state.
2. The Porter-Cologne Water Quality Control Act (Section 13240) requires each Regional Board to adopt and periodically review water quality control plans for all areas within the region.
3. The Regional Board adopted a Water Quality Control Plan (Basin Plan) for the South Lahontan Basin on May 8, 1975, and that plan contains general erosion control guidelines for the South Lahontan Basin.
4. As a result of current and potentially increasing impacts to a unique downstream fishery resource in Hot Creek caused by an increased amount of sediment being discharged to Mammoth Creek from accelerated land development in the community of Mammoth Lakes, the Regional Board is establishing specific erosion control guidelines for the Mammoth Creek Watershed.
5. Regional Board staff reviewed the Basin Plan and relevant technical literature and data and drafted an amendment to Chapter 5 of the Basin Plan.
6. The Regional Board staff prepared an environmental document in accordance with the California Environmental Quality Act (Public Resources Code, Section 21080.5) and the State Guidelines.
7. The draft Basin Plan amendment and environmental document were widely circulated for public review and comment.
8. On March 16, 1983 Regional Board staff conducted a workshop on the draft guidelines in Mammoth Lakes. The workshop was attended by representatives of governmental agencies and local engineers and developers. No adverse comments regarding the draft guidelines were received at the workshop.

9. On June 9, 1983 the Regional Board held a public hearing during which staff presented and explained the proposed amendment, the public was afforded the opportunity to comment, and staff responded to comments received.
10. The Regional Board, after consideration of all relevant evidence, has determined that the erosion control guidelines established in the amendment are reasonable and necessary for the protection of the existing high-quality of Mammoth and Hot Creeks and their present and future beneficial uses.

THEREFORE BE IT RESOLVED THAT

1. The attached amendment to the South Lahontan Basin Plan entitled "Guidelines for Erosion Control in the Mammoth Creek Watershed" is hereby adopted.
2. The "Guidelines for Erosion Control in the Mammoth Creek Watershed" shall apply to areas within the Mammoth Creek Watershed above an elevation of 7,000 feet.
3. The Regional Board shall file a Notice of Decision with the Secretary of Resources in accordance with Section 21080.5 of the California Environmental Quality Act.
4. Copies of the amendment shall be forwarded to the State Water Resources Control Board.

I, Roy C. Hampson, Executive Officer, do hereby certify that the foregoing is a full, true, and correct copy of a resolution adopted by the California Regional Water Quality Control Board, Lahontan Region on June 9, 1983.



ROY C. HAMPSON
EXECUTIVE OFFICER

GUIDELINES FOR EROSION CONTROL

IN THE MAMMOTH LAKES AREA

Erosion control guidelines have been adopted by the Regional Board to establish standards for the control of erosion and drainage from developments in the Mammoth Creek Watershed, above elevation 7,000 feet. Such standards are necessary to provide developers with a uniform approach for the design and installation of an adequate system to control erosion and storm runoff. The guidelines are designed to prevent the degradation of Mammoth and Hot Creeks by minimizing the impacts on the creeks of the drainage from the community of Mammoth Lakes.

I. GENERAL POLICY

The Regional Board will request a report of waste discharge from the developers of a proposed project and will establish waste discharge requirements to ensure that proper control measures for the protection of water quality are taken during all phases of a proposed development. The report of waste discharge and the adopted waste discharge requirements will be in conformance with the erosion control guidelines which are listed below:

II. WASTE DISCHARGE REPORTS

- A. The submittal of a report of waste discharge shall be required according to the following criteria:
1. A new development involving either (a) six or more dwelling units, or (b) commercial developments that involve soil disturbance on $\frac{1}{4}$ acre or more shall file a complete report of waste discharge not less than 90 days before the intended commencement of construction activities.
 2. Existing developments and new developments involving five or less dwelling units shall file a report of waste discharge only at the request of the Regional Board. Such filing shall be no more than 60 days from the date of request, or sooner, if so stated in the initial request.
- B. Reports of waste discharge for projects in the Mammoth Creek Watershed that involve the disturbance of soil shall contain the following elements:
1. A description of the interim erosion control measures to be applied during the period in which the project is under construction.
 2. Details of the short-term and long-term erosion and drainage control measures to be employed following the completion of the construction phase of the project.
 3. A time schedule delineating the sequence by which the above erosion and drainage control measures will be applied and are expected to become effective.

Details of all erosion control measures shall be shown on suitable-scale engineering drawings. The report shall also include engineering criteria and design calculations for erosion control facilities.

III. GUIDELINES

The following guidelines are necessary for the protection of water quality within the Mammoth Lakes area.

1. Drainage collection, retention, and infiltration facilities shall be constructed and maintained to prevent transport of the runoff from a 20-year, 1-hour design storm from the project site.^{a/}
2. Surplus or waste material shall not be placed in drainage ways or within the 100-year flood plain of surface waters.
3. All loose piles of soil, silt, clay, sand, debris, or earthen materials shall be protected in a reasonable manner to prevent any discharge to waters of the State.
4. Dewatering shall be done in a manner so as to prevent the discharge of earthen material from the site.
5. All disturbed areas shall be stabilized by appropriate soil stabilization measures by October 15th of each year.
6. All work performed between October 15th and May 1st of each year shall be conducted in such a manner that the project can be winterized within 48 hours.
7. Where possible, existing drainage patterns shall not be significantly modified.
8. After completion of a construction project, all surplus or waste earthen material shall be removed from the site and deposited at a legal point of disposal.
9. Drainage swales disturbed by construction activities shall be stabilized by the addition of crushed rock or riprap as necessary or other appropriate stabilization methods.
10. All nonconstruction areas shall be protected by fencing or other means to prevent unnecessary disturbance.

^{a/} The 20-year, 1-hour design storm for the Mammoth Lakes area is equal to 1.0 inch (2.5 cm).

11. During construction, temporary erosion control facilities (e.g. impermeable dikes, filter fences, hay bales, etc.) shall be used as necessary to prevent discharge of earthen materials from the site during periods of precipitation or runoff.
12. Revegetated areas shall be continually maintained in order to assure adequate growth and root development. Physical erosion control facilities shall be placed on a routine maintenance and inspection program to provide continued erosion control integrity.
13. Where construction activities involve the crossing and/or alteration of a stream channel, such activities shall be timed to occur during the period in which streamflow is expected to be lowest for the year.

IV. IMPLEMENTATION

1. The responsibility for the timely submittal of information necessary for the Regional Board to determine compliance with these guidelines rests with persons submitting proposals for development. The Porter-Cologne Water Quality Control Act provides that no person shall initiate any new discharge of wastes prior to filing a complete report of waste discharge and prior to issuance of waste discharge requirements, the expiration of 120 days after submittal of a complete report of waste discharge, or the waiver of waste discharge requirements.
2. The Regional Board may pursue enforcement action should these erosion control guidelines not be adhered to.

APPENDIX D.
Biotic Resources Survey

COMMON, POTENTIAL AND OBSERVED PLANT & WILDLIFE SPECIES
IN THE LODESTAR PROJECT AREA, MONO COUNTY, CALIFORNIA

Common Name

Scientific Name

PLANTS

White Fir	<i>Abies concolor</i>
Wheatgrass	<i>Agropyron cristatum</i>
Wild Onion	<i>Allium bisceptrum</i>
Pink Pussytoes	<i>Antennaria rosea</i>
Rockcress	<i>Arabis holboellii</i> var. <i>retrofracta</i>
Greenleaf Manzanita	<i>Arctostaphylos patula</i>
Big Sagebrush Sagebrush	<i>Artemisia tridentata</i> ssp. <i>tridentata</i>
California Brome Grass	<i>Bromus carinatus</i>
Pussypaws	<i>Calyptridium unbellatum</i> var. <i>umbellatum</i>
Sedge	<i>Carex</i> sp.
Paintbrush	<i>Castilleja</i> sp.
Snowbush	<i>Ceanothus cordulatus</i>
Tobacco Bush	<i>Ceanothus velutinus</i>
Douglas' Pincushion	<i>Chaenactis douglasii</i> var. <i>rubricaulis</i>
Dwarf Chamaesaracha	<i>Chamasaracha nana</i>
Goosefoot	<i>Chenopodium</i> sp.
Chrysothamnus	<i>Cryothamnus</i> sp.
Blue-Eyed Mary	<i>Collinsia</i> sp.
Spotted Coral-root	<i>Corallorhiza maculata</i>
Hawksbeard	<i>Crepis intermedia</i>
Cryptantha	<i>Cryptantha echinella</i>
Larkspur	<i>Delphinium</i> sp.
Nude Buckwheat	<i>Eriogonum</i> sp. var. <i>nudum</i>
Spurrey Eriogonum	<i>Eriogonum spergulinum</i> var. <i>spergulinum</i>
Sulphur Buckwheat	<i>Eriogonum umbellatum</i> var. <i>umbellatum</i>
Mountain Fritillary	<i>Fritillaria pinetorum</i>
Bedstraw	<i>Galium</i> sp.
Diffuse Gayophytum	<i>Gaylophytum diffusum</i> ssp. <i>parviflorum</i>
Miniature Gilia	<i>Gilia capillaris</i>
California Barley	<i>Hordeum californicum</i>
Firecracker Flower	<i>Ipomopsis aggregata</i> ssp. <i>aggregata</i>
Western Blue Flag	<i>Iris missouriensis</i>
Rush	<i>Juncus</i> sp.
Bristly-leaved Linanthus	<i>Linanthus ciliatus</i>
Nuttall's Linanthus	<i>Linanthus nuttallii</i>
Lotus	<i>Lotus</i> sp.
Anderson's Lupine	<i>Lupinus andersonii</i> var. <i>andersonii</i>
Elegant Madia	<i>Madia elegans</i> ssp. <i>wheeleri</i>
Melic Grass	<i>Melica bulbosa</i> var. <i>bulbosa</i>
Nevada Stickleaf	<i>Mentzelia dispersa</i>

Common Name

Scientific Name

Beard tounge	<i>Penstemon rydbergii</i>
Phlox	<i>Phlox hoodii</i> ssp. <i>canescens</i>
Lodgepole Pine	<i>Pinus contorta</i> var. <i>murrayana</i>
Jeffrey Pine	<i>Pinus jeffreyi</i>
Hooker's Bluegrass	<i>Poa nervosa</i>
Bluegrass	<i>Poa</i> sp.
Quaking Aspen	<i>Populus tremuloides</i>
Sticky Cinquefoil	<i>Potentilla glandulosa</i>
Five-finger	<i>Potentilla gracilis</i>
Bitter Cherry	<i>Prunus emarginata</i>
Terebinth Pteryxia	<i>Pteryxia terebinthina</i> var. <i>californica</i>
Antelope Bitterbrush	<i>Purshia tridentata</i>
Squaw Currant	<i>Ribes cereum</i>
Sorrel	<i>Rumex</i> sp.
Willow	<i>Salix</i> sp.
Single-Stemmed Groundsel	<i>Senecio integerrimus</i> var. <i>exaltatus</i>
Bottle-Brush Squirrel-Tail Grass	<i>Sitanion hystrix</i>
Sestern Needlegrass	<i>Stipa occidentalis</i>
Common Dandelion	<i>Taraxacum officinale</i>
Pretty Face	<i>Triteleia</i> sp.
California Valerian	<i>Valeriana capitata</i> ssp. <i>californica</i>
Mountain Violet	<i>Viola purpurea</i>
Mule's Ears	<i>Wyethia mollis</i>

MAMMALS

Mt. Lyell Shrew	<i>Sorex lyelli</i>
Dusky Shrew	<i>S. monticolus</i>
Water Shrew	<i>S. palustris</i>
California Mole*	<i>Scapanus latamanus</i>
California Myotis	<i>Myotis californicus</i>
Silver-Haired Bat	<i>Lasionycteris noctivagans</i>
Big Brown Bat	<i>Eptesicus fuscus</i>
Hoary Bat	<i>Lasiurus cinereus</i>
Black Bear*	<i>Ursus americanus</i>
Ringtail	<i>Bassaribus astutus</i>
Raccoon	<i>Procyon lotor</i>
Mountain Lion	<i>Felis concolor</i>
Bobcat	<i>Lynx rufus</i>
Feral House Cat*	<i>Felis domesticus</i>
Gray Fox	<i>Urocyon cinereoagenteus</i>
Coyote*	<i>Canis latrans</i>
Red Fox	<i>Vulpes vulpes</i>
Marten	<i>Marten americana</i>
Fisher	<i>M. pennanti</i>

Common Name

Scientific Name

Ermine	<i>Mustela erminea</i>
Longtail Weasel	<i>M. frenata</i>
Mink	<i>M. vison</i>
Wolverine	<i>Gulo gulo</i>
Badger	<i>Taxidea taxus</i>
Striped Skunk	<i>Mephitis mephitis</i>
Spotted Skunk	<i>Spilogale putorius</i>
Mountain Beaver	<i>Aplodontia rufa</i>
Yellow-Bellied Marmot	<i>Marmota flaviventris</i>
River Otter	<i>Lontra canadensis</i>
Yellow-Pine Chipmunk	<i>Tamias amoenus</i>
Allen's Chipmunk	<i>T. senex</i>
Least Chipmunk	<i>T. minimus</i>
Lodgepole Chipmunk*	<i>T. speciosus</i>
California Ground Squirrel	<i>Spermophilus beecheyi</i>
Belding's Ground Squirrel*	<i>S. beldingi</i>
Golden-mantled Ground Squirrel	<i>S. lateralis</i>
Douglas's Squirrel*	<i>Tamiasciurus douglassii</i>
Mountain Pocket Gopher*	<i>Thomomys monticola</i>
Beaver	<i>Castor canadensis</i>
Western Harvest Mouse	<i>Reithrodontomys megalotis</i>
Deer Mouse*	<i>Peromyscus maniculatus</i>
Pinon Mouse	<i>P. truei</i>
Bush-Tailed Wood Rat	<i>Neotoma cinerea</i>
Heather Vole	<i>Phenacomys intermedius</i>
Montane Vole	<i>Microtus montanus</i>
Long-Tailed Vole	<i>M. longicaudus</i>
House Mouse	<i>Mus musculus</i>
Western Jumping Mouse	<i>Zapus princeps</i>
Porcupine	<i>Erethizon dorsatum</i>
Blacktail Jackrabbit	<i>Lepus californicus</i>
Snowshoe Hare	<i>L. americanus</i>
White-Tailed Jackrabbit	<i>L. townsendii</i>
Pika	<i>Ochotona princeps</i>
Nuttall Cottontail	<i>Sylvilagus nuttallii</i>
Mule Deer*	<i>Odocoileus hemionus</i>

REPTILES AND AMPHIBIANS

Mount Lyell Salamander	<i>Hydromantes platycephalus</i>
Western Toad	<i>Bufo boreas</i>
Yosemite Toad	<i>B. canorus</i>
Pacific Treefrog	<i>Hyla regilla</i>
Mountain Yellow-Legged Frog	<i>Rana muscosa</i>

Common NameScientific Name

Western Fence Lizard*
Sagebrush Lizard
Northern Alligator Lizard
Rubber Boa
Pacific Gopher Snake
Common Kingsnake
Western Terrestrial Garter Snake
Western Aquatic Garter Snake
Western Rattlesnake

Sceloporus occidentalis
S. graciosus
Gerrhonotus coeruleus
Charina bottae
Pituophis melanoleucus
Lampropeltis getulus
Thamnophis elegans
T. couchi
Crotalus viridis

BIRDS

Turkey Vulture
Cooper's Hawk
Sharp-Shinned Hawk
Northern Goshawk
Northern Harrier (w)
Ferruginous Hawk (w)
Red-Tailed Hawk
Swainson's Hawk
Golden Eagle (w)
American Kestrel
Prairie Falcon
Blue Grouse
White-Tailed Ptarmigan
California Quail
Mountain Quail
Chukar
Band-Tailed Pigeon (s)
Killdeer
Spotted Sandpiper
Barn Owl
Flammulated Owl (s)
Great Horned Owl
Great Gray Owl
Long-Eared Owl
Northern Pygmy-Owl
Common Nighthawk (s)
Poor-Will
Black Swift (s)
Vaux's Swift (s)
White-Throated Swift (s)
Broad-Tailed Hummingbird (s)
Calliope Hummingbird

Cathartes aura
Accipiter cooperi
A. striatus
A. gentilis
Circus cyaneus
B. regalis
B. jamaicensis
B. swainsoni
Haliaeetus leucocephalus
Falco sparverius
F. mexicanus
Dendragapus obscurus
Lagopus leucurus
Callipepla californicus
Oreortyx pictus
Alectoris chukar
Columba faciata
Charadrius vociferus
Actitis macularia
Tyto alba
Otus flammeolus
Bubo virginianus
Strix nebulosa
Asio otus
Glaucidium gnoma
Chordeilus minor
Phalaenoptilus nuttallii
Cypseloides niger
Chaetura vauxi
Aeronautes saxatalis
Seasphorus platycercus
Stellula calliope

Common NameScientific Name

Belted Kingfisher	<i>Ceryle alcyon</i>
Northern Flicker*	<i>Colaptes auratus</i>
Pileated Woodpecker	<i>Dryocopus pileatus</i>
Lewis' Woodpecker	<i>Melanerpes lewis</i>
"Red-Breasted" Sapsucker	<i>Sphyrapicus varius daggetti</i>
Williamson's Sapsucker	<i>S. thyroideus</i>
White-Headed Woodpecker*	<i>Picoides albolarvatus</i>
Black-Backed Woodpecker	<i>P. arcticus</i>
Hairy Woodpecker	<i>P. villosus</i>
Hammond's Flycatcher (s)	<i>Empidonax hammondi</i>
Willow Flycatcher (s)	<i>E. traillii</i>
Dusky Flycatcher (s)*	<i>E. oberholseri</i>
Horned Lark	<i>Eremphila alpestris</i>
Barn Swallow (s)	<i>Hirundo rustica</i>
Violet-Green Swallow (s)	<i>Tachycineta thalassina</i>
Tree Swallow (s)	<i>Iridoprocne bicolor</i>
Stellar's Jay*	<i>Cyanocitta stelleri</i>
Pinyon Jay	<i>Gymnorhinus cyanocephalus</i>
Clark's Nutcracker*	<i>Nucifraga columbiana</i>
Black-Billed Magpie	<i>Pica pica</i>
Common Raven*	<i>C. corax</i>
Mountain Chickadee*	<i>Parus gambeli</i>
White-Breasted Nuthatch	<i>S. canadensis</i>
Pygmy Nuthatch*	<i>S. pygmaea</i>
Brown Creeper*	<i>Certhia familiaris</i>
American Dipper	<i>Cinclus mexicanus</i>
Rock Wren	<i>Salpinctes obsoletus</i>
Canyon Wren	<i>Catherpes mexicanus</i>
House Wren (s)	<i>Troglodytes aedon</i>
Winter Wren (w)	<i>T. troglodytes</i>
Robin*	<i>Turdus migratorius</i>
Hermit Thrush (s)	<i>Catharus guttata</i>
Swainson's Thrush (s)	<i>C. ustulata</i>
Mountain Bluebird	<i>Sialia currucoides</i>
Townsend's Solitaire	<i>Myadestes townsendi</i>
Ruby-Crowned Kinglet (s)	<i>Regulus calendula</i>
Golden-Crowned Kinglet	<i>R. satrapa</i>
Starling	<i>Sturnus vulgaris</i>
Solitary Vireo (s)	<i>Vireo solitarius</i>
Warbling Vireo (s)	<i>V. gilvus</i>
Yellow-Rumped Warbler (s)*	<i>Dendroica coronata</i>
MacGillivray's Warbler (s)	<i>Oporornis tolmiei</i>
House Sparrow	<i>Passer domesticus</i>
Redwinged Blackbird	<i>Agelaius phoeniceus</i>
Yellow-Headed Blackbirds (s)	<i>Xanthocephalus xanthocephalus</i>

<u>Common Name</u>	<u>Scientific Name</u>
Brewer's Blackbird*	<i>Euphagus cyanocephalus</i>
Brown-Headed Cowbird (s)*	<i>Molothrus ater</i>
Western Tanager*	<i>Piranga ludoviciana</i>
Western Meadowlark	<i>Sturnella neglecta</i>
Indigo Bunting	<i>Passerina cyanea</i>
Lazuli Bunting (s)	<i>P. amoena</i>
Rosy Finch	<i>Leucosticte arctoa</i>
Purple Finch (s)*	<i>Carpodacus purpureus</i>
Cassin's Finch	<i>C. cassini</i>
House Finch (s)	<i>C. mexicanus</i>
Pine Grosbeak	<i>Pinicola enucleator</i>
Red Crossbill	<i>Loxia recurvirostra</i>
Evening Grosbeak	<i>Coccothraustes vespertinus</i>
Pine Siskin	<i>Spinus pinus</i>
Green-Tailed Towhee (s)	<i>Pipilo chlorurus</i>
Savannah Sparrow (s)	<i>Passerculus sandwichensis</i>
Dark-Eyed Junco*	<i>Junco hyemnalis</i>
Chipping Sparrow (s)*	<i>Spizella passerina</i>
White-Crowned Sparrow (s)*	<i>Zonotrichia leucophrys oriantha</i>
Golden-Crowned Sparrow (w)	<i>Z. atricappilla</i>
Fox Sparrow	<i>Passerella iliaca</i>
Lincoln's Sparrow (s)	<i>Melospiza lincolni</i>

*Wildlife species observed during field survey June 16-18, 1990
(w) = Winter range only
(s) = Summer range only

All plant species recorded during field survey June 26-27, 1990.

Sources: California Department of Fish and Game, 1983, California Wildlife/Habitat Relationships Program. The distribution of California mammals, reptiles and amphibians.

E.W. Jameson, Jr. and H.J. Peeters, Mammals of California, University of California Press, Berkeley, California, 1988.

R.T. Peterson, 1969 A field Guide to Western Birds, Houghton Mifflin Company, Boston.

R.C. Stebbins, 1985, A Field Guide to Western Reptiles and Amphibians, Houghton Mifflin company, Boston.

Grenfell, W.E., Jr., and w.f. Laudenslayer, Jr., eds. q983. the distribution of California birds. California Wildlife/Habitat Relationships Program. Publ. #4. Calif. Dept. Fish and Game, Sacramento, and USDA For. Serv., San Francisco, CA.

RARE, ENDANGERED OR THREATENED SPECIES
KNOWN TO OCCUR IN THE PROJECT REGION¹

<u>Taxa</u>	<u>Status</u> ²	<u>Notes</u>
PLANTS		
Hoary Draba (<i>Draba cana</i>)	// List 2	A low herbaceous perennial herb occurring in rocky areas. Last observed in 1978 at the timberline on a north facing talus slope above a Whitebank Pine forest north of Lake Geneva.
Kobresia (<i>Kobresia myosuroides</i>)	// List 2	This mountain sedge is known to occur in moist habitats between 9,700 and 10,600 feet elevations. In California known only from Convict Basin.
Mono Lake Lupin (<i>Lupinus duranii</i>)	/C2/List 1B	A herbaceous perennial found only in disturbed areas of volcanic sand or gravel between 6500 - 8500 feet. Scattered plants of this species observed in 1981 between Mammoth Mountain and the highway to Minoret Summit from Mammoth Lakes.
Mono Milk Vetch (<i>Astragalus monoensis</i>)	R/CI/List 1B	A perennial legume found in gravelly or sandy flats, sometimes sheltered under and scrambling through low sage at the 7,500 to 7,900 elevations on the east slope of the Sierra Nevada. Known principally in the Lookout Mountain and Antelope Valley areas of Mono County.
BIRDS		
Northern Goshawk (<i>Accipiter gentilis</i>)	CSC3/ /	Known to breed throughout the Sierra Nevada Mountains at mid to higher elevations. Key habitats on north facing slopes near water. Known to nest in Mammoth Lakes area as recently as 1983. Locational information suppressed.

<u>Taxa</u>	<u>Status²</u>	<u>Notes</u>
Great Grey Owl (<i>Strix nebulosa</i>)	E/FSS2/	Forages in wet meadows and nests and roosts in nearby coniferous forests. Both old-growth and second-growth forest is used. Year around resident species. Active at times during day light hours. One owl observed in 1975 at Valentine Camp near Old Mammoth Lakes. Probable breeding habitat nearby, but no recent surveys have been done to evaluate breeding status.
Spotted Owl (<i>Strix Occidentalis</i>)	CSC2/T/	Resident in conifer, dense Redwood, old growth, multilayered mixed and Douglas Fir habitats from sea level to approximately 7,600 ft. elevations. Known to occur in Crystal Crag and Mammoth Mountain areas. Locational information suppressed
Yellow Warbler (<i>Dendroica petechia brewsteri</i>)	C5C2/ /	Known to occur in montane chaparral, in open Ponderosa Pine and mixed conifer habitats. Last known from area near Mammoth in 1923.
MAMMALS		
Pacific Fisher (<i>Martes pennanti pacifica</i>)	CSC3/FSS2/	Species preys on a variety of small to medium sized mammals in heavy stands of mixed species of native timber. Most recently seen 3.5 miles WNW of Mammoth Lakes in the vicinity of Mammoth Lodge in the 1970s.
Wolverine (<i>Gulo gulo</i>)	T/C2/	A large predator in high alpine habitats. Usually in open areas above timber line. Most sightings in California at the 8000 ft. level. Last observed in 1947 near Clover Leaf Lake.

¹Source:

California Natural Diversity Data Base (CNDDDB). Computer printout for four surrounding 7.5 minute quadrangle USGS maps in the project region (Old Mammoth, Bloody Mountain, Mammoth Mountain, Crystal Crag). June 30, 1990.

California Department of Fish and Game, Bird Species of Special Concern in California No. 78-1 (June 1978).

_____, Mammalian Species of Special Concern in California, Report 86-1 (June 1986).

_____, Special Animals List, April 1990.

²State/Federal/Other:

State:

California Endangered Species Act (1984), Native Plant Protection Act (1977), and the California Environmental Quality Act.

R = Rare. Plants that although not currently Threatened are in such small numbers or restricted habitats that they may become Threatened or Endangered if present conditions continue.

T = Threatened. Plants or animals likely to become Endangered in the foreseeable future in the absence of protection action(s).

E = Endangered. Seriously in danger of becoming extinct.

CCE = California Candidate for listing as Endangered.

CCT = California Candidate for listing as Threatened.

CSC# = California Department of Fish and Game "Species of Special Concern".

CFP = A California Department of Fish and Game "fully protected" species, as described in Section 4700 of Chapter 8, Section 5050 of Chapter 2, Division 6, Chapter 1, Section 5515.

Federal:

Federal Endangered Species Act of 1973, as amended.

E = Taxa formally listed as Endangered.

T = Taxa formally listed as Threatened

C1 = Candidate taxa for which there is enough information to support the biological appropriateness of proposing to list as Threatened or Endangered.

C2 = Candidate taxa for which there is biological information that indicates that proposing to list the taxa as Threatened or Endangered is possibly appropriate, but for which substantial data on biological vulnerability and threat(s) are not currently known or on file to support the immediate listing.

C3 = Taxa that are no longer under consideration for listing. There are three subcategories, depending on reason(s) for removal from consideration:

3A = Taxa believed to be extinct.

3B = Taxa with taxonomic problems that do not meet the Endangered Species Act definition of a "species."

3C = Taxa that are too common or widespread and/or those not subject to any identifiable threat(s).

PE = Proposed Endangered.

FSS = Federal (BLM and USFS) Sensitive Species.

1 = Category 1 Candidate for Federal listing. (Taxa for which the U.S. Fish and Wildlife Service has sufficient biological information to support a proposal to list as Endangered or Threatened.)

- 2 = Category 2 Candidate for Federal list. (Taxa which existing information indicates may warrant listing, but for which substantial biological information to support a proposed rule is lacking.)
- W = Watch list. Location information for these taxa is not computerized. The NDDDB is currently collecting distribution information but maintains manual files only.

Other:

Section 15380 of the California Environmental Quality Act [CEQA (September, 1983)] has a discussion regarding non-listed (State) taxa. This section states that a plant (or animal) must be treated as Rare or Endangered even if it is not officially listed as such. If a person (or organization) provides information showing that a taxa meets the State's definitions and criteria, then the taxa should be treated as such in an EIR.

The California Native Plant Society (CNPS) Inventory of Rare and Endangered Vascular Plants (1985).

List 1 = Plants of Highest Priority.

List 1A = Plants presumed Extinct in California.

List 1B = Plants Rare or Endangered in California and elsewhere.

List 2 = Plants Rare or Endangered in California, more common elsewhere.

List 3 = Plants for which more information is needed.

List 4 = Plants of limited distribution (a watch list).

Priority:

1. Face immediate extirpation in California.
2. Definitely in decline.
3. Vulnerable to extirpation due to small natural range.

³Suitable habitat for species maintenance and/or reproduction exists within project boundaries.

APPENDIX E.
Traffic Study

DRAFT

TRAFFIC STUDY FOR THE LODESTAR MASTER PLAN EIR

September, 1990

Prepared for:

EIP ASSOCIATES

Prepared by:

KAKU ASSOCIATES
1453 Third Street, Suite 400
Santa Monica, California 90401
(213) 458-9916

TABLE OF CONTENTS

I.	INTRODUCTION	1
	PROJECT DESCRIPTION	1
	STUDY SCOPE	4
	ORGANIZATION OF REPORT	6
II.	EXISTING CONDITIONS	7
	LAND USE	7
	ROADWAY SYSTEM	7
	EXISTING WINTER WEEKEND TRAFFIC VOLUMES	10
	EXISTING WINTER WEEKEND LEVELS OF SERVICE	11
III.	FUTURE TRAFFIC PROJECTIONS	20
	BASE STREET SYSTEM IMPROVEMENTS	20
	CUMULATIVE BASE TRAFFIC PROJECTIONS	22
	LODESTAR PROJECT TRAFFIC PROJECTIONS	34
	CUMULATIVE PLUS PROJECT TRAFFIC PROJECTIONS	36
IV.	TRAFFIC IMPACT ANALYSIS	39
	SIGNIFICANT TRAFFIC IMPACT CRITERIA	39
	CUMULATIVE BASE ANALYSIS	39
	CUMULATIVE PLUS PROJECT ANALYSIS	43
V.	MITIGATION MEASURES	46
	MITIGATION MEASURES	46
	EFFECT OF PROPOSED MITIGATION MEASURES	49
	LODESTAR PROJECT CONTRIBUTION	53
VI.	SITE ACCESS AND INTERNAL CIRCULATION ANALYSIS	57
	PROPOSED ACCESS AND INTERNAL CIRCULATION PLAN	57
	EVALUATION OF INTERNAL CIRCULATION SYSTEM	57
	EVALUATION OF SITE ACCESS POINTS	58
VII.	SUMMARY AND CONCLUSIONS	60
REFERENCES		
APPENDIX A - INTERSECTION CONFIGURATIONS		
APPENDIX B - WINTER WEEKEND PM PEAK HOUR INTERSECTION TURNING MOVEMENTS		
APPENDIX C - WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVEL OF SERVICE WORKSHEETS (UNDER SEPARATE COVER)		
APPENDIX D - TRAFFIC SIGNAL WARRANT WORKSHEETS (UNDER SEPARATE COVER)		

LIST OF TABLES

<u>NO.</u>		
1	LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS	13
2	LEVEL OF SERVICE DEFINITIONS FOR TWO-WAY STOP-CONTROLLED INTERSECTIONS	14
3	EXISTING WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE .	17
4	EXISTING WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVELS OF SERVICE	18
5	MAMMOTH MOUNTAIN SKI AREA EXPANSION PLAN	24
6	WINTER SATURDAY TRIP GENERATION RATES	26
7	ESTIMATED ALLOCATION OF ULTIMATE SKI AREA PAOT BY TRAVEL MODE . .	29
8	NET WINTER WEEKEND VEHICULAR TRIP GENERATION FOR CUMULATIVE PROJECTS	32
9	NET WINTER WEEKEND VEHICULAR TRIP GENERATION FOR PROPOSED PROJECT	35
10	WINTER WEEKEND DAILY STREET SEGMENT LEVEL OF SERVICE CUMULATIVE BASE	40
11	WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVELS OF SERVICE CUMULATIVE BASE AND CUMULATIVE PLUS PROJECT	41
12	WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE CUMULATIVE PLUS PROJECT	44
13	WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE CUMULATIVE PLUS PROJECT WITH MITIGATIONS	50
14	WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVELS OF SERVICE CUMULATIVE PLUS PROJECT WITH MITIGATIONS	51
15	PERCENT CONTRIBUTION OF PROJECT TRAFFIC TO CUMULATIVE WINTER WEEKEND DAILY TRAFFIC	54
16	PERCENT CONTRIBUTION OF PROJECT TRAFFIC TO CUMULATIVE WINTER WEEKEND PM PEAK HOUR TRAFFIC	55

LIST OF FIGURES

<u>NO.</u>		
1	STUDY AREA	2
2	PROPOSED PROJECT SITE PLAN	3
3	ESTIMATED EXISTING BASE DAILY TRAFFIC VOLUMES (WINTER WEEKEND) .	12
4	TOWN OF MAMMOTH LAKES CUMULATIVE DEVELOPMENTS	23
5	CUMULATIVE BASE DAILY TRAFFIC VOLUMES (WINTER WEEKEND)	33
6	PROJECT GENERATED DAILY TRAFFIC VOLUMES (WINTER WEEKEND)	37
7	CUMULATIVE PLUS LODESTAR DAILY TRAFFIC VOLUMES (WINTER WEEKEND) .	38

I. INTRODUCTION

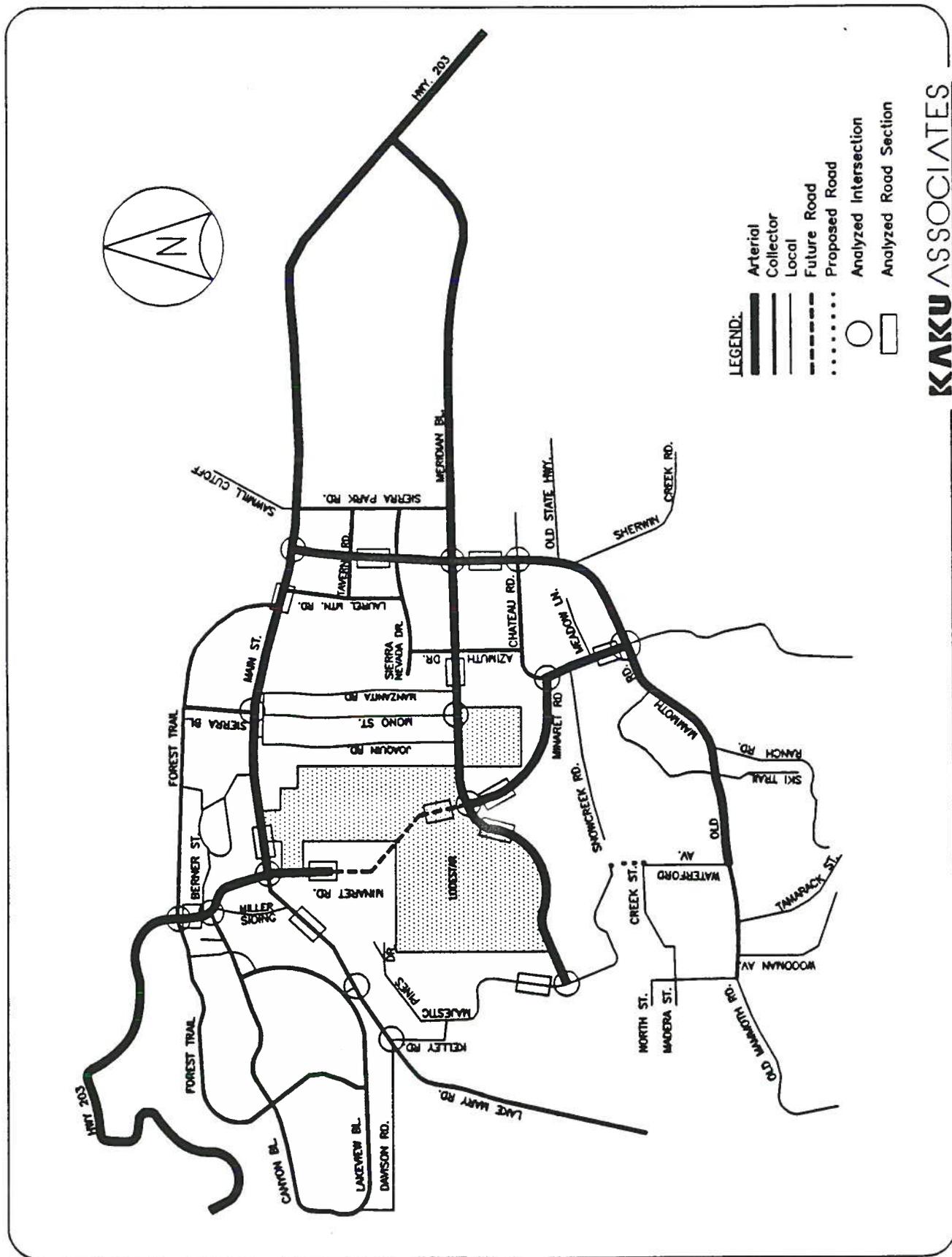
This report documents the findings of a traffic study conducted by Kaku Associates to evaluate the potential traffic impacts and circulation needs of the proposed Lodestar Master Plan in the Town of Mammoth Lakes, California. This study is part of an overall Environmental Impact Report (EIR) which is being prepared for the project by EIP Associates.

PROJECT DESCRIPTION

The proposed Lodestar development is a 210-acre master-planned resort community which would include the following components: single-family homes; resort condominiums; apartments for employee housing; lodges; resort hotels; a commercial village; an 18-hole golf course which would be built throughout the entire development area; and an overhead ski lift and ski back connecting the commercial village to Mammoth Mountain Ski Area (MMSA) Base 7. Figure 1 illustrates the project site location in relation to the existing street system, while Figure 2 illustrates the proposed project site plan.

As indicated on Figure 2, the project is divided into five development areas. The following summarizes the proposed development for each area:

- o Area 1
Area 1 would consist of 300 condominium units to be located on 20-acre site. The units would be constructed over subterranean parking.
- o Area 2
Area 2 would consist of 375 condominium and townhouse units to be located on a 23-acre site. Subterranean parking would be provided for the condominiums while the townhouses would have attached two-car garages.
- o Area 3
Area 3 would consist of 100 single-family homes and attached duplexes to be located on a 14-acre site. The duplexes would have attached two-car garages.



KAKU ASSOCIATES

FIGURE 1
STUDY AREA

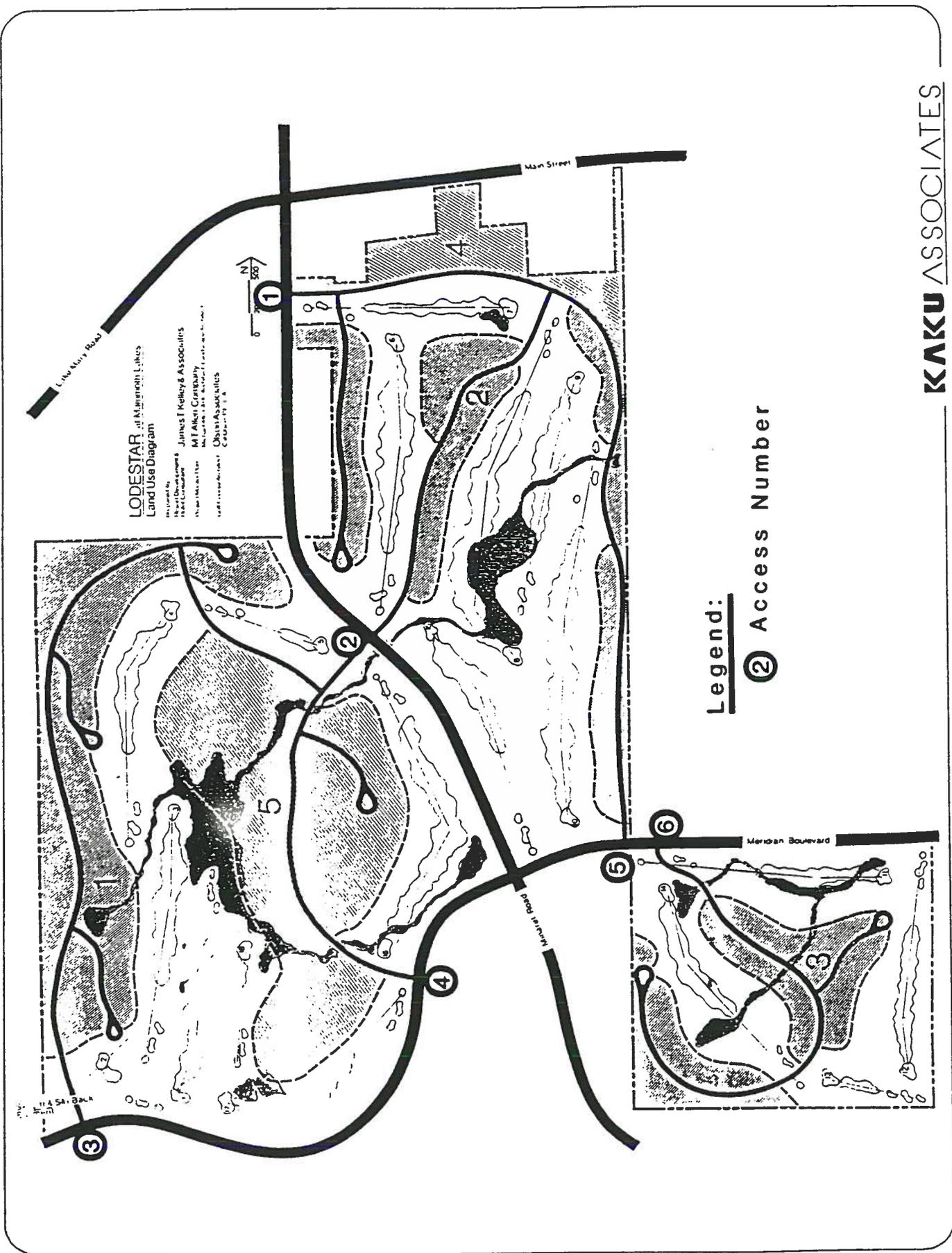


FIGURE 2
PROPOSED PROJECT SITE PLAN

- o Area 4
Area 4 would consist of 100 lodge and apartment (employee housing) units to be located on a 3-acre site. The number of lodge versus apartment units has not yet been determined.
- o Area 5
Area 5 is a 25-acre site to be developed with various mixed uses. The land uses proposed for this area are as follows:
 - 2 hotels with a combined total of 550 rooms and 550 underground parking spaces. The hotels would have various support facilities and amenities such as meeting rooms, restaurants, swimming pools, a fitness center, and tennis courts. The hotels would be situated on the north and south ends of Area 5.
 - A pedestrian-oriented commercial village totalling 80,000 square feet which is proposed to include retail shops, restaurants, movie theaters, and a skating rink. The village would be located between the two hotels. Parking for the village would be provided in part by the hotel underground parking structures and also by its own subterranean parking.
 - 150 resort condominiums to be built over the retail shops.
 - An overhead ski lift connecting the commercial village area with MMSA Base 7 (Chair 15), with provision for ski back.

Project access would be provided by a series of internal local streets, four of which would intersect Meridian Boulevard and two of which would intersect Minaret Road. Figure 2 indicates the proposed internal circulation plan.

STUDY SCOPE

The scope for this study was developed in conjunction with the Town of Mammoth Lakes. The base assumptions, technical methodologies and geographic coverage of the study were all identified as part of the study approach. The study is directed at the analysis of potential project-generated traffic impacts on the adjacent street system. Afternoon peak hour intersection capacity analyses are conducted in this study at the following fourteen intersections:

1. Minaret Road & Forest Trail
2. Minaret Road & Canyon Boulevard
3. Kelley Road & Lake Mary Road
4. Lakeview Road & Lake Mary Road
5. Minaret Road & Main Street/Lake Mary Road

6. Sierra Boulevard & Main Street
7. Old Mammoth Road & Main Street
8. Majestic Pines Drive & Meridian Boulevard
9. Minaret Road & Meridian Boulevard
10. Mono Street & Meridian Boulevard
11. Old Mammoth Road & Meridian Boulevard
12. Minaret Road & Chateau Road
13. Old Mammoth Road & Chateau Road
14. Minaret Road & Old Mammoth Road

In addition, daily volumes and capacities are evaluated for the following thirteen roadway segments:

1. Lake Mary Road - Lakeview Road to Minaret Road
2. Main Street - Minaret Road to Mono Street/Sierra Boulevard
3. Main Street - Mono Street/Sierra Boulevard to Old Mammoth Road
4. Majestic Pines Drive - Meridian Boulevard to Kelley Road
5. Meridian Boulevard - Majestic Pines Drive to Minaret Road
6. Meridian Boulevard - Minaret Road to Old Mammoth Road
7. Minaret Road - Old Mammoth Road to Chateau Road
8. Minaret Road - Chateau Road to Meridian Boulevard
9. Minaret Road - north of Meridian Boulevard (future segment)
10. Minaret Road - south of Main Street (future segment)
11. Minaret Road - Canyon Boulevard to Forest Trail
12. Old Mammoth Road - Chateau Road to Meridian Boulevard
13. Old Mammoth Road - Meridian Boulevard to Main Street

Also, potential project impacts at the proposed project access points onto Minaret Road and Meridian Boulevard are evaluated in the study.

In order to assess the potential impact of the project on future traffic operating conditions in the study area, the following traffic scenarios are analyzed in the study:

- o Existing Base Conditions
- o Cumulative Base Conditions (without the Lodestar Master Plan)
- o Cumulative Plus Project Conditions (with the Lodestar Master Plan)

Throughout the report, the traffic analysis concentrates on conditions for a peak Saturday during the winter ski season, which represents the most-heavily travelled and congested period on streets within Mammoth Lakes. Also, it is anticipated that the proposed Lodestar project would generate more traffic (and thus have greater traffic impacts) during the winter ski season than during the

summer months, as the project's proposed visitor lodging units would be more fully utilized during the winter ski season. Therefore, this study is concerned solely with peak winter conditions, on the assumption that summer traffic volumes would be adequately accommodated on roadways sized for winter conditions.

ORGANIZATION OF REPORT

The remainder of this report is divided into six parts. Chapter II presents an analysis of the existing street system and winter weekend traffic conditions within the study area. Forecasts of project-generated and future cumulative traffic volumes are presented in Chapter III. Potential impacts of the proposed project on cumulative traffic conditions are discussed in Chapter IV, while a description of mitigation measures is presented in Chapter V. Chapter VI includes a discussion of the proposed project site access and internal circulation plan. The results and conclusions of the traffic study are summarized in Chapter VII.

II. EXISTING CONDITIONS

A comprehensive data collection effort was undertaken to develop a detailed description of the existing conditions on and near the project site. The assessment of conditions relevant to this study include land use, streets and highways, traffic volumes, and operating conditions on the street system.

LAND USE

The proposed project site is currently undeveloped, consisting of both forested and open areas. The project site is centrally located in the Town of Mammoth Lakes, with a mixture of residential/lodging areas and undeveloped parcels to the east, south and west. Commercial and lodging uses are present along Main Street to the north of the project site.

ROADWAY SYSTEM

Regional Access

Regional access to the Town of Mammoth Lakes is provided by U.S. 395 via State Route 203 and the Mammoth Scenic Loop road. State Route 203 is an east-west, four-lane divided highway between the interchange with U.S. 395 and the Town. Within Mammoth Lakes, both Main Street (east of Minaret Road) and Minaret Road (north of Main Street) are designated as State Route 203. Main Street provides four travel lanes, while Minaret Road provides four lanes at Main Street and narrows to two lanes to the north of Main Street at Canyon Boulevard.

Local Roadways

Streets in Mammoth Lakes are classified in the Town of Mammoth Lakes General Plan according to the following definitions:

- o Arterials - Main traffic carrying facilities which accommodate relatively high volumes of traffic at speeds up to 40 miles per hour.
- o Collectors - Provide access from major residential, industrial, recreational and commercial areas to arterial streets.
- o Local Roads - Provide access from primarily residential areas to collector or arterial streets.
- o Rural Roads - Provide access to remote scenic or recreational areas.

Primary access to the Lodestar project site would be provided by Meridian Boulevard and Minaret Road. The following is a brief description of the key streets of interest in this study:

- o Main Street/Lake Mary Road - West of Minaret Road, this facility is known as Lake Mary Road and is a two-lane collector street. East of Minaret Road, this facility is known as Main Street and is also designated as State Route 203. Main Street is a major east/west arterial connecting with all three of the other arterials in Mammoth Lakes (Minaret Road, Old Mammoth Road, and Meridian Boulevard). Main Street/State Route 203 also provides the primary access into and out of the Mammoth Lakes area, connecting with U.S. 395 approximately three miles to the east of the Town. Main Street provides four travel lanes east of Minaret Road. A two-way continuous left-turn lane is provided between Mono Street/Sierra Boulevard and Sierra Park Boulevard. The intersections with Minaret Road and Old Mammoth Road are signalized.
- o Meridian Boulevard - Meridian Boulevard is a four-lane arterial between its western terminus at Majestic Pines Drive and Sierra Park Road east of Old Mammoth Road. Parking is permitted in this section in summer months. East of Sierra Park Road, Meridian Boulevard is striped for two lanes and connects with State Route 203, providing an alternative route into and out of Mammoth Lakes. The intersection with Old Mammoth Road is signalized.
- o Minaret Road - Minaret Road is designated as State Route 203 between Main Street and the Mammoth Mountain Ski Area and is designated as an arterial in the Town General Plan. Between Main Street and Canyon Boulevard, Minaret Road provides four travel lanes. From Canyon Road to the Mammoth Mountain Ski Area, Minaret is a two-lane rural highway. Between Main Street and the existing terminus of the Minaret Road to the south of Main Street, Minaret is striped for two lanes with a continuous left-turn lane. Minaret Road does not presently exist between this location and Meridian

Boulevard, although eventual completion of this section is envisioned in the General Plan. South of Meridian Boulevard to Old Mammoth Road, Minaret Road exists and is striped for two travel lanes. The intersection with Main Street/Lake Mary Road is signalized.

- o Old Mammoth Road - Old Mammoth Road is classified as an arterial. Between its northern terminus at Main Street and south of Chateau Road (at the Stove Restaurant), Old Mammoth Road has two travel lanes and a two-way continuous left-turn lane. Two lanes are provided from south of Chateau Road to the western terminus of the paved section of Old Mammoth Road (in Old Mammoth). West of this point to Lake Mary Road, Old Mammoth Road is narrow, unpaved, and closed during winter months. The segment of Old Mammoth Road between the Stove Restaurant and Ranch Road has recently been reconstructed on a new alignment. On-street parking is permitted on Old Mammoth Road between Main Street and the Stove Restaurant, in the summer only. The intersections of Old Mammoth Road with Meridian Boulevard and Main Street are signalized.
- o Majestic Pines Drive - Majestic Pines Drive is a two-lane local road between Monterey Pine Road/Kelley Road and its southern terminus adjacent to the private residential community of Snowcreek.
- o Kelley Road - Kelley Road is a two-lane local road which connects Majestic Pines Drive with Lake Mary Road.
- o Waterford Avenue - Waterford Avenue is a two-lane, discontinuous local road within the community of Old Mammoth. The road is about 20 feet wide and is paved between Old Mammoth Road and a point just north of Hill Street. From Hill Street to a point just north of Glasscock Street the road is unpaved.
- o Forest Trail - Forest Trail is a two-lane collector serving a residential areas to the east and west of Minaret Road. To the east it terminates at Main Street and to the west at Lakeview Boulevard.
- o Lakeview Boulevard - Lakeview Boulevard is classified as a collector. It provides two travel lanes and provides access between Warming Hut II and residential areas and Lake Mary Road (via Lakeview Road) and Minaret Road (via Canyon Boulevard). Near Warming Hut II at the western end of Lakeview Boulevard it turns north and becomes Canyon Boulevard.
- o Lakeview Road - Lakeview Road is a short, two-lane local road which connects Lakeview Boulevard with Lake Mary Road. Traffic travelling from Lake Mary Road to Warming Hut II must jog through Lakeview Road to obtain access to Lakeview Boulevard.
- o Canyon Boulevard - Canyon Boulevard is an east/west, two-lane collector. Near Warming Hut II at the western end of Canyon Boulevard it turns south and becomes Lakeview Boulevard. It provides access between Warming Hut II and residential areas and Minaret Road.
- o Miller Siding - This short two-lane local street provides a connection between Minaret Road and Lake Mary Road.

- o Sierra Boulevard - Sierra Boulevard is a north/south, two-lane collector that connects Forest Trail with Main Street.
- o Mono Street - Mono Street is a north/south local street serving a residential area. It is a paved street but is substandard in width and does not have any curbs or gutters. Mono Street intersects Meridian Boulevard to the south and connects with Main Street to the north via frontage road access points at Lupin Street and Manzanita Road.
- o Chateau Road - Chateau Road serves as a collector to the west of Old Mammoth Road and as a local street to the east of Old Mammoth Road. It provides two travel lanes.
- o Azimuth Drive - Azimuth Drive is a two-lane collector which intersects with Sierra Nevada Drive at its northern terminus and with Chateau Road at its southern terminus.
- o Sierra Nevada Drive - Sierra Nevada Drive is an east/west two-lane collector intersecting with Azimuth Drive, Laurel Mountain Road, Old Mammoth Road, and Sierra Park Road.

Diagrams illustrating the existing lane configurations at the fourteen analyzed intersections are contained in Appendix A.

EXISTING WINTER WEEKEND TRAFFIC VOLUMES

New 24-hour traffic counts were conducted at eleven of the thirteen analyzed roadway segments on the weekends of March 31 and April 7, 1990 (no counts were conducted for the two analyzed sections of Minaret Road north of Meridian Boulevard and south of Main Street, as Minaret Road currently exists immediately south of Main Street only and does not connect to Meridian Boulevard). New afternoon peak hour turning movement counts were conducted at the following eleven of the fourteen analyzed intersections on March 31 or April 7, 1990:

- o Kelley Road & Lake Mary Road
- o Lakeview Road & Lake Mary Road
- o Sierra Boulevard & Main Street
- o Old Mammoth Road & Main Street
- o Majestic Pines Drive & Meridian Boulevard
- o Minaret Road & Meridian Boulevard
- o Mono Street & Meridian Boulevard
- o Old Mammoth Road & Meridian Boulevard
- o Minaret Road & Chateau Road
- o Old Mammoth Road & Chateau Road
- o Minaret Road & Old Mammoth Road

PM peak hour turning movement counts conducted by BSI Consultants, Inc., on March 4, 1989, were obtained from the North Village Specific Plan EIR for the remaining three study intersections:

- o Minaret Road & Main Street/Lake Mary Road
- o Minaret Road & Canyon Boulevard
- o Minaret Road & Forest Trail

As indicated above, the majority of the new traffic counts conducted for this study were counted in late March or early April, during the spring skiing season. As this study is intended to evaluate traffic conditions for a peak winter ski weekend, the existing traffic counts were factored to estimate weekend conditions in the middle of the winter ski season. The factors used in this analysis were derived from a comparison of available historical traffic count data for sample locations to Mammoth Mountain Ski Area lift ticket sales data for the 1989 and 1990 ski seasons (obtained from the U.S. Forest Service). A regression analysis was performed to develop relationships between traffic volumes and lift ticket sales, with different equations developed depending upon the characteristics of the roadway (i.e., arterials serving commercial areas, roadways on access routes to MMSA base facilities, roadways primarily serving residential and lodging areas).

The resulting estimates of existing daily traffic volumes for a peak winter Saturday are illustrated on Figure 3, while the estimates of existing PM peak hour intersection turning movements are presented in Appendix B.

EXISTING WINTER WEEKEND LEVELS OF SERVICE

Level of Service Methodology

Level of service (LOS) is a qualitative measure used to describe the condition of traffic flow, ranging from excellent conditions at LOS A to overloaded conditions at LOS F. The Town of Mammoth Lakes' standard for acceptable level of service is LOS C or better. Level of service definitions are included in Tables 1 and 2 for signalized and unsignalized intersections, respectively.

TABLE 1
LEVEL OF SERVICE DEFINITIONS FOR SIGNALIZED INTERSECTIONS

<u>Level of Service</u>	<u>Volume/Capacity Ratio</u>	<u>Definition</u>
A	0.00 - 0.60	EXCELLENT. No vehicle waits longer than one red light and no approach phase is fully used.
B	0.61 - 0.70	VERY GOOD. An occasional approach phase is fully utilized; many drivers begin to feel somewhat restricted within groups of vehicles.
C	0.71 - 0.80	GOOD. Occasionally drivers may have to wait through more than one red light; backups may develop behind turning vehicles.
D	0.81 - 0.90	FAIR. Delays may be substantial during portions of the rush hours, but enough lower volume periods occur to permit clearing of developing lines, preventing excessive backups.
E	0.91 - 1.00	POOR. Represents the most vehicles intersection approaches can accommodate; may be long lines of waiting vehicles through several signal cycles.
F	Greater than 1.00	FAILURE. Backups from nearby locations or on cross streets may restrict or prevent movement of vehicles out of the intersection approaches. Tremendous delays with continuously increasing queue lengths.

Source: Transportation Research Board, *Transportation Research Circular No. 212, Interim Materials on Highway Capacity*, January 1980.

TABLE 2
LEVEL OF SERVICE DEFINITIONS FOR
TWO-WAY STOP-CONTROLLED INTERSECTIONS

<u>Available Reserve Capacity</u>	<u>Level of Service</u>	<u>Expected Delay to Minor Street Traffic</u>
400 or more	A	Little or no delay.
300 to 399	B	Short traffic delays.
200 to 299	C	Average traffic delays.
100 to 199	D	Long traffic delays.
0 to 99	E	Very long traffic delays.
Less than 0	F	Failure - extreme congestion.
(Any value)	F	Intersection blocked by external causes.

Source: Transportation Research Board, Highway Capacity Manual, Special Report 209, 1985.

The "Critical Movement Analysis-Planning" (CMA) (Transportation Research Board, 1980) method of intersection capacity analysis was used to determine the intersection volume to capacity (V/C) ratio and corresponding level of service for the turning movements and intersection characteristics at each of the signalized intersections in the study area. The CMA methodology normally uses a volume of 1,500 vehicles per lane per hour of green time as the capacity for a two-phase traffic signal, with per lane capacities of 1,425 and 1,375 vehicles per hour for signals with three and four critical signal phases, respectively. However, adverse weather and street surface conditions experienced in Mammoth Lakes during winter months can substantially reduce street and intersection capacities. This is due to such factors as reductions in speed and increased caution, use of tire chains, presence of snow removal equipment on the streets, etc., during poor weather conditions. To present a "worst case" analysis and ensure that the street system capacity is sufficient to accommodate traffic volumes during snow and ice conditions, a reduced capacity value of 1,275 vehicles per lane per hour of green was used in this study for two phase signals (15% lower than the standard capacity value), with a corresponding 15% reductions in capacity for three and four phase signals.

The "Two-Way Stop Control" (Transportation Research Board, 1985) method was used to conduct intersection capacity analyses for the unsignalized intersections. This methodology provides an estimate of the "available reserve capacity" and corresponding level of service for each of the constrained movements at the intersection. Under existing conditions, all but three of the analyzed intersections (Minaret Road/Main Street, Old Mammoth Road/Meridian Boulevard and Old Mammoth Road/Main Street) are unsignalized.

Levels of service for the analyzed roadway segments were determined based on a comparison of daily volumes and daily capacities, using procedures similar to those utilized in preparation of the Circulation Element for the Mammoth Lakes General Plan. These procedures are based on estimated two-way daily roadway capacity values of 12,500 vehicles per day (vpd) for a two-lane street, 17,500 vpd for a three-lane street (two through lanes plus a two-way continuous left-turn lane), 25,000 vpd for a four-lane arterial and 30,000 vpd for a five-lane street (four through lanes plus a two-way continuous left-turn lane). It should be noted that these values are slightly lower than typical daily capacity values

used for urban and suburban streets, and as such take into account the lower than average street capacities often experienced in Mammoth Lakes during winter months due to adverse weather and street surface conditions (as discussed above).

Existing Levels of Service

Table 3 shows the estimated existing daily levels of service on major streets in Mammoth Lakes for a typical winter Saturday, while the level of service worksheets are contained in Appendix C. As shown, all but two street segments are currently operating at acceptable levels of service (LOS C or better). Old Mammoth Road is operating at a poor LOS E between Meridian Boulevard and Main Street, and Minaret Road is operating at LOS F between Canyon Boulevard and Forest Trail.

Table 4 summarizes the estimated existing afternoon peak hour V/C ratio or available reserve capacity and corresponding level of service at each of the fourteen analyzed intersections for a typical winter Saturday. As indicated in the table, under estimated existing conditions, six of the fourteen analyzed intersections are currently operating at unacceptable levels of service (i.e. LOS D, E or F) during the PM peak hour. The signalized intersection of Old Mammoth Road/Meridian Boulevard operates at LOS D. The unsignalized intersections of Minaret Road/Forest Trail, Lakeview Road/Lake Mary Road and Old Mammoth Road/Chateau Road operate at LOS D, while Sierra Boulevard/Main Street and Minaret Road/Canyon Boulevard respectively operate at LOS E and F.

It should be recognized that the poor operating conditions indicated for these five unsignalized intersections reflect conditions only for the stop-controlled vehicles waiting to turn from the side street onto the major street, and do not represent conditions for the intersection as a whole. Traffic on the major street is not stopped.

It is interesting to note that the estimated existing traffic volumes at two of the five unsignalized intersections currently operating at poor levels of service (Minaret Road/Canyon Boulevard and Lakeview Road/Lake Mary Road) are sufficiently heavy to satisfy standard traffic signal warrants, indicating that installation

of traffic signals at these two locations could potentially be considered (see Appendix D). However, it should be noted that circulation improvements proposed as part of the North Village Specific Plan (see Chapter III), if implemented, would eliminate the Minaret Road/Canyon Boulevard intersection.

III. FUTURE TRAFFIC PROJECTIONS

In order to properly analyze the potential impact of the proposed project traffic on the local street system, it was necessary to develop estimates of future traffic conditions both with and without the project. Traffic projections for the Cumulative Base scenario (representing future conditions without the project), were developed along with forecasts for the Cumulative Plus Project scenario (representing future conditions with the project). These projections were developed assuming that certain street system improvements contained in the Mammoth Lakes General Plan and programmed for implementation would be in place.

BASE STREET SYSTEM IMPROVEMENTS

The analysis of cumulative traffic conditions in this study assumes implementation of several planned roadway improvements. These improvements include those that are planned by the Town of Mammoth Lakes and those that are proposed as part of the North Village Specific Plan (a proposed project included in the cumulative analysis for this study). The following summarizes these public and private improvements.

Town of Mammoth Lakes Improvements

The following roadway improvements are programmed for implementation by the Town of Mammoth Lakes:

- o Minaret Road - The Town of Mammoth Lakes is currently in the midst of constructing Minaret Road as a two-lane roadway between its present terminus just south of Main Street and Meridian Boulevard.
- o Minaret Road/Main Street/Lake Mary Road - In addition to construction of Minaret Road south of Main Street, the following localized intersection improvements are planned: widen and/or restripe the southbound Minaret

212 condominiums in The Ranch; and an additional 357 condominiums near Old Mammoth Road.

- o Juniper Ridge - Resort development consisting of 120 condominiums, 44 single-family dwelling units, a 250-room resort hotel and 35,000 square feet of resort commercial space.
- o Deer Creek - 195-room hotel.
- o Shady Rest - 120 condominiums.
- o Bluffs - 60 single-family dwelling units.
- o Gateway - 75 single-family dwelling units.

Cumulative Traffic Generation and Distribution

Future traffic generation was estimated for the cumulative developments listed above through a methodology developed specifically for use in Mammoth Lakes. This methodology was designed to take into account the unique trip-making characteristics associated with the ski resorts and the resort lodging developments, and the interrelationships between the two.

The methodology consisted of the following basic steps:

- o For Proposed Visitor Lodging (Hotel Rooms and Condominium Units)
 1. Generate total trips for proposed visitor lodging, using standard trip generation rates for the resort hotel rooms and a trip generation rate developed specifically for the resort condominium units (Table 6).
 2. Separate visitor lodging trip generation into two parts: trips to/from ski areas; and trips not associated with ski areas.
 3. Reduce visitor lodging to/from ski area portion of trips due to non-automobile modes (walk-ins, transit bus, tour bus). The mode splits for ski-related trips were estimated as part of the ski area PAOT allocation process described below.
 4. Distribute remaining visitor lodging to/from ski area vehicular trips to the various ski base facilities (MMSA and Sherwin Ski Area).

TABLE 6
WINTER SATURDAY TRIP GENERATION RATES

Land Use	Average Daily Rate	PM Peak Hour		
		Rate	% In	% Out
<u>RESORT HOTEL</u>				
Base Rate: Outside Walk-In Zone ^a (trips per room)	8.0	0.56	60%	40%
Effective Rate: Within Walk-In Zone ^b (trips per room)	7.2	0.36	51%	49%
<u>RESORT CONDOMINIUM</u>				
Base Rate: Outside Walk-In Zone ^c (trips per DU)	5.6	1.18	60%	40%
Effective Rate: Within Walk-In Zone ^b (trips per DU)	4.4	0.87	54%	46%
<u>OTHER USES</u>				
Single-Family Residential ^d (trips per DU)	10.1	1.01	63%	37%
Employee Housing (apartment) ^d (trips per DU)	6.1	0.67	68%	32%
Commercial ^d	[e]	[e]	49%	51%

Notes:

- a. Source: San Diego Association of Governments, San Diego Traffic Generators, January 1990 update.
- b. Modified rate for resort lodging within one-quarter mile walk-in zone surrounding ski base facilities or overhead lifts.
- c. Trip generation rates for resort condominiums not available from standard sources. Resort condominium rate derived assuming 1.6 ski and 4 non-ski vehicle trips per day per condominium unit, based on condominium visitor occupancy, skier to total visitor ratio, PAOT to SAOT ratio, mode split and peak percent factors as described in text.

approach to provide a left-turn lane, a shared through/left-turn lane, and a shared through/right-turn lane; widen and/or restripe the northbound Minaret approach to provide a left-turn lane, a through lane, and a shared through/right-turn lane.

- o Minaret Road/Meridian Boulevard - Stripe all four approaches to provide the following configurations: one left-turn lane, one through lane, and one shared through/right-turn lane on the westbound and eastbound Meridian approaches; one left-turn lane and one shared through/right-turn lane on the northbound Minaret approach; one left-turn lane, one through lane, and one right-turn lane on the southbound Minaret approach. Also, install a four-phase signal with protected left-turn phasing for all four approaches.

North Village Specific Plan Circulation Improvements

The following modifications to the roadway system within the North Village Specific Plan area are proposed as part of the North Village Specific Plan:

- o Minaret Road - Widen Minaret Road between Main Street and a point just north of Forest Trail to provide four travel lanes and a continuous left-turn lane. The two northbound lanes would merge into one lane just north of Forest Trail, while the second southbound lane would begin at Forest Trail. The improvements along Minaret Road would also include installation of a two-phase traffic signal at the Minaret Road/Forest Trail intersection, with a continuous right-turn arrow for traffic turning from eastbound Forest Trail into the second southbound Minaret Road lane originating at Forest Trail.
- o Lakeview Road/Lake Mary Road - Modify grades at the intersections of Lakeview Road/Lake Mary Road and Lakeview Road/Lakeview Boulevard. Also, install a traffic signal.
- o Canyon Boulevard - Abandon Canyon Boulevard between Hillside Drive and Minaret Road (eliminating its intersections with Spring Lane and Minaret Road), with traffic re-routed to Forest Trail. Reconstruct the intersection of Hillside Drive/Canyon Boulevard to a higher elevation. Realign the intersection of Hillside Drive and Forest Trail.
- o Miller Siding - Abandon Miller Siding as a public road and lower grades to provide better access to the underground parking garage which is planned to be constructed as part of the North Village West Plaza.
- o Berner Street - Closure of a portion of Berner Street just east of Minaret Road, with traffic re-routed to Forest Trail.

CUMULATIVE BASE TRAFFIC PROJECTIONS

Description of Cumulative Projects

The Cumulative Base traffic projections include traffic expected to be generated by the following sources: proposed expansion of the Mammoth Mountain Ski Area (MMSA) to 24,000 skiers-at-one-time (SAOT); construction of the proposed Sherwin Ski Area at a capacity of 8,000 SAOT; and a number of residential/lodging/commercial projects proposed for development throughout the Town. Information regarding these projects was obtained from the Mammoth Lakes General Plan and from previous traffic and environmental studies conducted in the Town, and was updated by the Town of Mammoth Lakes Planning Department. These projects are described below, and their locations are illustrated on Figure 4:

- o Mammoth Mountain Ski Area expansion - The proposed MMSA expansion plan would increase the skier capacity from an estimated current capacity of approximately 19,000 SAOT to an ultimate 24,000 SAOT, consistent with the Mammoth Lakes General Plan. Table 5 summarizes the estimated existing and ultimate SAOT by base facility. The expansion plan provides for a substantial increase in skier capacity at Bases 4 and 7, with slight decreases at Bases 1 and 2. New overhead lifts are anticipated which would carry skiers between the proposed North Village Specific Plan development and Base 2, and between the proposed Lodestar Master Plan development and Base 7.
- o Sherwin Ski Area (Alternative #6-Preferred Alternative) - 8,000 SAOT design capacity with a base lodge located adjacent to and east of Snowcreek Village. Parking would be provided for 2,000 automobiles and 30 buses, with access obtained via extensions of Minaret Road and Sherwin Creek Road.
- o North Village Specific Plan - Proposed resort development located on both sides of Minaret Road in the vicinity of Main Street, to include a total of 1,750 resort hotel rooms, 50 motel rooms, 400 condominium units and 80,000 square feet of commercial space. An overhead lift would be constructed to transport skiers from North Village to MMSA Base 2 (Warming Hut II), with a ski back provision. A shuttle bus system is proposed to provide internal circulation within the North Village Specific Plan area. Also, the circulation plan proposed as part of the North Village Specific Plan would implement the series of street system changes described previously under base street system improvements.
- o Snowcreek Master Plan (future development) - Proposed future phases of the Snowcreek resort development include a total of up to: 1,200 resort hotel rooms, 574 condominium units and 150,000 square feet of commercial space in the Snowcreek Village area; 288 condominiums in Snowcreek V;

TABLE 3
EXISTING WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE

LINK #	STREET	SEGMENT	# OF LANES	DAILY CAPACITY	EXISTING CONDITIONS		
					VOLUME	V/C	LOS
1.	Lake Mary Rd.	Lakeview Rd. to Minaret Rd.	2	12,500	9,400	0.75	C
2.	Main St.	Minaret Rd. to Sierra Blvd.	4	25,000	19,500	0.78	C
3.	Main St.	Forest Trail to Old Mammoth Rd.	5	30,000	19,800	0.66	B
4.	Majestic Pines Dr.	n/o Meridian Blvd.	2	12,500	3,600	0.28	A
5.	Meridian Blvd.	Majestic Pines Dr. to Minaret Rd.	4	25,000	5,300	0.21	A
6.	Meridian Blvd.	Manzanita Rd. to Azimuth Dr.	4	25,000	7,500	0.30	A
7.	Minaret Rd.	Old Mammoth Rd. to Meadow Ln.	2	12,500	5,400	0.43	A
8.	Minaret Rd.	Chateau Rd. to Meridian Blvd.	2	12,500	1,600	0.12	A
11.	Minaret Rd.	Canyon Blvd. to Forest Trail	2	12,500	12,900	1.03	F*
12.	Old Mammoth Rd.	Chateau Rd. to Meridian Blvd.	3	17,500	10,900	0.62	B
13.	Old Mammoth Rd.	Sierra Nevada Dr. to Tavern Rd.	3	17,500	17,200	0.98	E*

Note:

* Does not meet Town of Mammoth Lakes level of service standard.

TABLE 4
EXISTING WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVELS OF SERVICE

<u>Intersection</u>	<u>PM Peak Hour V/C Ratio or Reserve Capacity</u>	<u>LOS</u>
1. Minaret Rd. & Forest Trail	+117 ^a	D*
2. Minaret Rd. & Canyon Blvd.	-87 ^a	F*
3. Kelley Rd. & Lake Mary Rd.	+558 ^a	A
4. Lakeview Rd. & Lake Mary Rd.	+132 ^a	D*
5. Minaret Rd. & Main St.	0.57 ^b	A
6. Sierra Blvd. & Main St.	+11 ^a	E*
7. Old Mammoth Rd. & Main St.	0.68 ^b	B
8. Majestic Pines Dr. & Meridian Blvd.	+487 ^a	A
9. Minaret Rd. & Meridian Blvd.	+472 ^a	A
10. Mono St. & Meridian Blvd.	+322 ^a	B
11. Old Mammoth Rd. & Meridian Blvd.	0.84 ^b	D*
12. Minaret Rd. & Chateau Rd.	+678 ^a	A
13. Old Mammoth Rd. & Chateau Rd.	+144 ^a	D*
14. Minaret Rd. & Old Mammoth Rd.	+287 ^a	C

Notes:

- a. Intersection controlled by stop-signs on the minor street approaches, with free-flowing traffic on the major street. Indicates available reserve capacity and LOS for the most constrained movements on the minor street approaches.
 - b. Intersection controlled by signal. Indicates volume/capacity ratio and LOS for intersection operation as a whole.
- * Does not meet Town of Mammoth Lakes level of service standard.

TABLE 6 (continued)
WINTER SATURDAY TRIP GENERATION RATES

Notes (continued):

- d. Source: Institute of Transportation Engineers, Trip Generation, 4th Edition, 1987.
- e. Trip generation rates for retail/commercial uses vary according to the size of the development. Trip generation calculated using the following formulas:

Daily Trips: $\text{Ln}(T) = 0.65 \times \text{Ln}(A) + 5.92$
PM Peak Hour Trips: $\text{Ln}(T) = 0.52 \times \text{Ln}(A) + 4.04$

where:

Ln = Natural logarithm,

T = Two-way volume of traffic (total trip-ends), and

A = Area in 1,000 gross square feet of leasable area.

5. Distribute visitor lodging non-ski trips to commercial areas, including any internal commercial uses proposed within the cumulative projects.
- o For Proposed Single-Family Residential Units and Employee Housing Units
 1. Generate total trips using standard trip generation rates (Table 6).
 2. Distribute trips based on geographic distribution of commercial areas and employment centers throughout the Town.
 - o For Proposed Resort-Related Commercial Development
 1. Generate total vehicle trips using standard trip generation factors (Table 6).
 2. Reduce vehicular trip generation by 50% to account for internal overlap between the commercial development and on-site visitor lodging and for potential diversions from traffic already on adjacent streets.
 3. Distribute net remaining commercial-generated trips primarily to residential areas throughout the Town.
 - o For Proposed MMSA Expansion and Sherwin Ski Area
 1. Determine portion of projected ultimate persons-at-one-time (PAOT) at each MMSA base and Sherwin Ski Area which would be walk-ins from a one-quarter mile ring surrounding the base facility. For MMSA Bases 2 and 7, the amount which would arrive via the proposed overhead lifts from North Village and Lodestar, respectively, was also determined.
 2. The remaining PAOT (non-walk-in) was allocated to automobile, drop-off, tour bus and transit bus modes. The automobile allocation was derived based on the proposed ultimate parking supply to be provided at the MMSA base facilities and Sherwin Ski Area (it should be noted that no new parking spaces are proposed to be provided as part of the MMSA expansion plan). Drop-off allocations were estimated assuming that drop-offs represent seven percent of the total PAOT. Tour bus allocations were determined based on projections obtained from previous studies of 100 tour buses at MMSA Base 1 and 30 at Sherwin. All other PAOT was assumed to utilize the public transit system. Table 7 summarizes the estimated allocation of ultimate PAOT to travel mode for each of the ski base facilities.
 3. Vehicle trip generation was determined for each base facility from the PAOT allocation based on assumed vehicle occupancy factors.
 4. The overall net increase in future vehicular trip generation of the MMSA base facilities and Sherwin Ski Area was compared to the

TABLE 7
ESTIMATED ALLOCATION OF ULTIMATE SKI AREA PAOT BY TRAVEL MODE

Ski Base	Total Ultimate SAOT	Total Ultimate PAOT	Estimated Ultimate PAOT by Travel Mode				# of Parking Spaces		
			Walk-Ins	Overhead Lift	Transit	Tour Bus Drop-Off		Auto-mobile	
MMSA 1	7,500	8,025	1,800	n/a	205	4,000	550	1,470	460
MMSA 2	6,500	6,955	1,760	3,065	695	*	475	960	300
MMSA 4	2,100	2,245	*	n/a	205	*	155	1,890	590
MMSA 7	7,900	8,455	3,230	1,110	2,000	*	575	1,535	480
MMSA Subtotal	24,000	25,680	6,790	4,175	3,105	4,000	1,755	5,855	1,830
Sherwin Ski Area	8,000	8,560	2,975	n/a	600	1,200	585	3,200	1,000
Total	32,000	34,240	9,765	4,175	3,705	5,200	2,340	9,055	2,830

Note: All estimates rounded to nearest five PAOT.

estimated aggregate net increase in ski-related trip generation of the proposed future lodging facilities. It should be recognized that these trip types are in fact two ends of the same visitor lodging to ski area trips. As a result, the future growth in ski area-generated traffic was assigned from the proposed future visitor lodging facilities. The trips were not assigned again from the ski area end, as this would have resulted in a double-count of the lodging to ski area trips. (It is of interest to note that the estimated aggregate net increase in ski-related trip generation of the proposed future lodging facilities, as projected using the above methodology, is slightly higher than the projected overall net increase in vehicular trip generation of the MMSA expansion and Sherwin Ski Area. As such, assigning these trips from the lodging end, rather than from the ski area end, results in a conservative analysis.)

The following factors were assumed in this process:

- o Average condominium visitor occupancy of 4.15 persons per unit, with 100% of units occupied.
- o Average hotel/motel visitor occupancy of 2.65 persons per room, with 100% of rooms occupied.
- o 75% of all visitors to the Town on a winter Saturday actually ski.
- o Non-skier to skier ratio of 0.07 at the slopes, yielding a ratio of 1.07 PAOT per SAOT.
- o 75% of skiers staying in lodging within a one-quarter mile radius of a base facility (MMSA or Sherwin) or overhead lift (North Village or Lodestar) would walk to the nearby base facility/lift. The remaining 25% would travel via automobile or bus to another base facility (MMSA or Sherwin).
- o All skiers staying in lodging outside of a one-quarter mile radius of a base facility or overhead lift would travel via automobile or bus to a base facility (MMSA or Sherwin).
- o Average automobile occupancy for skiers travelling to and from the ski area by private automobile of 3.2 skiers per automobile.
- o Average peak period transit bus occupancy of 40 passengers per bus.
- o Average peak period tour bus occupancy of 40 passengers per bus.
- o 7% of all SAOT would be dropped-off and picked-up via private automobile at the ski area.
- o 52% of the daily SAOT would be in transit during the PM peak hour, outbound from the base facility (MMSA or Sherwin).

The above factors were utilized in combination with an assessment of the walk-in potential for each base facility and overhead lift (determined from an evaluation of the amount of existing and potential future lodging within one-quarter mile of each facility), as indicated on Table 7, to develop two sets of mode split factors for visitor lodging to ski area trips: one for trips between the ski areas and visitor lodging located within the one-quarter mile walk-in zone; and one for trips between the ski areas and visitor lodging located outside of the one-quarter mile walk-in zone, as follows:

Mode	Mode Split	
	Lodging Within Walk-In Zone	Lodging Outside Walk-In Zone
Walk-In	75%	0%
Transit Bus	5%	18%
Tour Bus	6%	26%
Drop-Off	3%	11%
Automobile	11%	45%
Total	100%	100%

These mode split estimates were applied to the base trip generation rates for the resort hotel and resort condominium uses to derive effective trip generation rates for visitor lodging located within the one-quarter mile walk-in zone, which are also indicated in Table 6.

The resulting estimates of net vehicular trip generation for each of the cumulative development projects is summarized on Table 8. As indicated on the table, the seven cumulative development projects are projected to generate a net total of approximately 46,980 daily vehicle trips on a peak winter Saturday, of which approximately 4,415 would be during the afternoon peak hour. As discussed previously, these trips include future trips generated by the MMSA expansion and the Sherwin Ski Area. Thus, in order to avoid double-counting the ski area trips, the MMSA and Sherwin Ski Area trips are not added to the cumulative total indicated on the table.

Cumulative Base Traffic Forecasts

Figure 5 illustrates the resulting projection of winter Saturday daily traffic volumes for the Cumulative Base scenario, assuming implementation of the base

TABLE 8

NET WINTER WEEKEND VEHICULAR TRIP GENERATION FOR CUMULATIVE PROJECTS

Name/Location	Land Use	Size	Daily Trips	PM Peak Hour		
				In	Out	Total
North Village	Hotel (walk-in)	200 rms	1,600	70	40	110
	Hotel (non-walk-in)	1,550 rms	11,190	280	275	555
	Motel	50 rms	360	10	10	20
	Condominiums (walk-in)	40 du	220	25	20	45
	Condominiums (non-walk-in)	360 du	1,590	170	145	315
	Commercial	80,000 sf	3,210	135	140	275
	Total		18,170	690	630	1,320
Snowcreek	Resort Hotel (walk-in)	1,200 rms	8,660	220	210	430
	Condominiums (walk-in)	575 du	2,430	270	230	500
	Condominiums (non-walk-in)	856 du	4,790	605	405	1,010
	Commercial	150,000 sf	4,840	190	195	385
	Total		20,720	1,285	1,040	2,325
Juniper Ridge	Resort Hotel (walk-in)	250 rms	1,810	45	45	90
	Condominiums (walk-in)	120 du	510	55	50	105
	Commercial	35,000 sf	1,880	90	90	180
	Single Family	44 du	440	30	15	45
	Total		4,640	220	200	420
Deer Creek	Resort Hotel (walk-in)	195 rms	1,410	35	35	70
Shady Rest	Condominiums (non-walk-in)	120 du	670	85	55	140
Bluffs	Single Family	60 du	610	40	20	60
Gateway	Single Family	75 du	760	50	30	80
	Net Total		46,980	2,405	2,010	4,415

Notes:

Daily trips rounded to nearest ten vehicles.

Peak hour trips rounded to nearest five vehicles.

street system improvements and the cumulative projects described above. The projected Cumulative Base PM peak hour intersection turning movements are presented in Appendix B.

LODESTAR PROJECT TRAFFIC PROJECTIONS

Projection of traffic volumes generated by the proposed Lodestar project used the same general process of trip generation, trip distribution and traffic assignment as used above in the projection of traffic for the cumulative projects.

Project Traffic Generation

Traffic generation estimates for the proposed project were developed using the methodology, assumptions and trip generation rates developed for use in the cumulative projects analysis (and shown in Table 6). For this analysis, all of the 550 resort hotel rooms and 150 resort condominium units proposed in Lodestar Area 5 were assumed to be within the one-quarter mile walk-in zone surrounding the proposed overhead lift from the commercial village to MMSA Base 7. One-half (150) of the 300 resort condominium units proposed in Lodestar Area 1 were assumed to be within the one-quarter mile walk-in zone surrounding MMSA Base 7.

The resulting estimates of net vehicular trip generation for the proposed Lodestar project are summarized on Table 9. As indicated on the table, the project is projected to generate a net total of approximately 13,160 daily vehicle trips on a peak winter Saturday, of which approximately 1,515 would be during the afternoon peak hour.

Project Traffic Distribution and Assignment

The geographic distribution of traffic expected to be generated by the proposed project was determined using the same factors described previously for the cumulative projects. Ski-related traffic generated by the resort hotel, motel and condominium elements of the project was distributed to the various ski base

TABLE 9

NET WINTER WEEKEND VEHICULAR TRIP GENERATION FOR PROPOSED PROJECT

Land Use	Size	Daily Trips	PM Peak Hour		
			In	Out	Total
Resort Hotel (walk-in)	550 rms	3,970	100	95	195
Motel	50 du	400	20	10	30
Condominiums (walk-in)	300 du	1,320	140	120	260
Condominiums (non-walk-in)	525 du	2,940	370	250	620
Single Family	100 du	1,010	65	35	100
Employee Housing	50 du	310	25	10	35
Commercial Village	80,000 sf	3,210	135	140	275
Total		13,160	855	660	1,515

Notes:

Daily trips rounded to nearest ten vehicles.
 Peak hour trips rounded to nearest five vehicles.

facilities (MMSA and Sherwin). Non-ski-related traffic generated by the resort hotel, motel and condominium elements of the project was distributed to commercial areas throughout the Town as well as to the resort commercial uses proposed within the Lodestar project. Traffic generated by the single-family residential and employee housing elements of the project was distributed to commercial and employment areas, while the net external traffic generated by the commercial village was distributed primarily to residential areas throughout the Town.

Figure 6 illustrates the assignment of the project-generated winter weekend daily traffic to the roadway system, while Appendix B summarizes the project-generated winter weekend PM peak hour traffic at the analyzed intersections.

CUMULATIVE PLUS PROJECT TRAFFIC PROJECTIONS

The traffic expected to be generated by the Lodestar project was added to the projected Cumulative Base traffic volumes illustrated earlier on Figure 5 and in Appendix B. Figure 7 illustrates the resulting projections of winter weekend daily traffic volumes for the Cumulative Plus Project scenario, while Appendix B summarizes the projected PM peak hour intersection volumes.

IV. TRAFFIC IMPACT ANALYSIS

The previous chapter described the development of the traffic forecasts of future conditions both with and without the proposed project. In this chapter, intersection and roadway segment capacity analyses are conducted for both scenarios to assess the potential impact of the proposed project-generated traffic on the local street system.

SIGNIFICANT TRAFFIC IMPACT CRITERIA

As indicated, this traffic analysis was conducted as part of the overall EIR to determine if the proposed project-generated traffic would have a significant impact at any of the fourteen intersections or thirteen roadway segments that have been identified. For the purposes of this study, the project is considered to have a significant traffic impact if it contributes traffic to an intersection or roadway segment which is projected to operate at an unacceptable level of service (i.e., LOS D, E or F) after the addition of the project traffic.

Using this criteria, the project would not have a significant impact on an intersection or roadway segment if it is operating at an acceptable level of service (i.e., LOS C or better) after the addition of project regardless of the volume of traffic which is added to the intersection or roadway segment.

CUMULATIVE BASE ANALYSIS

The Cumulative Base traffic volumes illustrated in Figure 5 and Appendix B were analyzed using the same level of service methodologies used to assess existing conditions (and described in Chapter II) to determine the projected winter weekend daily and peak hour levels of service for the thirteen study roadway segments and fourteen study intersections. Tables 10 and 11 summarize the

TABLE 10

WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE
CUMULATIVE BASE

LINK #	STREET	SEGMENT	# OF LANES	DAILY CAPACITY	CUMULATIVE BASE CONDITIONS		
					VOLUME	V/C	
1.	Lake Mary Rd.	Lakeview Rd. to Minaret Rd.	2	12,500	15,800	1.26	F*
2.	Main St.	Minaret Rd. to Sierra Blvd.	4	25,000	26,200	1.05	F*
3.	Main St.	Forest Trail to Old Mammoth Rd.	5	30,000	24,000	0.80	C
4.	Majestic Pines Dr.	n/o Meridian Blvd.	2	12,500	3,200	0.26	A
5.	Meridian Blvd.	Majestic Pines Dr. to Minaret Rd.	4	25,000	11,100	0.44	A
6.	Meridian Blvd.	Manzanita Rd. to Azimuth Dr.	4	25,000	13,000	0.52	A
7.	Minaret Rd.	Old Mammoth Rd. to Meadow Ln.	2	12,500	15,000	1.20	F*
8.	Minaret Rd.	Chateau Rd. to Meridian Blvd.	2	12,500	12,600	1.01	F*
9.	Minaret Rd.	n/o Meridian Blvd.	2	12,500	14,400	1.15	F*
10.	Minaret Rd.	s/o Main St.	2	12,500	14,500	1.16	F*
11.	Minaret Rd.	Berner St. to Forest Trail	5	30,000	16,400	0.55	A
12.	Old Mammoth Rd.	Chateau Rd. to Meridian Blvd.	3	17,500	19,300	1.10	F*
13.	Old Mammoth Rd.	Sierra Nevada Dr. to Tavern Rd.	3	17,500	20,500	1.17	F*

Note:

* Does not meet Town of Mammoth Lakes level of service standard.

As indicated in Table 11, poor PM peak hour levels of service are projected under Cumulative Plus Project conditions for the same eleven intersections which are projected to operate poorly under the Cumulative Base conditions. The addition of project-generated traffic would result in a decline in level of service from D to E at Old Mammoth Road/Main Street, Minaret Road/Meridian Boulevard and Mono Street/Meridian Boulevard, and from E to F at Minaret Road/Main Street. The project-generated traffic is projected to increase V/C ratios at the signalized intersections from between 0.02 (at Lakeview Road/Lake Mary Road) to 0.25 (at Minaret Road/Main Street), and would also contribute to declines in operating conditions at the unsignalized intersections. The intersections of Kelley Road/Lake Mary Road and Majestic Pines Drive/Meridian Boulevard are projected to continue to operate good levels of service with the addition of project traffic.

V. MITIGATION MEASURES

The traffic impact analysis in Chapter IV determined that unacceptable levels of service would be experienced on peak winter Saturdays along portions of Lake Mary Road, Main Street, Minaret Road and Old Mammoth Road on a daily basis and at eleven of the fourteen analyzed intersections during the afternoon peak hour, under both Cumulative Base and Cumulative Plus Project conditions. These conditions result from the substantial amount of new traffic which would be generated by the cumulative projects as well as by the proposed Lodestar project. The proposed project is expected to contribute traffic to each of the locations which are projected to operate at poor levels of service under the cumulative conditions.

Therefore, a series of street system improvements have been developed in an attempt to achieve acceptable operating conditions throughout the roadway system with the projected future traffic volumes. These mitigation measures are described below and are illustrated in Appendix A. Where possible, these mitigations are consistent with roadway designations as contained in the Circulation Element of the Mammoth Lakes General Plan. Also, these improvements would be in addition to the roadway improvements either currently programmed by the Town of Mammoth Lakes or proposed as part of the North Village Specific Plan and assumed to be implemented in the Cumulative Base scenario (as described in Chapter III).

MITIGATION MEASURES

Major Roadway Improvements

- o Minaret Road (Main Street/Lake Mary Road to south of Old Mammoth Road) - Widen Minaret Road between Main Street/Lake Mary Road and a point just south of Old Mammoth Road to provide four travel lanes plus the necessary

snow storage easement. This improvement is consistent with the designation of Minaret Road as an arterial in the Town General Plan.

- o Old Mammoth Road (Main Street to south of Chateau Road) - Restripe or widen Old Mammoth Road between Main Street and a point just south of Chateau Road to provide four travel lanes, and maintain the existing continuous left-turn lane. This improvement is consistent with the designation of Old Mammoth Road as an arterial in the Town General Plan.
- o Lake Mary Road (Main Street to Lakeview Road) - Widen Lake Mary Road between Main Street and Lakeview Road to provide four travel lanes. The outer westbound through lane within this road segment would become a forced right-turn lane at the intersection with Lakeview Road.
- o Main Street (Sierra Boulevard to Minaret Road) - Widen and restripe Main Street between Sierra Boulevard and Minaret Road to provide a two-way continuous left-turn lane in the median (consistent with the existing two-way continuous left-turn lane east of Sierra Boulevard).

Intersection Improvements

1. Minaret Road/Forest Trail - In addition to the traffic signal and other improvements proposed as part of the North Village Specific Plan circulation plan, widen Minaret Road just north of Forest Trail to provide two southbound lanes, resulting in one exclusive left-turn lane, one through lane and a shared through/right-turn lane on the southbound Minaret approach to Forest Trail. Also, eliminate the constant eastbound right-turn arrow for traffic turning from eastbound Forest Trail to southbound Minaret which is proposed as part of the North Village Specific Plan circulation plan.
4. Lakeview Road/Lake Mary Road - In conjunction with the recommended widening of Lake Mary Road as described above, the following localized intersection improvements are required: widen or restripe the eastbound Lake Mary Road approach to provide one exclusive left-turn lane and one through lane (the second eastbound through lane recommended as part of the Lake Mary Road widening east of Lakeview Road would begin at Lakeview Road); widen the westbound Lake Mary Road approach to provide one through lane and one exclusive right-turn lane (the second westbound through lane recommended as part of the Lake Mary Road widening east of Lakeview Road would terminate as the forced right-turn lane at Lakeview Road); and formally stripe the southbound approach Lakeview Road approach to provide one exclusive left-turn lane and one shared left/right-turn lane. These improvements would be in addition to the installation of a traffic signal and grade reconstruction proposed as part of the North Village Specific Plan circulation plan.
5. Minaret Road/Main Street/Lake Mary Road - Widen the northbound Minaret approach to provide an exclusive right-turn lane. Restripe the southbound approach and northbound departure to provide the following configuration

on the southbound Minaret approach: two exclusive left-turn lanes, one through lane, and one shared through/right-turn lane. Restripe the westbound approach and eastbound departure to provide a second left-turn lane on the westbound Main approach. Also, modify the signal phasing to provide left-turn protected phases on the north and south approaches which would replace the existing split phasing on these approaches.

6. Sierra Boulevard/Main Street - Restripe Main Street to provide a left-turn lane on the eastbound approach (in conjunction with the recommended widening of Main Street to provide a two-way continuous left-turn lane between Sierra Boulevard and Minaret Road as described above). This would remove turning vehicles from the through traffic lanes and thus improve the overall operation of the intersection. However, installation of a traffic signal is not recommended, as the cumulative traffic volumes do not satisfy signal warrants (see Appendix D), and the projected poor level of service would be experienced only by stop-controlled vehicles waiting to turn left from Sierra onto Main.
7. Old Mammoth Road/Main Street - Restripe the northbound and eastbound approaches to provide the following configurations: one exclusive left-turn lane and one shared left/right-turn lane on the northbound Old Mammoth approach; one through lane, one shared through/right-turn lane, and one exclusive right-turn lane on the eastbound Main approach.
9. Minaret Road/Meridian Boulevard - In conjunction with the recommended widening of Minaret Road to four through lanes as described above, the following localized intersection improvements would be required: widen both the northbound and southbound Minaret approaches to provide one exclusive left-turn lane, one through lane, and one shared through/right-turn lane on each approach; and widen and/or restripe the eastbound approach Meridian to provide an exclusive right-turn lane. These improvements would be in addition to the exclusive left-turn lanes on the eastbound and westbound Meridian approaches and installation of a traffic signal programmed for implementation by the Town of Mammoth Lakes.
10. Mono Street/Meridian Boulevard - Widen and restripe Meridian Boulevard to provide left-turn lanes on both the eastbound and westbound approaches (consistent with the two-way continuous left-turn lane proposed for Meridian Boulevard as a project access improvement in Chapter VI). This would remove turning vehicles from the through traffic lanes and thus improve the overall operation of the intersection. However, installation of a traffic signal is not recommended, as the cumulative traffic volumes do not satisfy signal warrants (see Appendix D), and the projected poor level of service would be experienced only by stop-controlled vehicles waiting to turn left from Mono onto Meridian.
11. Old Mammoth Road/Meridian Boulevard - In conjunction with the recommended widening of Old Mammoth Road as described above, the following localized intersection improvements would be required: restripe the southbound Old Mammoth approach to provide one exclusive left-turn lane, one through lane, and one shared through/right-turn lane; and widen the northbound Old Mammoth approach to provide two exclusive left-turn lanes, one through lane, and one shared through/right-turn lane.

12. Minaret Road/Chateau Road - In conjunction with the recommended widening of Minaret Road as described above, the following localized intersection improvements would be required: stripe the northbound Minaret approach to provide one through lane and one shared through/right-turn lane; widen the southbound Minaret approach to provide one exclusive left-turn lane and two through lanes; restripe the westbound Chateau approach to provide an exclusive left-turn lane and a shared left-turn/right-turn lane; and install a two-phase traffic signal (the cumulative traffic volumes satisfy traffic signal warrants -- see Appendix D).
13. Old Mammoth Road/Chateau Road - In conjunction with the recommended widening of Old Mammoth Road as described above, the following localized intersection improvements would be required: restripe the southbound Old Mammoth approach to provide one exclusive left-turn lane, one through lane, and one shared through/right-turn lane; widen the northbound Old Mammoth approach to provide one exclusive left-turn lane, one through lane, and one shared through/right-turn lane; and install a two-phase traffic signal (the cumulative traffic volumes satisfy traffic signal warrants -- see Appendix D).
14. Minaret Road/Old Mammoth Road - In conjunction with the recommended widening of Minaret Road as described above, the following localized intersection improvements would be required: widen the northbound Minaret approach to provide one exclusive left-turn lane, one through lane and one shared through/right-turn lane; widen the southbound Minaret approach to provide one exclusive left-turn lane, two through lanes and one exclusive right-turn lane; widen the westbound Old Mammoth approach to provide two exclusive left-turn lanes, one through lane and one exclusive right-turn lane; widen the eastbound Old Mammoth approach to provide one exclusive left-turn lane, one through lane, and one exclusive right-turn lane; and install a traffic signal with overlapping left-turn phasing on the Old Mammoth approaches (the cumulative traffic volumes satisfy traffic signal warrants -- see Appendix D).

EFFECT OF PROPOSED MITIGATION MEASURES

Each of the analyzed roadway segments and intersections were evaluated under the assumption that the mitigation measures identified above would be implemented. Tables 13 and 14 summarize the results of these analyses. As indicated on Table 13, each of the roadway segments would operate at acceptable levels of service (LOS C or better) on a peak winter weekend with the proposed roadway improvements, with the exception of the two analyzed segments of Main Street between Minaret Road and Old Mammoth Road (which are projected to operate at LOS D and E).

TABLE 13

WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE
CUMULATIVE PLUS PROJECT WITH MITIGATIONS

LINK #	STREET	SEGMENT	# OF LANES	DAILY CAPACITY	CUMULATIVE PLUS PROJECT CONDITIONS		LOS
					VOLUME	V/C	
1.	Lake Mary Rd.	Lakeview Rd. to Minaret Rd.	4	25,000	15,900	0.64	B
2.	Main St.	Minaret Rd. to Sierra Blvd.	5	30,000	29,200	0.97	E*
3.	Main St. [a]	Forest Trail to Old Mammoth Rd.	5	30,000	25,900	0.86	D*
4.	Majestic Pines Dr.	n/o Meridian Blvd.	2	12,500	3,200	[b]	[b]
5.	Meridian Blvd.	Majestic Pines Dr. to Minaret Rd.	4	25,000	13,200	[b]	[b]
6.	Meridian Blvd.	Manzanita Rd. to Azimuth Dr.	4	25,000	15,900	[b]	[b]
7.	Minaret Rd.	Old Mammoth Rd. to Meadow Ln.	4	25,000	16,500	0.66	B
8.	Minaret Rd.	Chateau Rd. to Meridian Blvd.	4	25,000	14,000	0.56	A
9.	Minaret Rd.	n/o Meridian Blvd.	4	25,000	16,400	0.66	B
10.	Minaret Rd.	s/o Main St.	4	25,000	18,900	0.76	C
11.	Minaret Rd.	Berner St. to Forest Trail	5	30,000	16,700	0.56	A
12.	Old Mammoth Rd.	Chateau Rd. to Meridian Blvd.	5	30,000	20,300	0.68	B
13.	Old Mammoth Rd.	Sierra Nevada Dr. to Tavern Rd.	5	30,000	21,200	0.71	C

Note:

a. No mitigations available for this location.

b. No mitigations required for this location.

* Does not meet Town of Mammoth Lakes level of service standard.

TABLE 14

WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVELS OF SERVICE
CUMULATIVE PLUS PROJECT WITH MITIGATIONS

Intersection	PM Peak Hour			
	Cumulative Plus Project		Cumulative w/ Mitigations	
	V/C	LOS	V/C	LOS
1. Minaret Rd. & Forest Trail	1.14 ^b	F*	0.73	C
2. Minaret Rd. & Canyon Blvd.	[c]		[c]	
3. Kelley Rd. & Lake Mary Rd.	[e]		[e]	
4. Lakeview Rd. & Lake Mary Rd.	0.89 ^b	D*	0.47	A
5. Minaret Rd. & Main St.	1.22	F*	0.94	E*
6. Sierra Blvd. & Main St.	+10 ^a	E*	+10 ^a	E*
7. Old Mammoth Rd. & Main St.	0.91	E*	0.59	A
8. Majestic Pines Dr. & Meridian Blvd.	[e]		[e]	
9. Minaret Rd. & Meridian Blvd.	0.95 ^d	E*	0.68	B
10. Mono St. & Meridian Blvd.	+86 ^a	E*	+86 ^a	E*
11. Old Mammoth Rd. & Meridian Blvd.	1.32	F*	0.94	E*
12. Minaret Rd. & Chateau Rd.	+6 ^a	E*	0.36	A
13. Old Mammoth Rd. & Chateau Rd.	-48 ^a	F*	0.56	A
14. Minaret Rd. & Old Mammoth Rd.	-701 ^a	F*	0.80	C

Notes:

- a. Intersection controlled by stop-signs on the minor street approaches, with free-flowing traffic on the major street. Indicates available reserve capacity and LOS for the most constrained movements on the minor street approaches.
 - b. Intersection would be signalized in conjunction with proposed North Village Specific Plan improvements.
 - c. Intersection would be vacated in conjunction with proposed North Village Specific Plan improvements.
 - d. Intersection to be signalized as a Town of Mammoth Lakes improvement.
 - e. No mitigations required for this location.
- * Does not meet Town of Mammoth Lakes level of service standard.

As indicated on Table 14, each of the analyzed intersections would operate at acceptable levels of service during the winter weekend afternoon peak hour with the proposed intersection improvements, with the following four exceptions (each of which is projected to operate at LOS E):

- o Minaret Road/Main Street/Lake Mary Road
- o Sierra Boulevard/Main Street
- o Mono Street/Meridian Boulevard
- o Old Mammoth Road/Meridian Boulevard

Further evaluation of the locations identified above which are projected to continue to operate at poor levels of service indicates that substantial additional physical improvements (such as widening Main Street to provide six through lanes or widening the Old Mammoth/Meridian Boulevard intersection into adjacent commercial parcels) would be needed which may not be feasible. At Sierra Boulevard/Main Street and Mono Street/Meridian Boulevard, traffic signals would be required to improve the poor levels of service projected for stop-controlled vehicles waiting to turn from the side street (Sierra or Mono) onto the major street (Main or Meridian). However, traffic signal warrants are not satisfied by the projected volumes at these locations, indicating that the side street volumes would not be sufficient to justify the delays to and degradation of flows on the major street which would be incurred if a signal were to be installed. These results imply that, if the projected travel demands in fact materialize in the future, additional measures such as implementation of an extensive and successful public transit system would be needed to accommodate the peak winter weekend.

However, it should be recognized that the level of service projections in this study represent a conservative "worst case" scenario combining peak winter weekend traffic volumes with reduced capacities due to adverse weather and road surface conditions (snow and ice). Levels of service better than those projected would be experienced during most of the year, including the spring, summer and fall months and winter weekdays, when lower traffic volumes are present on the roadway system. Better levels of service would also be experienced during peak winter weekends with "normal" (dry) roadway conditions, when the street and intersection capacities would be greater.

An evaluation was conducted of the projected winter weekend traffic volumes at these locations assuming typical capacities associated with "normal" (dry) roadway conditions to determine the potential levels of service which would be experienced when snow and ice conditions are not present. This evaluation determined that the two signalized intersections of Minaret Road/Main Street/Lake Mary Road and Old Mammoth Road/Meridian Boulevard, as well as the affected segments of Main Street on a daily basis, would operate at acceptable levels of service of C. Although poor levels of service would still be experienced by stop-controlled vehicles waiting to turn from the side street at the unsignalized intersections of Sierra Boulevard/Main Street and Mono Street/Meridian Boulevard, these results indicate that each of the analyzed street segments and signalized intersections throughout the Town would operate at acceptable levels of service with winter weekend traffic during "normal" surface conditions, assuming implementation of the series of mitigation measures recommended previously.

LODESTAR PROJECT CONTRIBUTION

The mitigation measures discussed above are intended to achieve acceptable levels of service throughout the roadway system under cumulative conditions, wherever feasible. As discussed in Chapter IV, however, the poor cumulative traffic conditions at these locations result from both the addition of traffic generated by the proposed Lodestar project and the cumulative growth in traffic volumes resulting from other proposed cumulative developments throughout the Town. Therefore, in order to ascertain that portion of the cumulative mitigation measures which could be attributable to the proposed Lodestar project, an analysis was conducted to determine the percentage contribution of the proposed Lodestar project to the projected cumulative traffic volumes at each location.

Tables 15 and 16 summarize the results of this analysis, for winter weekend daily traffic on the analyzed roadway segments and for afternoon peak hour traffic at the analyzed intersections, respectively. As indicated on Table 15, the Lodestar project is projected to contribute anywhere from one percent (on Lake Mary Road between Lakeview Road and Minaret Road) to 23% (on Minaret Road south of Main Street) of the total cumulative daily winter weekend traffic volumes on the roadway segments requiring mitigation. If existing background traffic is not

TABLE 15

PERCENT CONTRIBUTION OF PROJECT TRAFFIC TO CUMULATIVE WINTER WEEKEND DAILY TRAFFIC

LINK #	STREET	SEGMENT	PERCENT OF TOTAL CUMULATIVE TRAFFIC [a]			PERCENT OF CUMULATIVE TRAFFIC GROWTH [b]		
			LODESTAR	PROJECTS	EXISTING	LODESTAR	PROJECTS	OTHER
1.	Lake Mary Rd.	Lakeview Rd. to Minaret Rd.	1%	24%	75%	3%		97%
2.	Main St.	Minaret Rd. to Sierra Blvd.	10%	38%	52%	22%		78%
3.	Main St.	Forest Trail to Old Mammoth Rd.	7%	34%	59%	18%		82%
4.	Majestic Pines Dr.	n/o Meridian Blvd.	*	3%	97%	*		100%
5.	Meridian Blvd.	Majestic Pines Dr. to Minaret Rd.	16%	48%	36%	25%		75%
6.	Meridian Blvd.	Manzanita Rd. to Azimuth Dr.	18%	23%	59%	44%		56%
7.	Minaret Rd.	Old Mammoth Rd. to Meadow Ln.	9%	52%	39%	15%		85%
8.	Minaret Rd.	Chateau Rd. to Meridian Blvd.	10%	61%	29%	14%		86%
9.	Minaret Rd.	n/o Meridian Blvd.	12%	58%	30%	18%		82%
10.	Minaret Rd.	s/o Main St.	23%	51%	26%	32%		68%
11.	Minaret Rd.	Berner St. to Forest Trail	2%	6%	92%	25%		75%
12.	Old Mammoth Rd.	Chateau Rd. to Meridian Blvd.	5%	54%	41%	8%		92%
13.	Old Mammoth Rd.	Sierra Nevada Dr. to Tavern Rd.	3%	37%	60%	8%		92%

Note:

- a. Percent of total cumulative traffic volume, including existing traffic.
- b. Percent of incremental increase in traffic, not including existing traffic.

* Less than one percent.

TABLE 16

PERCENT CONTRIBUTION OF PROJECT TRAFFIC TO
CUMULATIVE WINTER WEEKEND PM PEAK HOUR TRAFFIC

Intersection	Percent of Total Cumulative Traffic ^a			Percent of Cumulative Traffic Growth ^b	
	Lodestar	Other Projects	Existing	Lodestar	Other Projects
1. Minaret Rd. & Forest Trail	4%	13%	83%	24%	76%
2. Minaret Rd. & Canyon Bl.	[c]	[c]	[c]	[c]	[c]
3. Kelley Rd. & Lake Mary Rd.	1%	17%	82%	7%	93%
4. Lakeview Rd. & Lake Mary Rd.	2%	10%	88%	19%	81%
5. Minaret Rd. & Main St.	12%	36%	52%	25%	75%
6. Sierra Bl. & Main St.	9%	19%	72%	31%	69%
7. Old Mammoth Rd. & Main St.	6%	24%	70%	20%	80%
8. Majestic Pines Dr. & Meridian Bl.	1%	28%	71%	4%	96%
9. Minaret Rd. & Meridian Bl.	20%	56%	24%	26%	74%
10. Mono St. & Meridian Bl.	24%	19%	57%	56%	44%
11. Old Mammoth Rd. & Meridian Bl.	8%	28%	64%	21%	79%
12. Minaret Rd. & Chateau Rd.	14%	67%	19%	18%	82%
13. Old Mammoth Rd. & Chateau Rd.	*	46%	54%	*	100%
14. Minaret Rd. & Old Mammoth Rd.	7%	67%	26%	10%	90%

Notes:

- a. Percent of total cumulative traffic volume, including existing traffic.
- b. Percent of incremental increase in traffic, not including existing traffic.
- c. Intersection would be vacated in conjunction with proposed North Village Specific Plan improvements.
- * Less than one percent.

considered in this analysis, the Lodestar project would contribute anywhere from 3% (on Lake Mary Road between Lakeview Road and Minaret Road) to 32% (on Minaret Road south of Main Street) of the net incremental growth in cumulative future traffic volumes.

As indicated on Table 16, the Lodestar project is projected to contribute between less than one percent (at Old Mammoth Road/Chateau Road) to 24% (at Mono Street/Meridian Boulevard) of the total cumulative afternoon peak hour winter weekend traffic volumes at the intersections requiring mitigation. Again, if existing background traffic is not considered in the analysis, the Lodestar project contribution would range from less than one percent (at Old Mammoth Road/Chateau Road) to 56% (at Mono Street/Meridian Boulevard) of the net incremental increase in cumulative future traffic volumes.

VI. SITE ACCESS AND INTERNAL CIRCULATION ANALYSIS

This chapter presents an analysis of the preliminary access and internal circulation plan proposed for the Lodestar Master Plan. The access and internal circulation analysis is based upon the Cumulative Plus Project winter weekend traffic projections developed in Chapter III.

PROPOSED ACCESS AND INTERNAL CIRCULATION PLAN

The preliminary project site plan illustrated previously in Figure 2 indicates that access to the proposed Lodestar project would be provided by a series of internal local streets, four of which would intersect Meridian Boulevard and two of which would intersect Minaret Road. Primary internal circulation would be provided via these access roads, while secondary circulation would be provided via local cul-de-sacs connecting to the access roads.

As indicated on Figure 2, the six access points onto Meridian Boulevard and Minaret Road have been assigned reference numbers for discussion purposes. Access number 1 onto Minaret Road would serve Lodestar Areas 2 and 4, while access number 2 onto Minaret Road would serve Areas 2, 4, 1 and 5. Access number 3 onto Meridian Boulevard would primarily serve Lodestar Area 1, and access number 4 onto Meridian Boulevard would primarily serve Area 5. Access number 5 onto Meridian would serve Areas 2 and 4, while access number 6 onto Meridian would serve Area 3 only.

EVALUATION OF INTERNAL CIRCULATION SYSTEM

A review of projected daily and peak hour traffic volumes on the proposed internal roadways serving the Lodestar site indicates that each of the streets would be adequate to accommodate the projected traffic volumes at good levels of

service with two through lanes (one in each direction). Thus, each of the internal roadways providing access to the Lodestar project site should be constructed to two-lane collector street standards. The proposed internal cul-de-sacs should be constructed to two-lane local street standards.

EVALUATION OF SITE ACCESS POINTS

The projected peak hour traffic volumes at the six project access points were evaluated to determine the potential levels of service and to ascertain whether traffic signals would be warranted. The following table summarizes the results of this analysis:

<u>Access # (Location)</u>	<u>Volumes Meet Signal Warrants?</u>	<u>Level of Service</u>
1 (Minaret Road)	yes	A*
2 (Minaret Road)	yes	A*
3 (Meridian Boulevard)	no	E
4 (Meridian Boulevard)	no	E
5 (Meridian Boulevard)	no	D
6 (Meridian Boulevard)	no	D

* assuming signalization

As indicated in the table, the projected traffic volumes at access numbers 1 and 2 would be sufficient to warrant installation of traffic signals (see Appendix D). Both of these locations would operate under very poor conditions without signalization (LOS E at access number 1 and LOS F at access number 2), and both would operate at excellent levels of service (LOS A) assuming signalization.

The projected traffic volumes at access numbers 3 through 6 would not be sufficient to satisfy signal warrants. Since the projected poor LOS of D or E at these locations would be experienced only by stop-controlled vehicles waiting to exit the project site and turn left onto Meridian Boulevard, with good levels of service experienced by all other movements at the intersections, it is recommended that traffic signals not be installed (the close spacing of traffic signals at these locations, if they were to be installed, would likely result in a degradation of level of service along Meridian Boulevard itself). Rather, it is recommended that Meridian Boulevard be widened and restriped to provide a two-

way continuous left-turn lane along the entire Lodestar project frontage, from west of access number 3 to east of Manzanita Road. This would remove turning vehicles from the through traffic lanes and thus improve the overall operation of the intersections along Meridian Boulevard.

The following measures are recommended to avoid potential adverse impacts related to the project site access plan:

- o Traffic signals should be installed at access numbers 1 and 2 onto Minaret Road. Left-turn storage pockets should be provided on the southbound Minaret approach to access number 1, and on both the northbound and southbound approaches to access number 2. Two approach (outbound) lanes and one departure (inbound) lane should be provided on each access road. At access number 1, the outbound lanes should be striped as one left-turn and one right-turn lane. At access number 2, the outbound lanes should be striped as one left-turn lane and one shared through/right-turn lane.
- o The four access points onto Meridian Boulevard should be controlled by stop signs on the project access approaches, with uncontrolled traffic flows along Meridian. Two approach (outbound) lanes and one departure (inbound) lane should be provided on each access road, with the outbound lanes striped as one left-turn and one right-turn lane.
- o Access number 6 (from Lodestar Area 3 to Meridian Boulevard) should be aligned directly opposite the existing Joaquin Road, to form a four-way intersection rather than two slightly offset "T" intersections. Through movements from the access road onto Joaquin Road should be permitted from the rightmost approach (outbound) lane on the access road.
- o Access number 5 (from Areas 2 and 4 to Meridian Boulevard) should be located as close as possible to the midpoint between Minaret Road and Joaquin Road/access number 6, to maximize the spacing between the three adjacent intersections.
- o Widen Meridian Boulevard along entire Lodestar project frontage to provide a two-way continuous left-turn lane, thus providing left-turn storage on Meridian at each of the proposed project access roads (access numbers 3, 4, 5 and 6), as well as at the existing intersections of Meridian with Villa Vista Drive, Joaquin Road, Lupin Street, Mono Street and Manzanita Road.

VII. SUMMARY AND CONCLUSIONS

This study was undertaken to analyze the potential traffic impacts of the proposed Lodestar Master Plan on the surrounding street system. The following summarizes the key findings of this analysis:

- o A total of thirteen roadway segments and fourteen intersections were analyzed within the study area for this project. Two of the roadway segments currently operate at unacceptable levels of service (LOS D, E or F) on peak winter weekends, while six of the intersections currently operate at unacceptable levels of service during the winter weekend afternoon peak hour.
- o The proposed project would generate a net total of approximately 13,160 new daily vehicle trips on a peak winter weekend day, of which approximately 1,515 are projected to occur during the afternoon peak hour.
- o Analysis of the Cumulative Base conditions, representing future conditions without the proposed project, indicates that eight of the thirteen analyzed roadway segments and eleven of the fourteen analyzed intersections would operate at unacceptable levels of service on a peak winter weekend.
- o Analysis of the Cumulative Plus Project conditions indicates that, with the addition of traffic expected to be generated by the proposed Lodestar project, the same eight roadway segments and eleven intersections would operate at unacceptable levels of service on a peak winter weekend. An additional analyzed roadway segment (Main Street between Sierra Boulevard and Old Mammoth Road) would decline from LOS C to LOS D. The proposed project is expected to contribute to the poor cumulative conditions at each of these locations, and thus would significantly impact these same locations.
- o The roadway improvements proposed in Chapter V would mitigate the projected poor cumulative operating conditions on all but two of the impacted roadway segments on a daily basis (Main Street between Minaret Road and Sierra Boulevard and between Sierra Boulevard and Old Mammoth Road), and all but four of the impacted intersections during the afternoon peak hour (Minaret Road/Main Street/Lake Mary Road, Sierra Boulevard/Main Street, Mono Street/Meridian Boulevard and Old Mammoth Road/Meridian Boulevard). Additional physical improvements to further mitigate these remaining impacts do not appear to be feasible or practical, particularly since the projected levels of service represent a "worst case" scenario combining peak winter weekend traffic volumes with weather-related reductions in intersection and street capacities. These conditions would

not be present during most of the year. Under "normal" (dry) weather and road surface conditions, each of the analyzed street segments and signalized intersections are projected to operate at acceptable levels of service during peak winter weekends.

- o The proposed Lodestar project is projected to contribute anywhere from 3% (on Lake Mary Road between Lakeview Road and Minaret Road) to 32% (on Minaret Road south of Main Street) of the net incremental growth in cumulative future daily traffic volumes on the roadway segments requiring mitigation. The Lodestar project contribution would range from less than one percent (at Old Mammoth Road/Chateau Road) to 56% (at Mono Street/Meridian Boulevard) of the net incremental increase in cumulative future traffic volumes at the intersections requiring mitigation.
- o Each of the proposed internal roadways providing access to the Lodestar project site should be constructed to two-lane collector street standards. The proposed internal cul-de-sacs should be constructed to two-lane local street standards.
- o The two proposed project access points onto Minaret Road should be signalized, while the four proposed project access points onto Meridian Boulevard should be controlled by stop signs on the access roadway approaches. Each access roadway should provide two approach (outbound) and one departure (inbound), with an exclusive left-turn lane on the outbound approach. Left-turn pockets should be provided on Minaret Road at the project access points, and a two-way continuous left-turn lane should be provided on Meridian Boulevard along the entire Lodestar project frontage. Access number 6 (from Lodestar Area 3 to Meridian Boulevard) should be aligned directly opposite the existing Joaquin Road. Access number 5 should be located close to the midpoint between Minaret Road and Joaquin Road/access number 6.

It should be noted that the Cumulative Base forecasts represent traffic demand at each of the roadway segments and intersections under analysis. When streets or intersections become severely congested, traffic will generally choose another route. Since it is not possible to analyze all possible paths when distributing traffic and since it is of value to understand the magnitude of the demand and the potential "worst case" conditions, traffic projections at some locations may be unrealistically high. The levels of service projected for these locations may be unlikely to occur, but provide an indication of the magnitude of the potential problems.

CUMULATIVE PLUS PROJECT ANALYSIS

The Cumulative Plus Project traffic volumes illustrated in Figure 7 and Appendix B were analyzed to determine the future operating conditions with the addition of project traffic. Table 12 summarizes the projected winter weekend daily levels of service for the analyzed roadway segments, while the final column in Table 11 summarizes the projected winter weekend afternoon peak hour intersection levels of service.

As indicated in Table 12, poor daily levels of service are projected under Cumulative Plus Project conditions for the same roadway segments (sections of Lake Mary Road, Main Street, Minaret Road and Old Mammoth Road) which are projected to operate poorly under the Cumulative Base conditions. In addition, operating conditions along Main Street between Sierra Boulevard and Old Mammoth Road are projected to decline from a good LOS C to an unacceptable LOS D. The addition of project-generated traffic would result in increases in the projected volume to capacity ratios at each of these locations. The streets which would be impacted most significantly by the proposed project include Main Street (increases in V/C of 0.06 to 0.12), Minaret Road between Old Mammoth Road and Main Street (V/C increases of 0.11 to 0.35) and Old Mammoth Road (increases of 0.04 to 0.06). This indicates that, at these locations, the project-generated traffic would utilize between approximately 4% (Old Mammoth Road between Meridian Boulevard and Main Street) to 35% (Minaret Road south of Main Street) of the daily roadway capacity.

TABLE 12

WINTER WEEKEND DAILY STREET SEGMENT LEVELS OF SERVICE
CUMULATIVE PLUS PROJECT

LINK #	STREET	SEGMENT	# OF LANES	DAILY CAPACITY	CUMULATIVE PLUS PROJECT CONDITIONS		
					VOLUME	V/C	LOS
1.	Lake Mary Rd.	Lakeview Rd. to Minaret Rd.	2	12,500	15,900	1.27	F*
2.	Main St.	Minaret Rd. to Sierra Blvd.	4	25,000	29,200	1.17	F*
3.	Main St.	Forest Trail to Old Mammoth Rd.	5	30,000	25,900	0.86	D*
4.	Majestic Pines Dr.	n/o Meridian Blvd.	2	12,500	3,200	0.26	A
5.	Meridian Blvd.	Majestic Pines Dr. to Minaret Rd.	4	25,000	13,200	0.53	A
6.	Meridian Blvd.	Manzanita Rd. to Azimuth Dr.	4	25,000	15,900	0.64	B
7.	Minaret Rd.	Old Mammoth Rd. to Meadow Ln.	2	12,500	16,500	1.32	F*
8.	Minaret Rd.	Chateau Rd. to Meridian Blvd.	2	12,500	14,000	1.12	F*
9.	Minaret Rd.	n/o Meridian Blvd.	2	12,500	16,400	1.31	F*
10.	Minaret Rd.	s/o Main St.	2	12,500	18,900	1.51	F*
11.	Minaret Rd.	Berner St. to Forest Trail	5	30,000	16,700	0.56	A
12.	Old Mammoth Rd.	Chateau Rd. to Meridian Blvd.	3	17,500	20,300	1.16	F*
13.	Old Mammoth Rd.	Sierra Nevada Dr. to Tavern Rd.	3	17,500	21,200	1.21	F*

Note:

* Does not meet Town of Mammoth Lakes level of service standard.

TABLE 11

**WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVELS OF SERVICE
CUMULATIVE BASE AND CUMULATIVE PLUS PROJECT**

Intersection	PM Peak Hour			
	Cumulative Base		Cumulative Plus Project	
	V/C	LOS	V/C	LOS
1. Minaret Rd. & Forest Trail	1.08 ^b	F*	1.14 ^b	F*
2. Minaret Rd. & Canyon Blvd.	[c]		[c]	
3. Kelley Rd. & Lake Mary Rd.	+511 ^a	A	+507 ^a	A
4. Lakeview Rd. & Lake Mary Rd.	0.87 ^b	D*	0.89 ^b	D*
5. Minaret Rd. & Main St.	0.97	E*	1.22	F*
6. Sierra Blvd. & Main St.	+10 ^a	E*	+10 ^a	E*
7. Old Mammoth Rd. & Main St.	0.87	D*	0.91	E*
8. Majestic Pines Dr. & Meridian Blvd.	+352 ^a	B	+346 ^a	B
9. Minaret Rd. & Meridian Blvd.	0.82 ^d	D*	0.95 ^d	E*
10. Mono St. & Meridian Blvd.	+180 ^a	D*	+86 ^a	E*
11. Old Mammoth Rd. & Meridian Blvd.	1.21	F*	1.32	F*
12. Minaret Rd. & Chateau Rd.	+50 ^a	E*	+6 ^a	E*
13. Old Mammoth Rd. & Chateau Rd.	-48 ^a	F*	-48 ^a	F*
14. Minaret Rd. & Old Mammoth Rd.	-630 ^a	F*	-701 ^a	F*

Notes:

- a. Intersection controlled by stop-signs on the minor street approaches, with free-flowing traffic on the major street. Indicates available reserve capacity and LOS for the most constrained movements on the minor street approaches.
 - b. Intersection would be signalized in conjunction with proposed North Village Specific Plan improvements.
 - c. Intersection would be vacated in conjunction with proposed North Village Specific Plan improvements.
 - d. Intersection to be signalized as a Town of Mammoth Lakes improvement.
- * Does not meet Town of Mammoth Lakes level of service standard.

results of this analysis, indicating the projected winter weekend levels of service for the Cumulative Base scenario for roadway segments and intersections, respectively. The intersection level of service worksheets are presented in Appendix C.

The results of this analysis indicates that traffic conditions on streets and intersections throughout the Town would decline substantially from existing conditions under the Cumulative Base scenario. Comparing the results in Table 10 with the existing conditions summarized in Table 3, it can be seen that operating conditions along the following analyzed roadway segments are projected to deteriorate to poor levels of service of F as a result of the growth in traffic from cumulative projects:

- o Lake Mary Road - Lakeview Road to Minaret Road
- o Main Street - Minaret Road to Sierra Boulevard
- o Minaret Road - Old Mammoth Road to Main Street
- o Old Mammoth Road - Chateau Road to Main Street

Table 11 indicates that eleven of the fourteen analyzed intersections would operate at LOS D, E or F during the afternoon peak hour under the projected Cumulative Base conditions (as compared to six under existing conditions). These intersections are as follows:

- o Minaret Road/Forest Trail
- o Lakeview Road/Lake Mary Road
- o Minaret Road/Main Street
- o Sierra Boulevard/Main Street
- o Old Mammoth Road/Main Street
- o Minaret Road/Meridian Boulevard
- o Mono Street/Meridian Boulevard
- o Old Mammoth Road/Meridian Boulevard
- o Minaret Road/Chateau Road
- o Old Mammoth Road/Chateau Road
- o Minaret Road/Old Mammoth Road

The intersections of Kelley Road/Lake Mary Road and Majestic Pines Drive/Meridian Boulevard are projected to continue to operate good levels of service (LOS A and B, respectively). As discussed in Chapter III, the intersection of Minaret Road/Canyon Boulevard would be eliminated as part of the circulation improvements proposed as part of the North Village Specific Plan.

REFERENCES

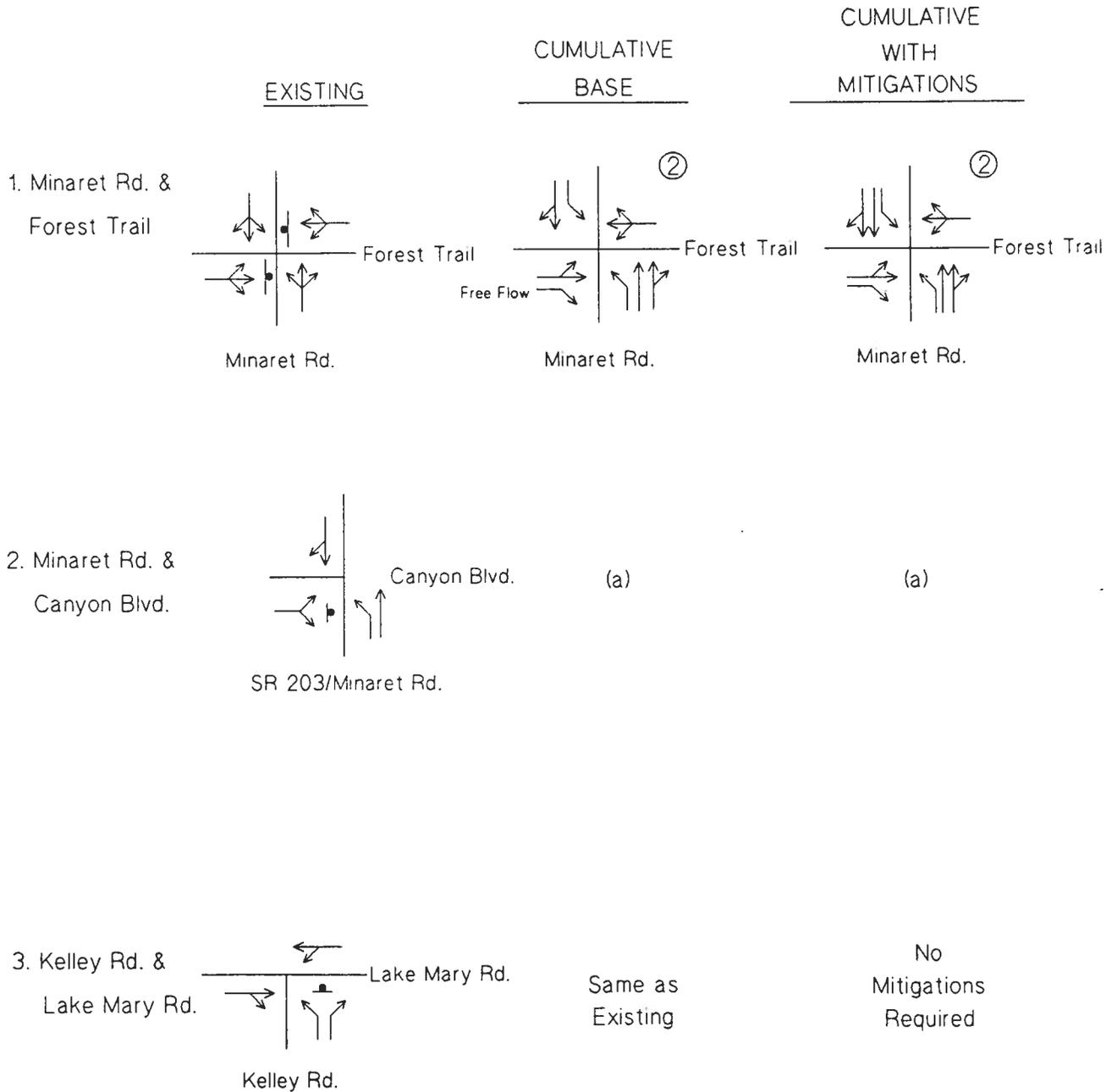
- California Department of Transportation, 1988 Traffic Volumes on California State Highways, 1989.
- California Department of Transportation, Traffic Manual, December 1986.
- Dock, Frederick C. (Environmental Science Associates, Inc.), letter report to Don Gutoff regarding Mammoth Lakes General Plan Update traffic projections, May 6, 1985.
- Donald A. Woolfe and Associates, Draft Environmental Impact Report for General Plan, Town of Mammoth Lakes, January 1986.
- Draft Environmental Impact Report, North Village Specific Plan, April 1989.
- Institute of Transportation Engineers, Trip Generation, 4th Edition, 1987.
- Kaku Associates, Alternatives Analysis and Preliminary Design Study for the Waterford Gap Closure, January 1990.
- Kaku Associates, Transportation Study for the Proposed Sherwin Ski Area, January 1986.
- Kaku, Dick S. (Kaku Associates), letter report to Charles Karoly of Town of Mammoth Lakes regarding Juniper Ridge traffic impacts, October 29, 1986.
- Omni-Means, Ltd., Traffic Impact Analysis for the Revised Juniper Ridge Development Plan-Mammoth Lakes, California.
- PRC Engineering, Traffic Impact Analysis for the Juniper Ridge Development Plan, March 1984.
- San Diego Association of Governments, San Diego Traffic Generators, January 1990 update.
- Sherwin Ski Area Environmental Impact Statement.
- Sweet, Clyde E., Jr. (BSI Consultants, Inc.), letter report to David Laverty of Triad Engineering Corporation regarding North Village project traffic impacts, March 23, 1989.
- Town of Mammoth Lakes General Plan.
- Triad Engineering Corporation, North Village Specific Plan, May 1990.
- Transportation Research Board, Highway Capacity Manual-Special Report 209, 1985.

Transportation Research Board, Transportation Research Circular No. 212-Interim Materials on Highway Capacity, 1980.

U.S. Department of Transportation, Federal Highway Administration, Manual on Uniform Traffic Control Devices, 1986.

APPENDIX A
INTERSECTION CONFIGURATIONS

Intersection Configurations



LEGEND:

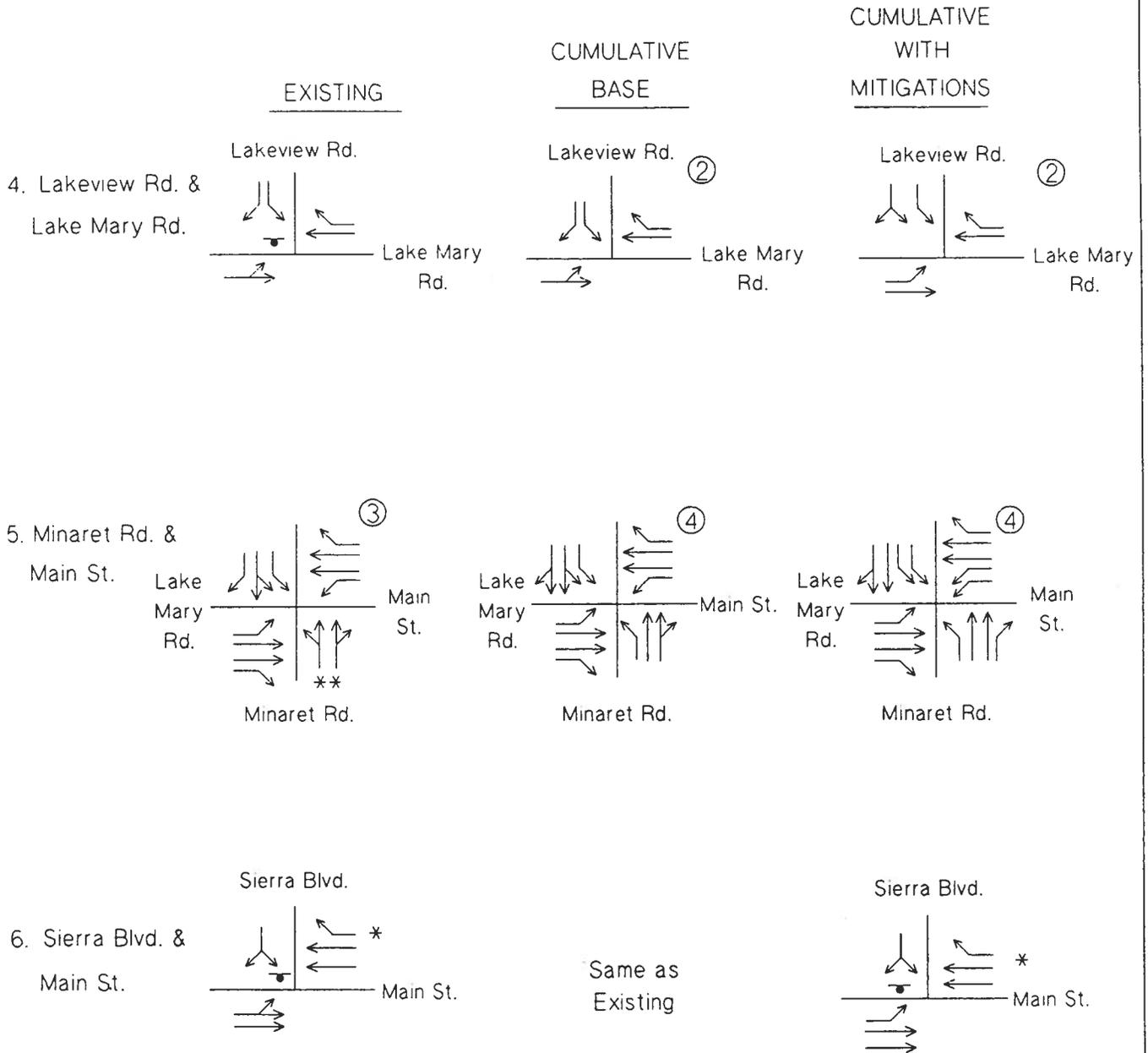
② Number of Signal Phases.

▸ Stop Sign

* Functions as a separate turn lane, although not striped.

a. Intersection to be vacated in conjunction with North Village Specific Plan

Intersection Configurations



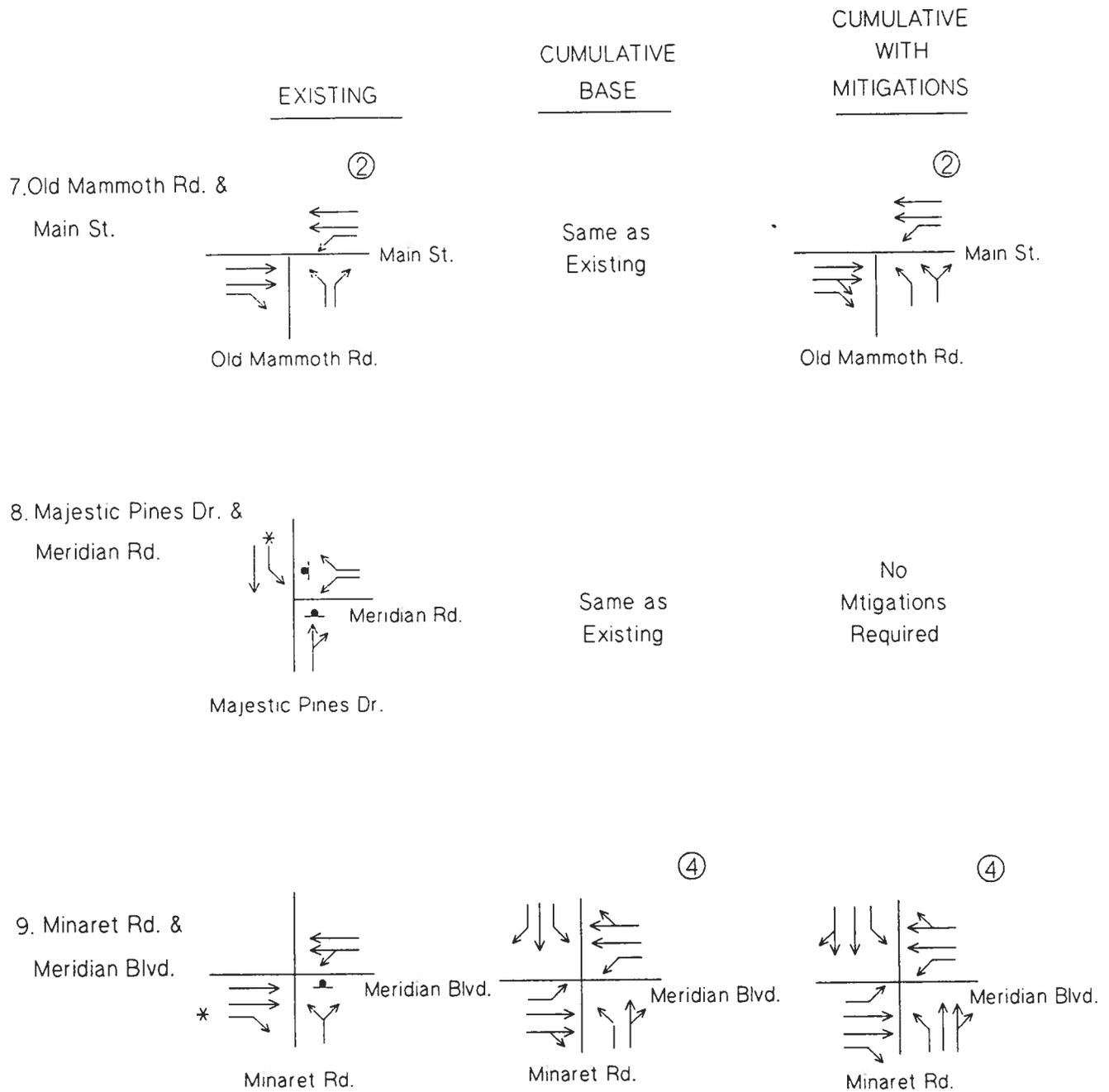
LEGEND:

② Number of Signal Phases.

▬ Stop Sign

* Functions as a separate turn lane, although not striped.

Intersection Configurations



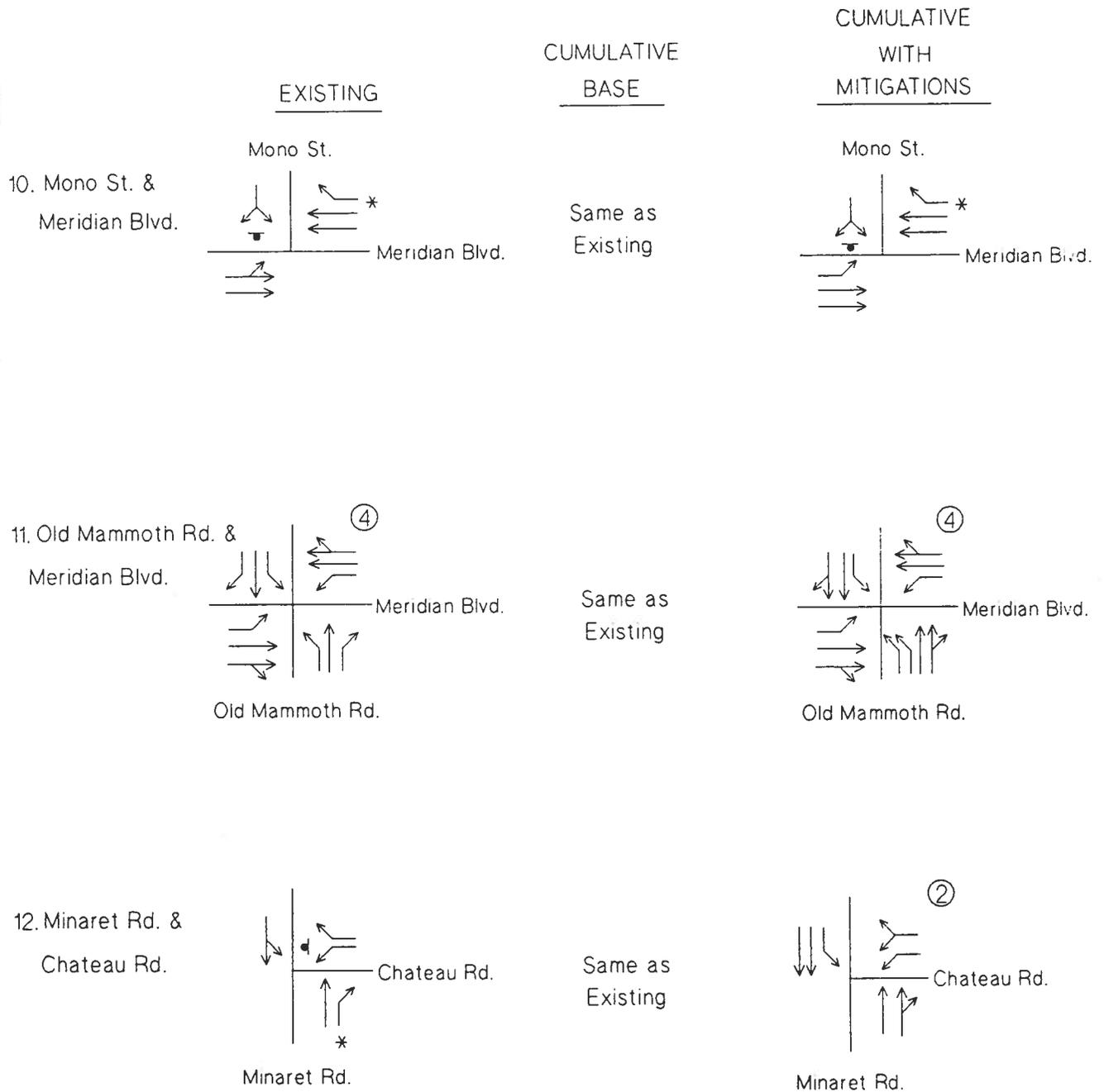
LEGEND:

② Number of Signal Phases.

▸ Stop Sign

* Functions as a separate turn lane, although not striped.

Intersection Configurations



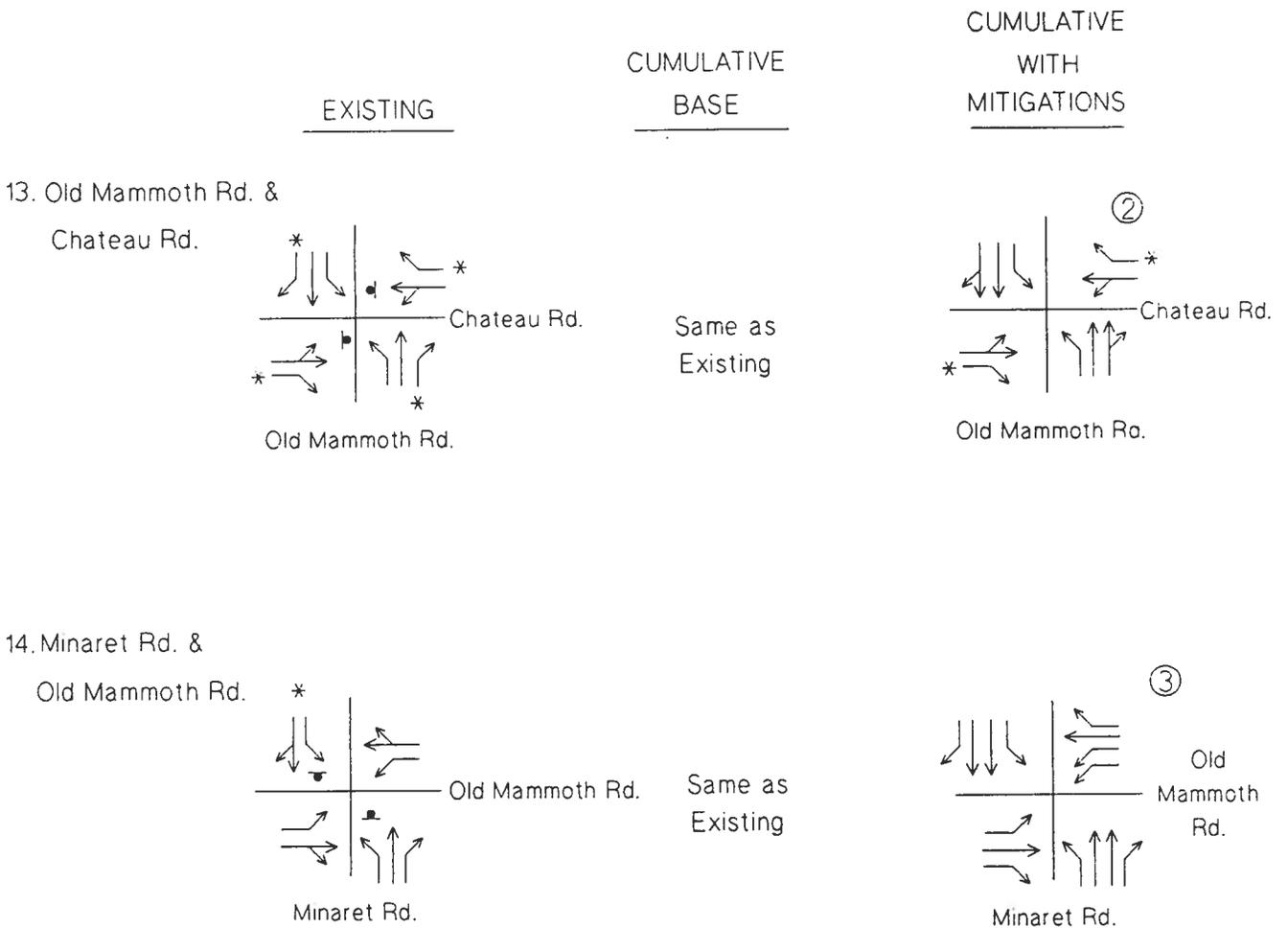
LEGEND:

② Number of Signal Phases.

▸ Stop Sign

* Functions as a separate turn lane, although not striped.

Intersection Configurations



LEGEND:

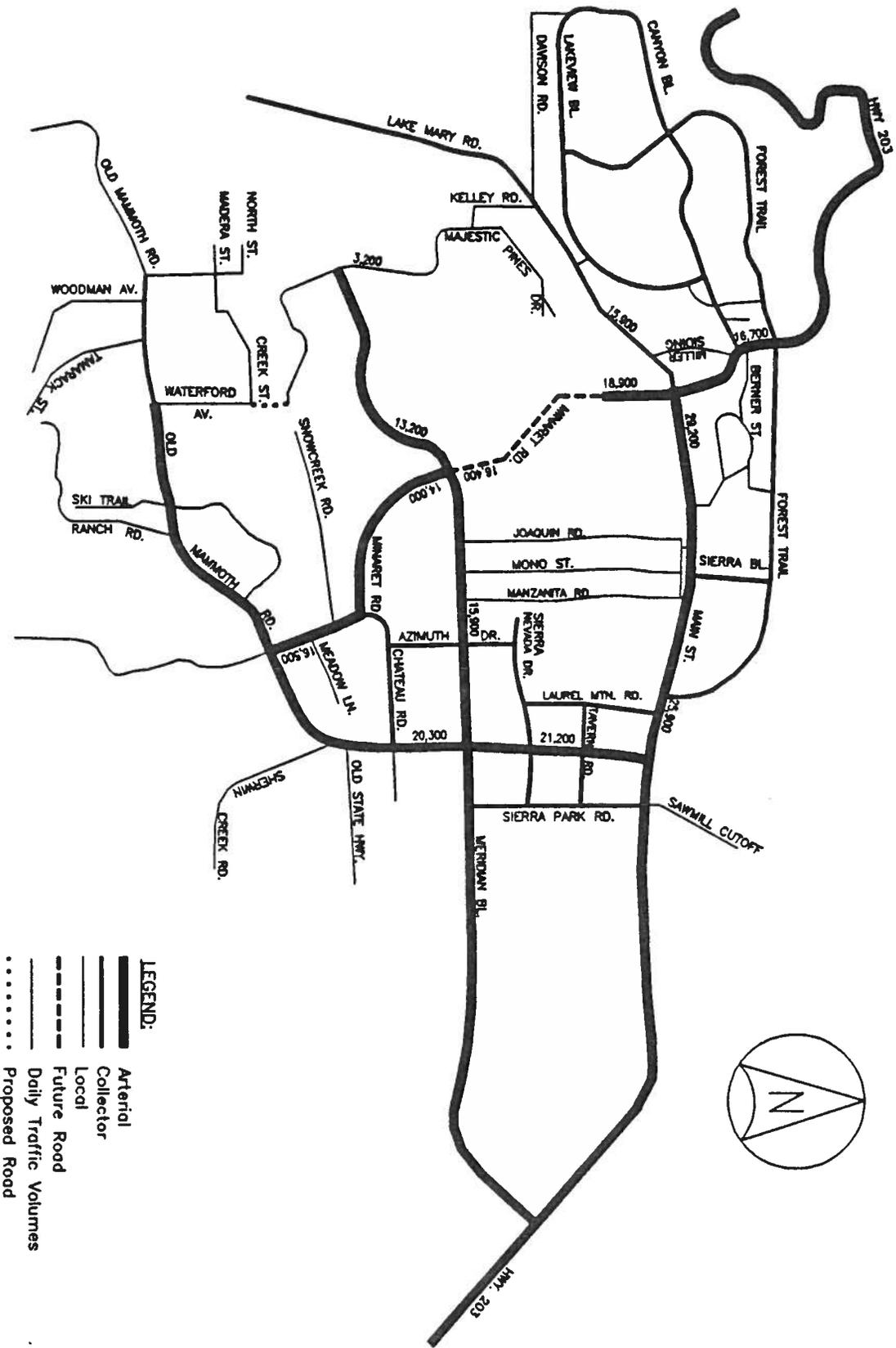
② Number of Signal Phases.

▸ Stop Sign

* Functions as a separate turn lane, although not striped.

APPENDIX B

WINTER WEEKEND PM PEAK HOUR INTERSECTION TURNING MOVEMENTS



Program Licensed To: Kaku Associates

LODESTAR EIR

EXISTING (SAT) PM PEAK HOUR TURNING VOLUMES

8/10/90

INTERSECTION		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
NO	STREETS	L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	71	364	31	24	786	20	2	7	58	20	2	9
		[	466]		[	830]		[	67]		[	31]	
2	MINARET RD. & CANYON BLVD.	183	224	-	-	694	68	64	-	369	-	-	-
		[	407]		[	762]		[	433]		[]	
3	KELLY RD. & LAKE MARY RD.	22	-	91	-	-	-	-	111	69	66	123	-
		[	113]		[	]		[	180]		[	189]	
4	LAKEVIEW & LAKE MARY RD.	-	-	-	214	-	63	63	349	-	-	289	161
		[	]		[	277]		[	412]		[	450]	
5	MINARET RD. & MAIN	2	2	19	881	24	141	59	427	11	15	255	376
		[	23]		[	1046]		[	497]		[	646]	
6	SIERRA & MAIN	-	-	-	48	-	10	24	1474	-	-	674	23
		[	]		[	58]		[	1498]		[	697]	
7	OLD MAMMOTH & MAIN	429	-	75	-	-	-	-	177	770	103	207	-
		[	504]		[	]		[	947]		[	310]	
8	MAJ. PINES & MERIDIAN	-	8	21	260	32	-	-	-	-	39	-	145
		[	29]		[	292]		[	]		[	184]	
9	MINARET RD. & MERIDIAN	24	-	23	-	-	-	-	292	57	31	285	-
		[	47]		[	]		[	349]		[	316]	
10	MOND ST. & MERIDIAN	-	-	-	56	-	16	13	291	-	-	362	36
		[	]		[	72]		[	304]		[	398]	
11	OLD MAMMOTH & MERIDIAN	110	326	93	271	641	229	56	71	127	113	178	300
		[	529]		[	1141]		[	254]		[	591]	
12	MINARET RD. & CHATEAU RD.	-	45	63	16	78	-	-	-	-	101	-	5
		[	108]		[	94]		[	]		[	106]	
13	OLD MAMMOTH & CHATEAU RD.	11	302	4	50	471	211	108	11	3	8	3	36
		[	317]		[	732]		[	122]		[	49]	
14	MINARET RD. & OLD MAMMOTH	63	3	81	13	11	26	26	242	169	42	177	6
		[	147]		[	50]		[	437]		[	227]	

Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE BASE FM PEAK TURNING MOVEMENTS
WINTER WEEKEND CONDITIONS

9/14/90

INTERSECTION		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
NO	STREETS	L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	217	351	33	47	953	74	60	13	353	28	16	20
		[601]			[1074]			[426]			[64]		
3	KELLY RD. & LAKE MARY RD.	29	-	105	-	-	-	-	127	86	75	151	-
		[134]			[]			[213]			[226]		
4	LAKEVIEW & LAKE MARY RD.	-	-	-	344	-	61	59	383	-	-	328	224
		[]			[405]			[442]			[552]		
5	MINARET RD. & MAIN	63	301	119	1006	451	149	65	562	91	109	387	480
		[483]			[1606]			[718]			[976]		
6	SIERRA & MAIN	-	-	-	48	-	10	24	1755	-	-	929	23
		[]			[58]			[1779]			[952]		
7	OLD MAMMOTH & MAIN	642	-	80	-	-	-	-	237	995	108	260	-
		[722]			[]			[1232]			[368]		
8	MAJ. PINES & MERIDIAN	-	9	103	272	35	-	-	-	-	126	-	146
		[112]			[307]			[]			[272]		
9	MINARET RD. & MERIDIAN	126	359	23	63	468	63	78	386	274	31	258	53
		[508]			[594]			[738]			[342]		
10	MOND ST. & MERIDIAN	-	-	-	56	-	16	13	445	-	-	485	36
		[]			[72]			[458]			[521]		
11	OLD MAMMOTH & MERIDIAN	167	660	194	287	943	250	83	101	193	206	200	30
		[1021]			[1480]			[377]			[715]		
12	MINARET RD. & CHATEAU RD.	-	505	60	20	759	-	-	-	-	96	-	-
		[565]			[779]			[]			[102]		
13	OLD MAMMOTH & CHATEAU RD.	11	825	4	50	957	201	103	11	3	8	3	3
		[840]			[1208]			[117]			[49]		
14	MINARET RD. & OLD MAMMOTH	123	291	456	13	489	224	143	373	205	386	362	60
		[870]			[726]			[721]			[808]		

Program Licensed To: Kaku Associates

LODESTAR

LODESTAR PROJECT GENERATED PM PEAK TURNING MOVEMENTS
PEAK WINTER WEEKEND CONDITIONS

9/14/90

INTERSECTION	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
	L	T	R	L	T	R	L	T	R	L	T	R
0 STREETS												
1 MINARET RD. & FOREST TRAIL	-	17	-	-	74	-	-	-	-	-	-	-
	[	17]		[	74]		[]		[]	
3 KELLY RD. & LAKE MARY RD.	2	-	-	-	-	-	-	-	5	-	-	-
	[	2]		[	]		[	5]		[]	
4 LAKEVIEW & LAKE MARY RD.	-	-	-	22	-	-	-	-	-	-	-	11
	[	]		[	22]		[	]		[	11]	
5 MINARET RD. & MAIN	11	63	147	-	121	-	-	-	22	146	-	-
	[	221]		[	121]		[	22]		[	146]	
6 SIERRA & MAIN	-	-	-	-	-	-	-	129	-	-	130	-
	[	]		[	]		[	129]		[	130]	
7 OLD MAMMOTH & MAIN	50	-	-	-	-	-	-	24	51	-	24	-
	[	50]		[	]		[	24]		[	24]	
8 MAJ. PINES & MERIDIAN	-	-	-	5	-	-	-	-	-	-	-	2
	[	]		[	5]		[]		[]	
9 MINARET RD. & MERIDIAN	55	94	29	42	39	13	29	95	12	11	62	62
	[	178]		[	94]		[	136]		[	135]	
10 MONO ST. & MERIDIAN	-	-	-	-	-	-	-	158	-	-	172	-
	[	]		[	]		[	158]		[	172]	
11 OLD MAMMOTH & MERIDIAN	71	2	-	-	1	54	48	51	46	-	30	-
	[	73]		[	55]		[	145]		[	30]	
12 MINARET RD. & CHATEAU RD.	-	178	3	-	62	-	-	-	-	1	-	-
	[	181]		[	62]		[	]		[	1]	
14 MINARET RD. & OLD MAMMOTH	-	110	-	-	63	-	-	-	-	-	-	71
	[	110]		[	63]		[]		[]	

Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK TURNING MOVEMENTS
WINTER WEEKEND CONDITIONS

9/14/90

INTERSECTION		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
NO	STREETS	L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	217	368	33	47	1027	74	60	13	353	28	16	20
		[618]			[1148]			[426]			[64]		
3	KELLY RD. & LAKE MARY RD.	31	-	105	-	-	-	-	127	91	75	151	-
		[136]			[]			[218]			[226]		
4	LAKEVIEW & LAKE MARY RD.	-	-	-	366	-	61	59	383	-	-	328	235
		[]			[427]			[442]			[563]		
5	MINARET RD. & MAIN	74	364	266	1006	572	149	65	562	113	255	387	480
		[704]			[1727]			[740]			[1122]		
6	SIERRA & MAIN	-	-	-	48	-	10	24	1884	-	-	1059	20
		[]			[58]			[1908]			[1082]		
7	OLD MAMMOTH & MAIN	692	-	80	-	-	-	-	261	1046	108	284	-
		[772]			[]			[1307]			[392]		
8	MAJ. PINES & MERIDIAN	-	9	103	277	35	-	-	-	-	126	-	140
		[112]			[312]			[]			[274]		
9	MINARET RD. & MERIDIAN	181	453	52	105	507	76	107	481	286	42	320	115
		[686]			[688]			[874]			[477]		
10	MONO ST. & MERIDIAN	-	-	-	56	-	16	13	603	-	-	657	36
		[]			[72]			[616]			[693]		
11	OLD MAMMOTH & MERIDIAN	238	662	194	287	944	304	131	152	239	206	230	309
		[1094]			[1535]			[522]			[745]		
12	MINARET RD. & CHATEAU RD.	-	683	63	20	821	-	-	-	-	97	-	0
		[746]			[841]			[]			[103]		
13	OLD MAMMOTH & CHATEAU RD.	11	825	4	50	957	201	103	11	3	8	3	3
		[840]			[1208]			[117]			[49]		
14	MINARET RD. & OLD MAMMOTH	123	401	456	13	552	224	143	373	205	386	362	13
		[980]			[789]			[721]			[879]		

TABLE C-2

RELATIONSHIP OF LEVEL OF SERVICE TO RESERVE CAPACITY

<u>Available Reserve Capacity</u>	<u>Level of Service</u>	<u>Expected Delay to Minor Street Traffic</u>
400 or more	A	Little or no delay
300 to 399	B	Short traffic delays
200 to 299	C	Average traffic delays
100 to 199	D	Long traffic delays
0 to 99	E	Very long traffic delays
Less than 0 (Any value)	F	Failure - extreme congestion Intersection blocked by external causes

The remainder of this appendix contains the worksheets used to calculate the winter weekend PM peak hour levels of service at the analyzed intersections. In addition to the calculation of V/C ratio or reserve capacity, each worksheet indicates the hourly volumes for each turning movement, the lane configuration for each approach, and the type of intersection control.

The worksheets are grouped in the following order:

1. Existing Conditions
2. Cumulative Base Conditions
3. Cumulative Plus Project Conditions
4. Cumulative Plus Project Conditions with Mitigations

Please refer to the appropriate sections of the report for more detailed descriptions of these scenarios.

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: MINARET RD. Peak Period: PM
 Minor Street: FOREST TRAIL
 Scenario: EXISTING (SAT) BASE 17,000 SADT

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	$1/2 V3 + V2 + V1 + V6 + V5 + V4 = Vc8$ 16 + 364 + 71 + 20 + 786 + 24 = 1281 vph	|	$1/2 V6 + V5 + V4 + V3 + V2 + V1 = Vc11$ 10 + 786 + 24 + 31 + 364 + 71 = 1286 vph
Critical Gap:	Tc = 6.0 sec	|	Tc = 6.0 sec
Potential Capacity:	Cp8 = 185 pcph	|	Cp11 = 184 pcph
Impedance Factor:	P8 = 0.995	|	P11 = 0.975
Actual Capacity:	$Cm8 = Cp8 \times P8$ $F1 \times F4 = 164 \text{ pcph}$	|	$Cm11 = Cp11 \times P11$ $F4 \times F1 = 163 \text{ pcph}$

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	$Vc8 + V11 + V12 = Vc7$ 1281 + 7 + 58 = 1346 vph	|	$Vc11 + V8 + V9 = Vc10$ 1286 + 2 + 9 = 1297 vph
Critical Gap:	Tc = 6.5 sec	|	Tc = 6.5 sec
Potential Capacity:	Cp7 = 136 pcph	|	Cp10 = 146 pcph
Actual Capacity:	$Cm7 = Cp7 \times P7$ $F1 \times P4 \times P11 \times P12 = 108 \text{ pcph}$	|	$Cm10 = Cp10 \times P10$ $P8 \times P9 = 128 \text{ pcph}$

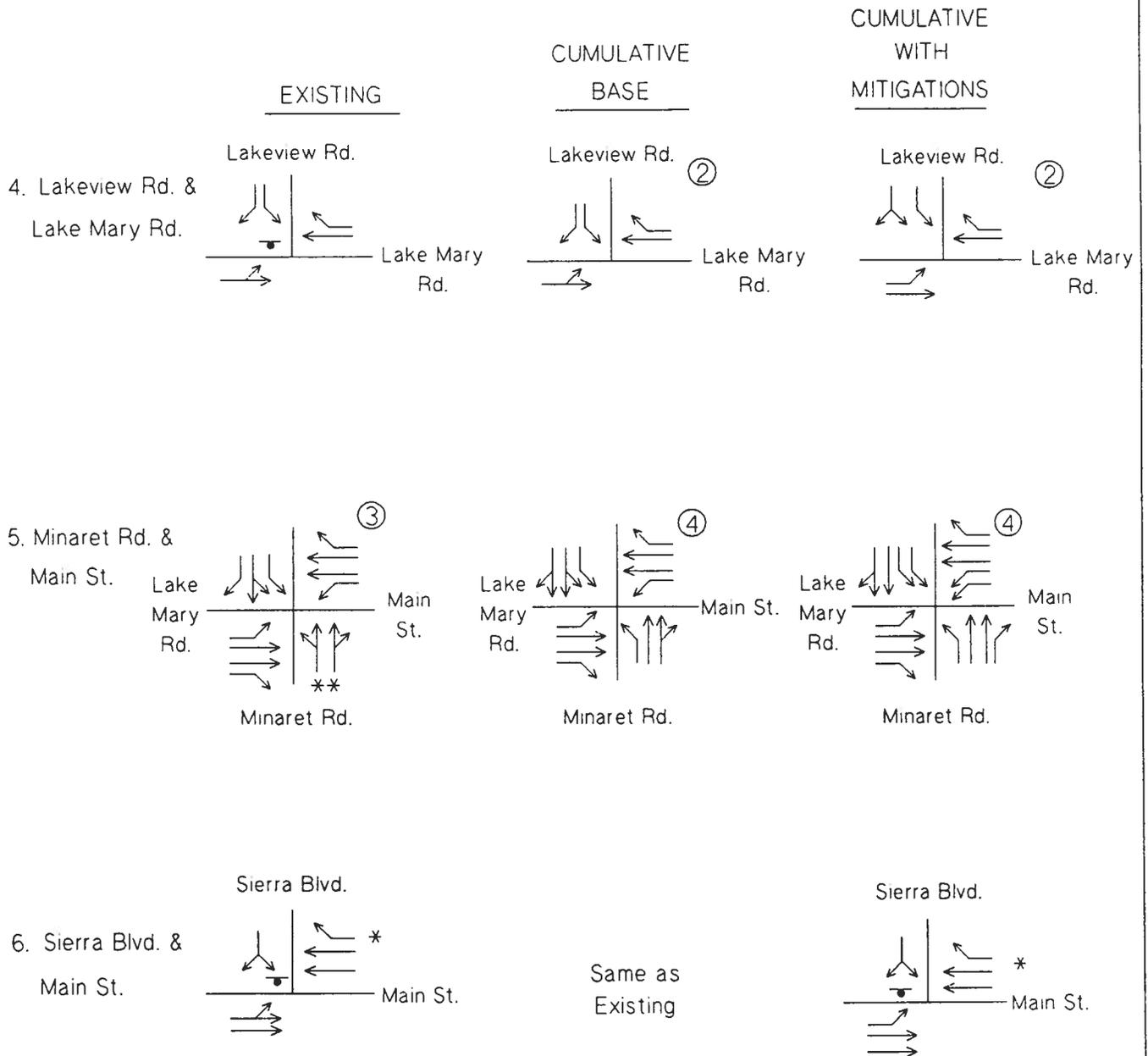
SHARED LANE CAPACITIES

Two Movements (L+T):	Csh = NA pcph	|	Csh = NA pcph
Two Movements (T+R):	Csh = NA pcph	|	Csh = NA pcph
Three Movements:	Csh = 148 pcph	|	Csh = 347 pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	NA	NA	NA	
Through from Minor Street (V8)	31	148	117	D
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Minor Street (V10)	NA	NA	NA	
Through from Minor Street (V11)	67	347	280	C
Right Turn from Minor Street (V12)	NA	NA	NA	
Left Turn from Major Street (V1)	71	497	426	A
Left Turn from Major Street (V4)	24	800	776	A

Intersection Configurations



LEGEND:

② Number of Signal Phases.

‡ Stop Sign

* Functions as a separate turn lane, although not striped.

Program Licensed To: Kaku Associates

LODESTAR EIR

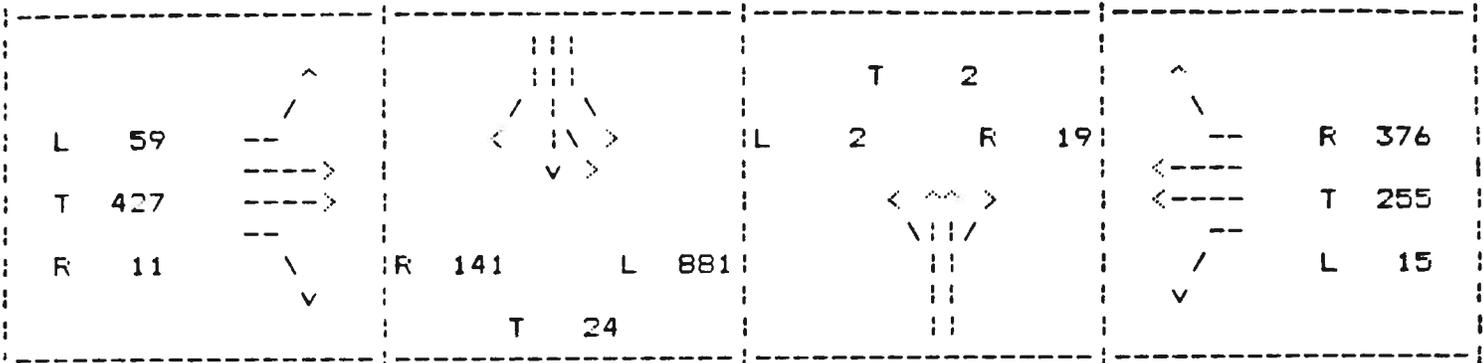
EXISTING SATURDAY PM PEAK LOS

8/9/90

BASE 17,000 SAOT

Intersection: S MINARET RD. & MAIN

Lane Configuration and Turn Volumes



Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	LT	1	4	4
	R	1	19	
SB	LT	2	453	453
	EXR	1	141	
EB	EXL	1	59	
	T	2	214	214
	EXR	1	11	
WB	EXL	1	15	15
	T	2	128	
	EXR	1	376	(o.k.)
Total Critical Volume				686

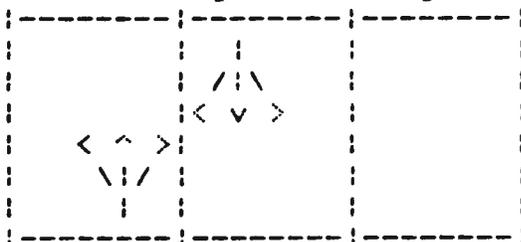
$\frac{686}{1210} = 0.57$

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

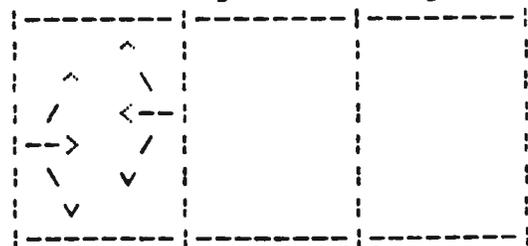
Critical Volume = 686
 No of Critical Phases = 3
 Level of Service = A
 Volume/Capacity = ~~0.48~~

0.57

N/S Signal Phasing



E/W Signal Phasing



3 Phase Signal

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

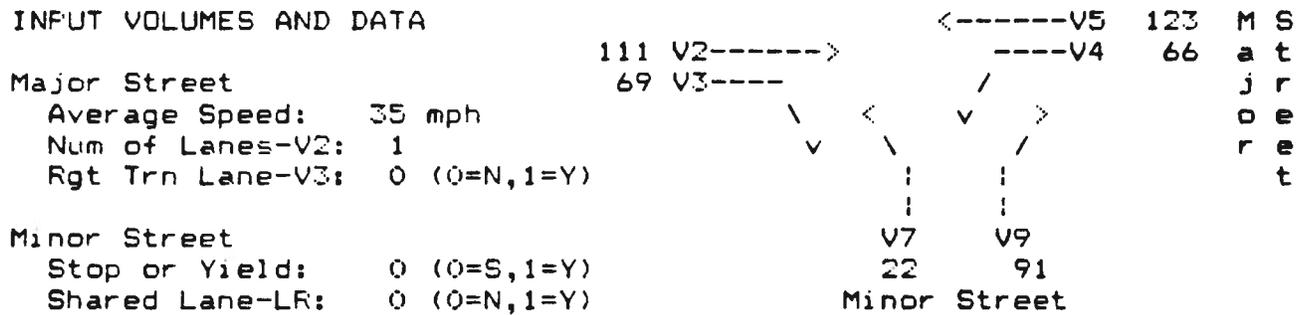
Major Street: LAKE MARY RD.

Peak Period: PM

Minor Street: KELLY RD.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	: Vc9 = 1/2 V3 + V2 =	35 + 111 =	146 vph
Critical Gap:	: Tc =		5.5 sec
Potential Capacity:	: Cp9 =		947 pcph
Actual Capacity:	: Cm9 = Cp9 =		947 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	: Vc4 = V3 + V2 =	69 + 111 =	180 vph
Critical Gap:	: Tc =		5.0 sec
Potential Capacity:	: Cp4 =		1011 pcph
Impedance Factor:	: F4 =		0.955
Actual Capacity:	: Cm4 = Cp4 =		1011 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	: Vc7 = 1/2 V3 + V2 + V5 + V4 =	35 + 111 + 123 + 66 =	335 vph
Critical Gap:	: Tc =		6.5 sec
Potential Capacity:	: Cp7 =		607 pcph
Actual Capacity:	: Cm7 = Cp7 x F4 =		580 pcph
Shared Lane Capacity:	: Csh =		NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	22	580	558	A
Right Turn from Minor Street (V9)	91	947	856	A
Left Turn from Major Street (V4)	66	1011	945	A

Intersection Configurations

	EXISTING	CUMULATIVE BASE	CUMULATIVE WITH MITIGATIONS
10. Mono St. & Meridian Blvd.		Same as Existing	
11. Old Mammoth Rd. & Meridian Blvd.		Same as Existing	
12. Minaret Rd. & Chateau Rd.		Same as Existing	

LEGEND:

② Number of Signal Phases.

‡ Stop Sign

* Functions as a separate turn lane, although not striped.

Program Licensed To: Kaku Associates

LODESTAR EIR

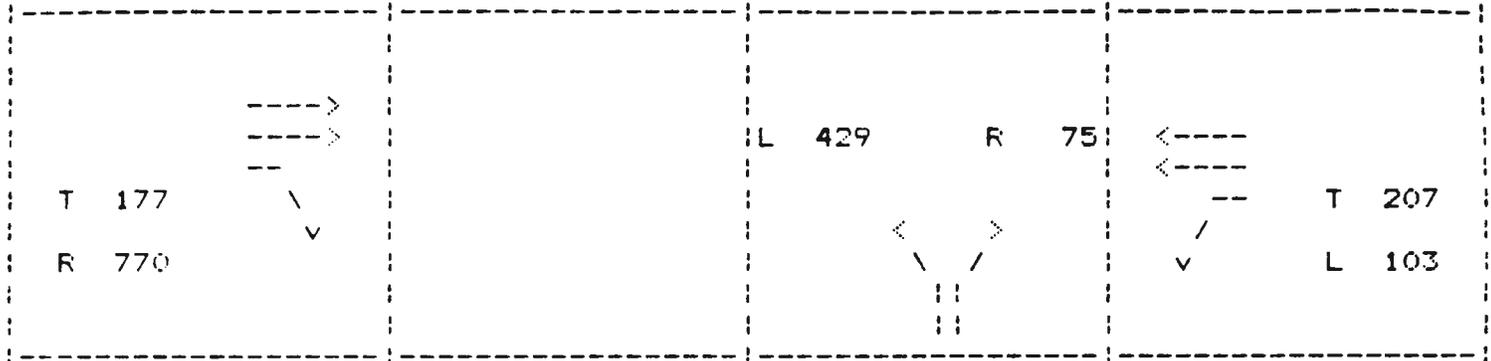
EXISTING SATURDAY PM PEAK LOS

8/13/90

BASE 17,000 SADD

Intersection: 7 OLD MAMMOTH & MAIN

Lane Configuration and Turn Volumes

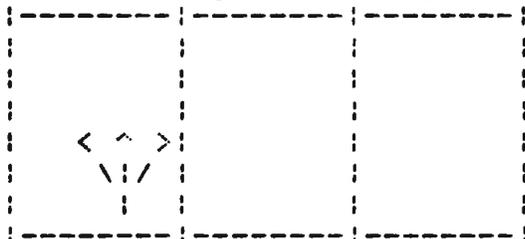


Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	429	429
	EXR	1	75	
EB	T	2	89	89
	EXR	1	770	252 (RIGHTS)
WB	EXL	1	103	103
	T	2	104	
Total Critical Volume				621

Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume	=	621
No of Critical Phases	=	2
Level of Service	=	AB
Volume/Capacity	=	0.41

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

$$\frac{621 + 252}{873} = 1.275$$

0.68

09-Aug-90

Kaku Associates

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

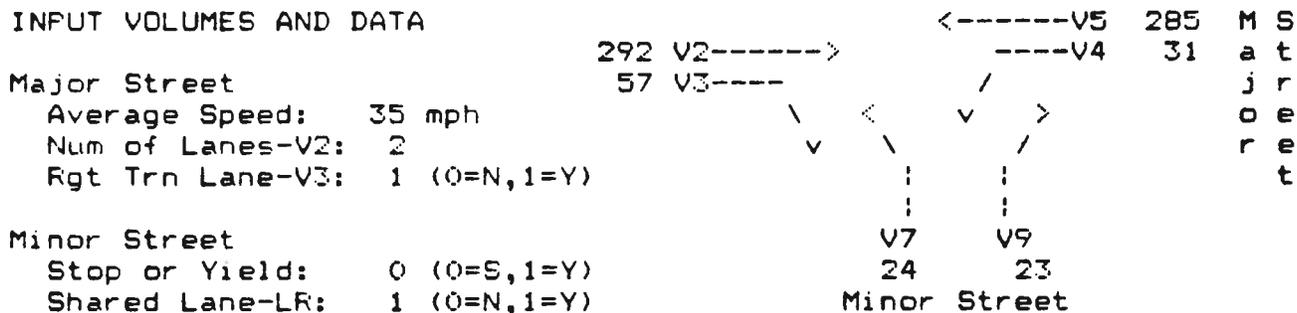
Major Street: MERIDIAN BLVD.

Peak Period: PM

Minor Street: MINARET RD.

Scenario: EXISTING (SAT) BASE 17,000 SADT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	|	$Vc9 = 1/2 V3 + V2 =$	$0 + 146 =$	146 vph
Critical Gap:	|	$Tc =$		5.5 sec
Potential Capacity:	|	$Cp9 =$		947 pcph
Actual Capacity:	|	$Cm9 = Cp9 =$		947 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	|	$Vc4 = V3 + V2 =$	$57 + 292 =$	349 vph
Critical Gap:	|	$Tc =$		5.5 sec
Potential Capacity:	|	$Cp4 =$		746 pcph
Impedance Factor:	|	$F4 =$	0.975	
Actual Capacity:	|	$Cm4 = Cp4 =$		746 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	|	$Vc7 = 1/2 V3 + V2 +$	$V5 + V4 =$	
	|	$0 + 292 +$	$285 + 31 =$	608 vph
Critical Gap:	|	$Tc =$		7.0 sec
Potential Capacity:	|	$Cp7 =$		371 pcph
Actual Capacity:	|	$Cm7 = Cp7 \times F4 =$		362 pcph
Shared Lane Capacity:	|	$Csh =$		519 pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	47	519	472	A
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	31	746	715	A

Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE BASE PM PEAK TURNING MOVEMENTS
WINTER WEEKEND CONDITIONS

9/14/90

INTERSECTION		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
NO	STREETS	L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	217	351	33	47	953	74	60	13	353	28	16	2
		[601]			[1074]			[426]			[64]		
3	KELLY RD. & LAKE MARY RD.	29	-	105	-	-	-	-	127	86	75	151	-
		[134]			[]			[213]			[226]		
4	LAKEVIEW & LAKE MARY RD.	-	-	-	344	-	61	59	383	-	-	328	224
		[]			[405]			[442]			[552]		
5	MINARET RD. & MAIN	63	301	119	1006	451	149	65	562	91	109	387	480
		[483]			[1606]			[718]			[976]		
6	SIERRA & MAIN	-	-	-	48	-	10	24	1755	-	-	929	23
		[]			[58]			[1779]			[952]		
7	OLD MAMMOTH & MAIN	642	-	80	-	-	-	-	237	995	108	260	-
		[722]			[]			[1232]			[368]		
8	MAJ. PINES & MERIDIAN	-	9	103	272	35	-	-	-	-	126	-	14
		[112]			[307]			[]			[272]		
9	MINARET RD. & MERIDIAN	126	359	23	63	468	63	78	386	274	31	258	5
		[508]			[594]			[738]			[342]		
10	MONO ST. & MERIDIAN	-	-	-	56	-	16	13	445	-	-	485	3
		[]			[72]			[458]			[521]		
11	OLD MAMMOTH & MERIDIAN	167	660	194	287	943	250	83	101	193	206	200	309
		[1021]			[1480]			[377]			[715]		
12	MINARET RD. & CHATEAU RD.	-	505	60	20	759	-	-	-	-	96	-	6
		[565]			[779]			[]			[102]		
13	OLD MAMMOTH & CHATEAU RD.	11	825	4	50	957	201	103	11	3	8	3	38
		[840]			[1208]			[117]			[49]		
14	MINARET RD. & OLD MAMMOTH	123	291	456	13	489	224	143	373	205	386	362	60
		[870]			[726]			[721]			[808]		

Program Licensed To: Kaku Associates

LODESTAR EIR

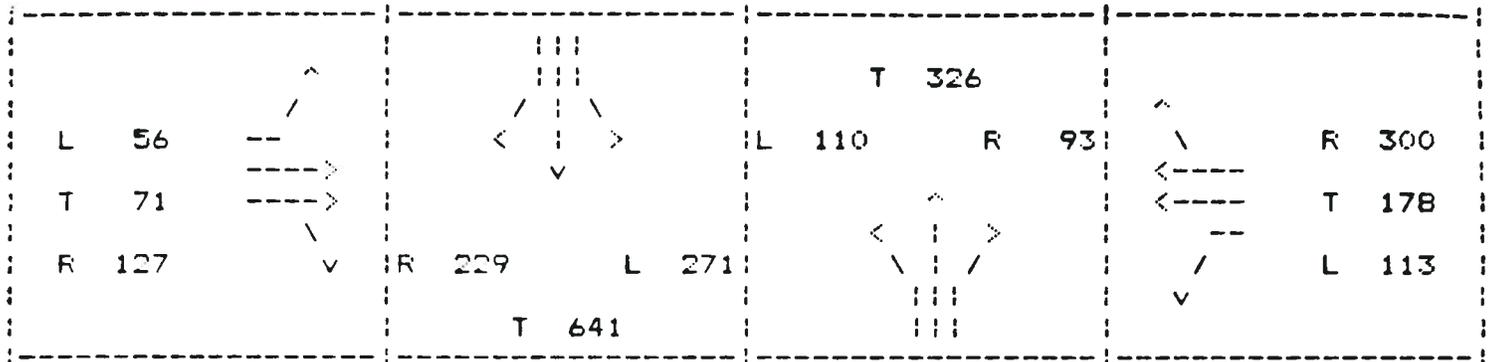
EXISTING SATURDAY PM PEAK LOS

8/9/90

BASE 17,000 SAOT

Intersection: 11 OLD MAMMOTH & MERIDIAN

Lane Configuration and Turn Volumes



Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	110	110
	T	1	326	
	EXR	1	93	
SB	EXL	1	271	
	T	1	641	641
	EXR	1	229	
EB	EXL	1	56	56
	T	1	71	
	R	1	127	
WB	EXL	1	113	
	T	1	178	178
	R	1	300	
Total Critical Volume				985

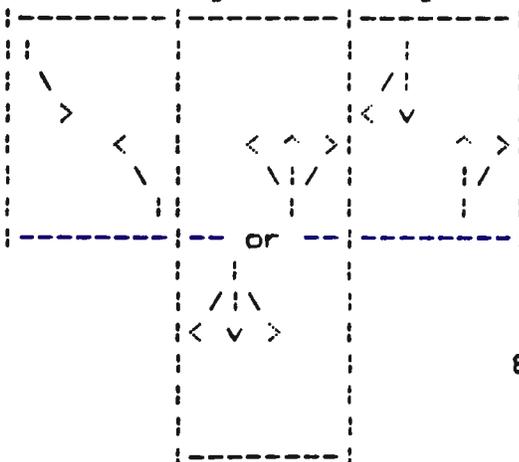
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 985
 No of Critical Phases = 4
 Level of Service = **ED**
 Volume/Capacity = ~~0.72~~

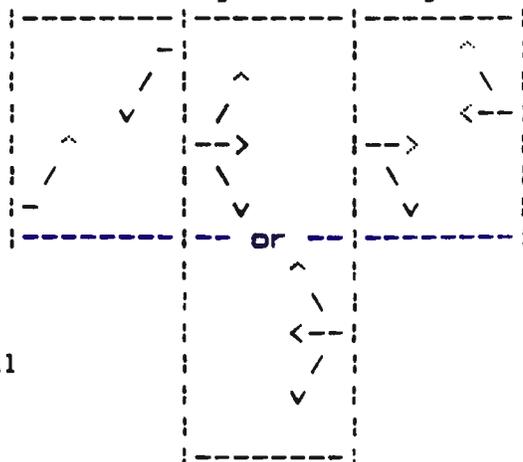
$\frac{985}{1170} = 0.84$

0.84

N/S Signal Phasing



E/W Signal Phasing



B Phase Signal

Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK TURNING MOVEMENTS 9/14/90
WINTER WEEKEND CONDITIONS

NO	INTERSECTION STREETS	NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
		L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	217	368	33	47	1027	74	60	13	353	28	16	20
		[618]			[1148]			[426]			[64]		
3	KELLY RD. & LAKE MARY RD.	31	-	105	-	-	-	-	127	91	75	151	-
		[136]			[]			[218]			[226]		
4	LAKEVIEW & LAKE MARY RD.	-	-	-	366	-	61	59	383	-	-	328	235
		[]			[427]			[442]			[563]		
5	MINARET RD. & MAIN	74	364	266	1006	572	149	65	562	113	255	387	480
		[704]			[1727]			[740]			[1122]		
6	SIERRA & MAIN	-	-	-	48	-	10	24	1884	-	-	1059	23
		[]			[58]			[1908]			[1082]		
7	OLD MAMMOTH & MAIN	692	-	80	-	-	-	-	261	1046	108	284	-
		[772]			[]			[1307]			[392]		
8	MAJ. PINES & MERIDIAN	-	9	103	277	35	-	-	-	-	126	-	14
		[112]			[312]			[]			[274]		
9	MINARET RD. & MERIDIAN	181	453	52	105	507	76	107	481	286	42	320	11
		[686]			[688]			[874]			[477]		
10	MOND ST. & MERIDIAN	-	-	-	56	-	16	13	603	-	-	657	3
		[]			[72]			[616]			[693]		
11	OLD MAMMOTH & MERIDIAN	238	662	194	287	944	304	131	152	239	206	230	30
		[1094]			[1535]			[522]			[745]		
12	MINARET RD. & CHATEAU RD.	-	683	63	20	821	-	-	-	-	97	-	6
		[746]			[841]			[]			[103]		
13	OLD MAMMOTH & CHATEAU RD.	11	825	4	50	957	201	103	11	3	8	3	38
		[840]			[1208]			[117]			[49]		
14	MINARET RD. & OLD MAMMOTH	123	401	456	13	552	224	143	373	205	386	362	13
		[980]			[789]			[721]			[879]		

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

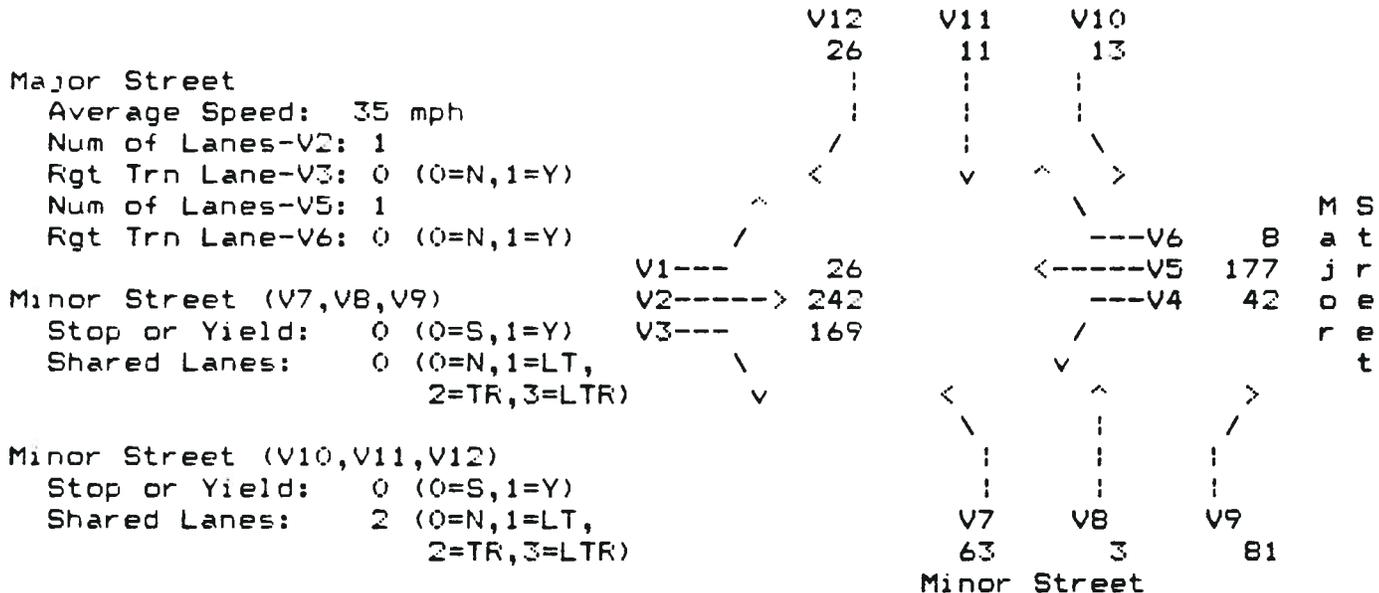
Major Street: OLD MAMMOTH RD.

Peak Period: PM

Minor Street: MINARET RD.

Scenario: EXISTING (SAT) BASE 17,000 SADT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

Conflicting Flows:	$1/2 V3 + V2 =$	$Vc9$	:	$1/2 V6 + V5 =$	$Vc12$
	$85 + 242 =$	327 vph	:	$4 + 177 =$	181 vph
Critical Gap:	$Tc =$	5.5 sec	:	$Tc =$	5.5 sec
Potential Capacity:	$Cp9 =$	766 pcph	:	$Cp12 =$	910 pcph
Impedance Factor:	$P9 =$	0.930	:	$P12 =$	0.980
Actual Capacity:	$Cm9 = Cp9 =$	766 pcph	:	$Cm12 = Cp12 =$	910 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 =$	$Vc4$	:	$V6 + V5 =$	$Vc1$
	$169 + 242 =$	411 vph	:	$8 + 177 =$	185 vph
Critical Gap:	$Tc =$	5.0 sec	:	$Tc =$	5.0 sec
Potential Capacity:	$Cp4 =$	785 pcph	:	$Cp1 =$	1006 pcph
Impedance Factor:	$P4 =$	0.970	:	$P1 =$	0.980
Actual Capacity:	$Cm4 = Cp4 =$	785 pcph	:	$Cm1 = Cp1 =$	1006 pcph

continued

level of service and V/C ratio based on the sum of critical volumes and the number of critical phases are shown in Table C-1.

TABLE C-1
RELATIONSHIP OF LEVEL OF SERVICE TO CRITICAL VOLUME

<u>Maximum Sum of Critical Volumes</u>			<u>Level of Service</u>	<u>Typical V/C Ratio</u>
<u>Two Phases</u>	<u>Three Phases</u>	<u>Four or More Phases</u>		
765	725	700	A	0.00 - 0.60
895	845	820	B	0.61 - 0.70
1,020	970	935	C	0.71 - 0.80
1,150	1,090	1,055	D	0.81 - 0.90
1,275	1,210	1,170	E	0.90 - 1.00
-----not applicable-----			F	Greater than 1.00

The "Two-Way Stop Control" method was employed to determine the levels of service at the two-way stop-sign controlled intersections within the study area. This methodology bases the level of service on the amount of delay expected to be experienced by stopping vehicles.² The delay to stopped vehicles on the minor street is dependent upon the volume of traffic on the major street. Vehicles from the minor street will only pull out into the traffic stream when there is an acceptable gap in traffic on the major street. The intersection level of service is therefore evaluated based upon the amount of "reserve capacity" available for the minor street traffic to pull out into or across the major street traffic. The lower the reserve capacity, the lower the number of additional vehicles on the minor street that could be accommodated at the intersection and the greater the delay to minor street traffic. If the reserve capacity reached zero, no additional vehicles could turn from the side street or cross the main street (any available gaps for such movements are already utilized). Table C-2 indicates the relationship of reserve capacity to level of service.

² Source: Transportation Research Board, Highway Capacity Manual, Special Report 209, 1985, Chapter 10.

Program Licensed To: Kaku Associates

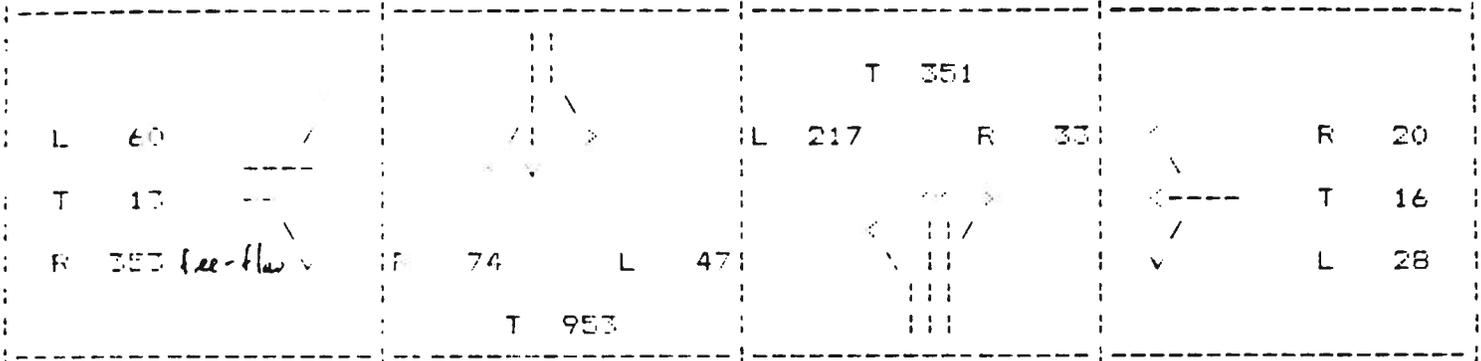
LODESTAR EIR

CUMULATIVE BASE PM PEAK LOS
WINTER WEEKEND CONDITIONS

9/12/90

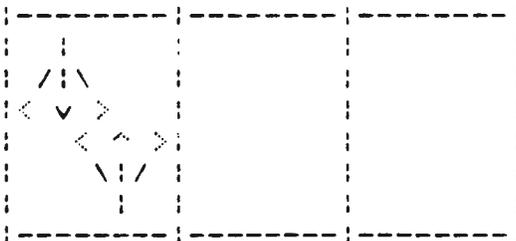
Intersection: 1 MINARET RD. & FOREST TRAIL (High Critical Volume Estimate)

Lane Configuration and Turn Volumes

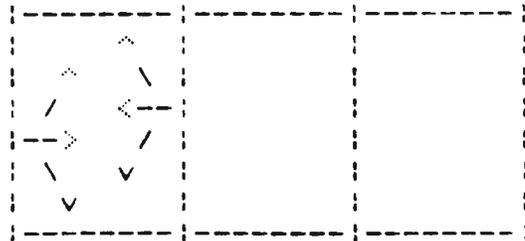


Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume	Maximum Total Critical Volumes			
					Level of Service	Two Phase	Three Phase	Four Phase
NB	EXL	1	217	217	A	900	855	825
	TR	2	192					
SE	EXL	1	47		B	1050	1000	965
	TR	1	1027	1027				
EB	LT	1	73	73	C	1200	1140	1100
	EXR	1	353					
WB	LTR	1	64	64	D	1350	1275	1225
Total Critical Volume				1381	E	1500	1425	1375
				$\frac{1381}{1275} = 1.08$	F	NA	NA	NA
					Critical Volume = 1381			
					No of Critical Phases = 2			
					Level of Service = BF			
					Volume/Capacity = $\frac{1381}{1275} = 1.08$			

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD.

Peak Period: PM

Minor Street: FOREST TRAIL

Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA

Major Street

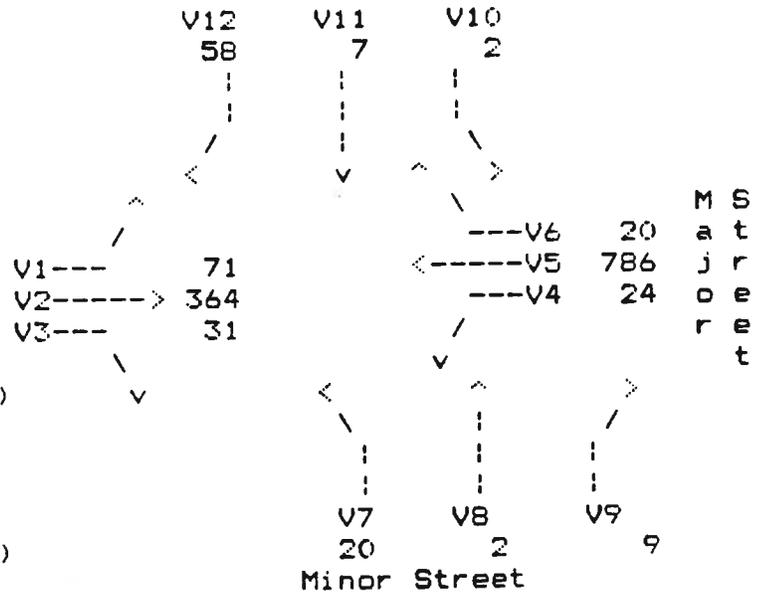
Average Speed: 30 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 0 (0=N,1=Y)
 Num of Lanes-V5: 1
 Rgt Trn Lane-V6: 0 (0=N,1=Y)

Minor Street (V7,V8,V9)

Stop or Yield: 0 (0=S,1=Y)
 Shared Lanes: 3 (0=N,1=LT,
 2=TR,3=LTR)

Minor Street (V10,V11,V12)

Stop or Yield: 0 (0=S,1=Y)
 Shared Lanes: 3 (0=N,1=LT,
 2=TR,3=LTR)



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

Conflicting Flows:	$1/2 V3 + V2 = Vc9$	:	$1/2 V6 + V5 = Vc12$
	$16 + 364 = 380$ vph	:	$10 + 786 = 796$ vph
Critical Gap:	$Tc = 5.5$ sec	:	$Tc = 5.5$ sec
Potential Capacity:	$Cp9 = 718$ pcph	:	$Cp12 = 432$ pcph
Impedance Factor:	$F9 = 0.995$	:	$P12 = 0.915$
Actual Capacity:	$Cm9 = Cp9 = 718$ pcph	:	$Cm12 = Cp12 = 432$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 = Vc4$	:	$V6 + V5 = Vc1$
	$31 + 364 = 395$ vph	:	$20 + 786 = 806$ vph
Critical Gap:	$Tc = 5.0$ sec	:	$Tc = 5.0$ sec
Potential Capacity:	$Cp4 = 800$ pcph	:	$Cp1 = 497$ pcph
Impedance Factor:	$F4 = 0.980$	:	$P1 = 0.905$
Actual Capacity:	$Cm4 = Cp4 = 800$ pcph	:	$Cm1 = Cp1 = 497$ pcph

continued

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

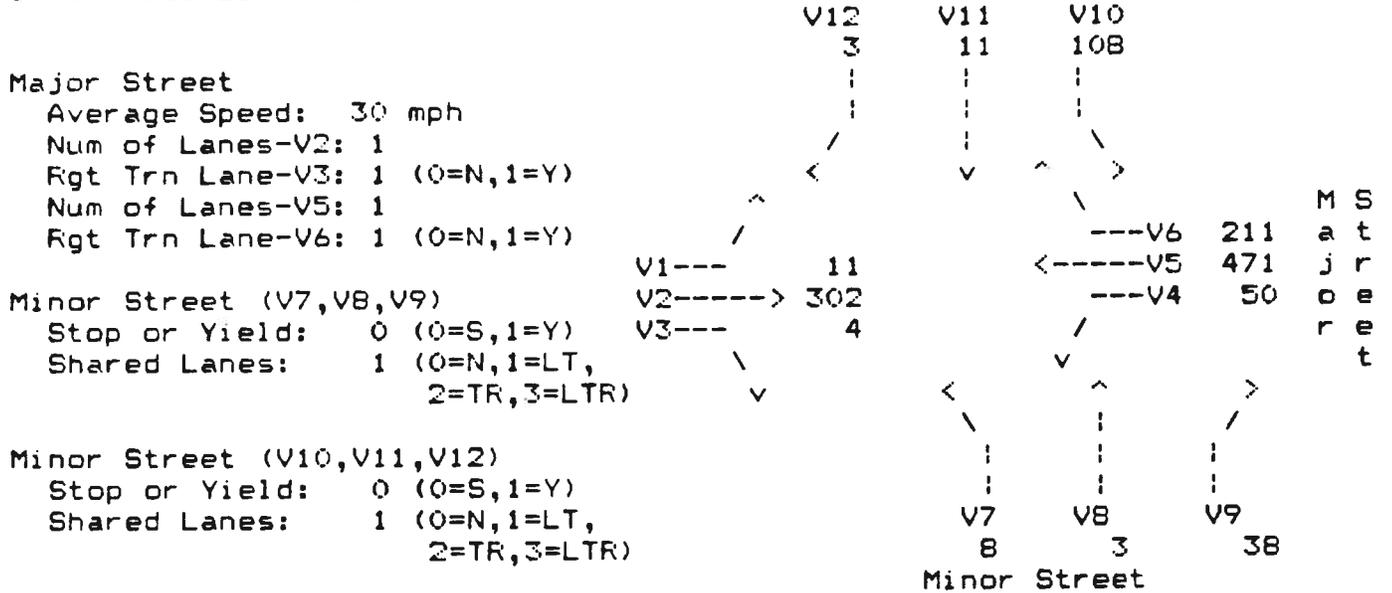
Major Street: OLD MAMMOTH RD.

Peak Period: PM

Minor Street: CHATEAU RD.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

Conflicting Flows:	$1/2 V3 + V2 =$	$Vc9$	:	$1/2 V6 + V5 =$	$Vc12$
	$0 + 302 =$	302 vph	:	$0 + 471 =$	471 vph
Critical Gap:	$Tc =$	5.5 sec	:	$Tc =$	5.5 sec
Potential Capacity:	$Cp9 =$	788 pcph	:	$Cp12 =$	654 pcph
Impedance Factor:	$P9 =$	0.970	:	$P12 =$	1.000
Actual Capacity:	$Cm9 = Cp9 =$	788 pcph	:	$Cm12 = Cp12 =$	654 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 =$	$Vc4$	:	$V6 + V5 =$	$Vc1$
	$4 + 302 =$	306 vph	:	$211 + 471 =$	682 vph
Critical Gap:	$Tc =$	5.0 sec	:	$Tc =$	5.0 sec
Potential Capacity:	$Cp4 =$	884 pcph	:	$Cp1 =$	577 pcph
Impedance Factor:	$P4 =$	0.965	:	$P1 =$	0.990
Actual Capacity:	$Cm4 = Cp4 =$	884 pcph	:	$Cm1 = Cp1 =$	577 pcph

continued

Program Licensed To: Kaku Associates

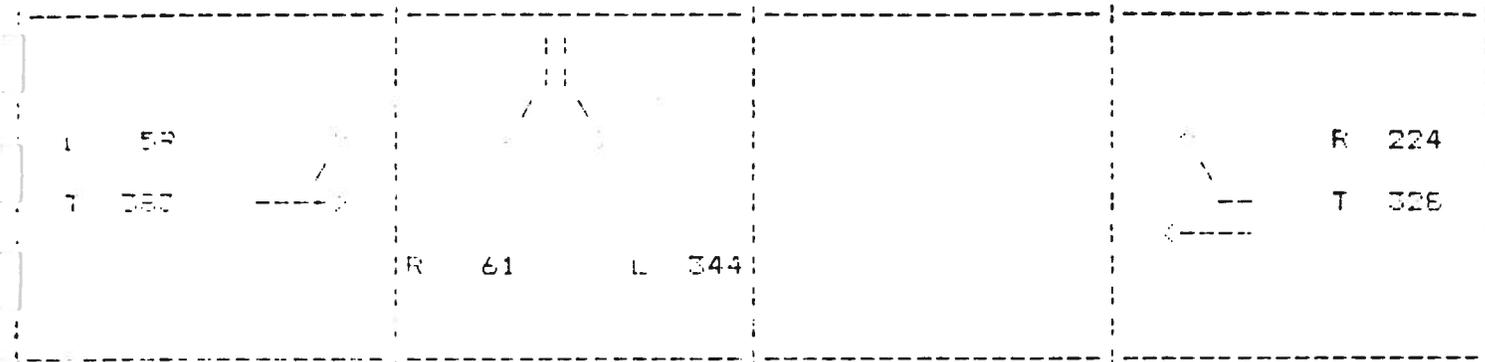
LODESTAR EIR

CUMULATIVE BASE PM PEAK LOS
WINTER WEEKEND CONDITIONS

9/12/90

Intersection: 4 LAKEVIEW & LAKE MARY RD. (High Critical Volume Estimate)

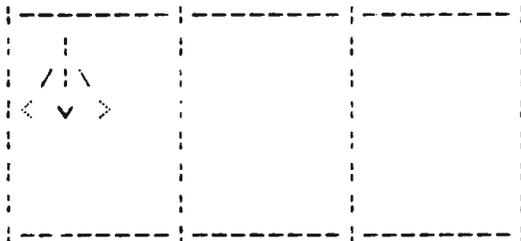
Lane Configuration and Turn Volumes



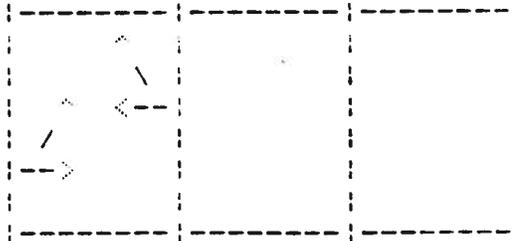
Appro	Lane Group	No of Lanes	Per Lane Volume	Critical Volume	Maximum Total Critical Volumes			
					Level of Service	Two Phase	Three Phase	Four Phase
SE	EXL	1	344	344	A	900	855	825
	EXR	1	61		B	1050	1000	965
EE	T	1	442	442	C	1200	1140	1100
					D	1350	1275	1225
WE	T	1	328	328	E	1500	1425	1375
	EXR	1	224		F	NA	NA	NA
Total Critical Volume				1114				
				<u>1275</u>				$F = 0.87$

Critical Volume = 1114
 No of Critical Phases = 2
 Level of Service = 70
 Volume/Capacity = 0.74
 0.87

N/S Signal Phasing



E/W Signal Phasing

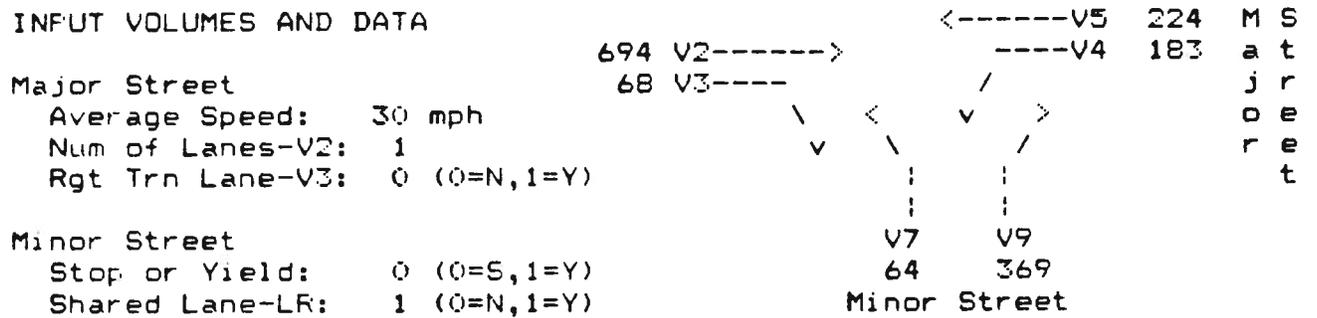


2 Phase Signal

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD. Peak Period: PM
 Minor Street: CANYON BLVD.
 Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	|	$Vc9 = 1/2 V3 + V2 = 34 + 694 =$	728 vph
Critical Gap:	|	$Tc =$	5.5 sec
Potential Capacity:	|	$Cp9 =$	470 pcph
Actual Capacity:	|	$Cm9 = Cp9 =$	470 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	|	$Vc4 = V3 + V2 = 68 + 694 =$	762 vph
Critical Gap:	|	$Tc =$	5.0 sec
Potential Capacity:	|	$Cp4 =$	525 pcph
Impedance Factor:	|	$F4 =$	0.720
Actual Capacity:	|	$Cm4 = Cp4 =$	525 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	|	$Vc7 = 1/2 V3 + V2 + V5 + V4 =$	1135 vph
Critical Gap:	|	$Tc =$	6.5 sec
Potential Capacity:	|	$Cp7 =$	190 pcph
Actual Capacity:	|	$Cm7 = Cp7 \times F4 =$	137 pcph
Shared Lane Capacity:	|	$Csh =$	346 pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	433	346	-87	F
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	183	525	342	B

12-Sep-90

Kaku Associates

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MAIN ST.

Peak Period: PM

Minor Street: SIERRA BLVD.

Scenario: CUMULATIVE BASE

INPUT VOLUMES AND DATA

Major Street

Average Speed: 30 mph

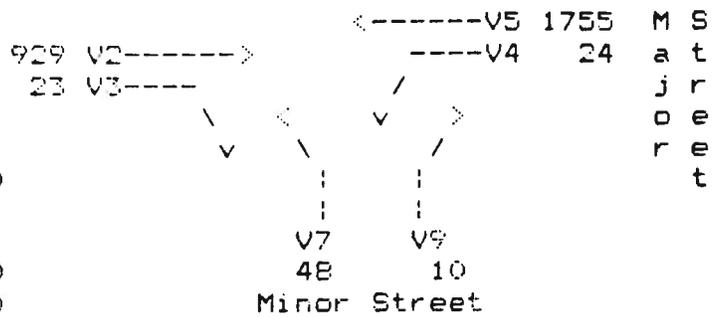
Num of Lanes-V2: 2

Rgt Trn Lane-V3: 1 (0=N,1=Y)

Minor Street

Stop or Yield: 0 (0=S,1=Y)

Shared Lane-LR: 1 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: | $Vc9 = 1/2 V3 + V2 = 0 + 465 = 465$ vph
 Critical Gap: | $Tc = 5.5$ sec
 Potential Capacity: | $Cp9 = 658$ pcph
 Actual Capacity: | $Cm9 = Cp9 = 658$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: | $Vc4 = V3 + V2 = 23 + 929 = 952$ vph
 Critical Gap: | $Tc = 5.5$ sec
 Potential Capacity: | $Cp4 = 349$ pcph
 Impedance Factor: | $F4 = 0.955$
 Actual Capacity: | $Cm4 = Cp4 = 349$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: | $Vc7 = 1/2 V3 + V2 + V5 + V4 = 0 + 929 + 1755 + 24 = 2708$ vph
 Critical Gap: | $Tc = 7.0$ sec
 Potential Capacity: | $Cp7 = 60$ pcph
 Actual Capacity: | $Cm7 = Cp7 \times F4 = 57$ pcph
 Shared Lane Capacity: | $Csh = 68$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	58	68	10	E
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	24	349	325	B

09-Aug-90

Kaku Associates

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

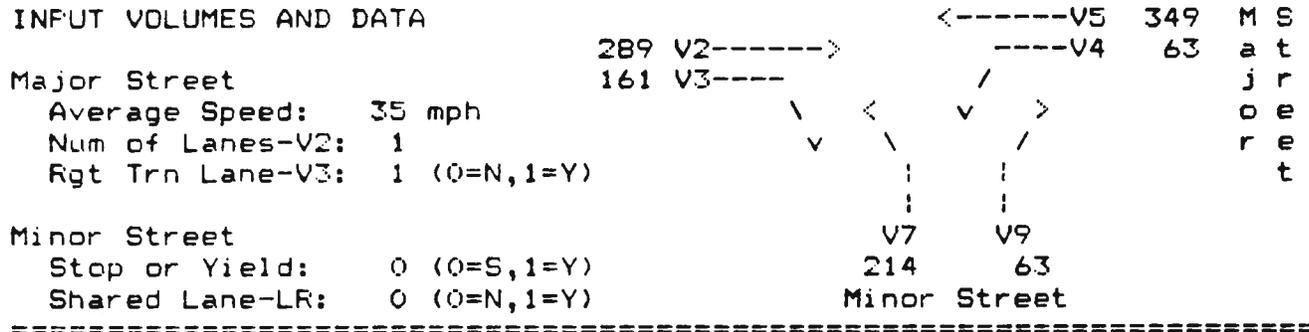
Major Street: LAKE MARY RD.

Peak Period: PM

Minor Street: LAKEVIEW

Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	: Vc9 = 1/2 V3 + V2 =	0 + 289 =	289 vph
Critical Gap:	: Tc =		5.5 sec
Potential Capacity:	: Cp9 =		801 pcph
Actual Capacity:	: Cm9 = Cp9 =		801 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	: Vc4 = V3 + V2 =	161 + 289 =	450 vph
Critical Gap:	: Tc =		5.0 sec
Potential Capacity:	: Cp4 =		750 pcph
Impedance Factor:	: P4 =	0.950	
Actual Capacity:	: Cm4 = Cp4 =		750 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	: Vc7 = 1/2 V3 + V2 + V5 + V4 =	0 + 289 + 349 + 63 =	701 vph
Critical Gap:	: Tc =		6.5 sec
Potential Capacity:	: Cp7 =		364 pcph
Actual Capacity:	: Cm7 = Cp7 x P4 =		346 pcph
Shared Lane Capacity:	: Csh =		NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	214	346	132	D
Right Turn from Minor Street (V9)	63	801	738	A
Left Turn from Major Street (V4)	63	750	687	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

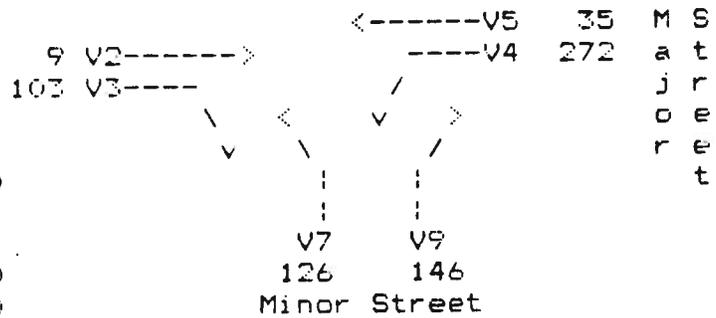
Major Street: MERIDIAN RD.
 Minor Street: MAJESTIC PINES DR.
 Scenario: CUMULATIVE BASE

Peak Period: PM

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: $Vc9 = 1/2 V3 + V2 = 52 + 9 = 61$ vph
 Critical Gap: $Tc = 5.5$ sec
 Potential Capacity: $Cp9 = 1036$ pcph
 Actual Capacity: $Cm9 = Cp9 = 1036$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: $Vc4 = V3 + V2 = 103 + 9 = 112$ vph
 Critical Gap: $Tc = 5.0$ sec
 Potential Capacity: $Cp4 = 1082$ pcph
 Impedance Factor: $F4 = 0.815$
 Actual Capacity: $Cm4 = Cp4 = 1082$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: $Vc7 = 1/2 V3 + V2 + V5 + V4 = 52 + 9 + 35 + 272 = 368$ vph
 Critical Gap: $Tc = 6.5$ sec
 Potential Capacity: $Cp7 = 586$ pcph
 Actual Capacity: $Cm7 = Cp7 \times F4 = 478$ pcph
 Shared Lane Capacity: $Csh = NA$ pcph

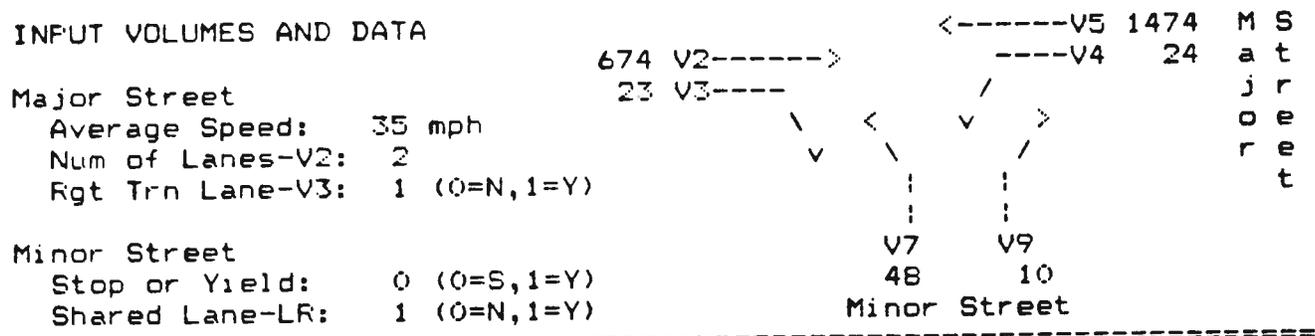
RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	126	478	352	B
Right Turn from Minor Street (V9)	146	1036	890	A
Left Turn from Major Street (V4)	272	1082	810	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MAIN ST. Peak Period: PM
 Minor Street: SIERRA BLVD.
 Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA



Major Street
 Average Speed: 35 mph
 Num of Lanes-V2: 2
 Rgt Trn Lane-V3: 1 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 1 (0=N,1=Y)

STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: | $V_{c9} = 1/2 V_3 + V_2 = 0 + 337 = 337$ vph
 Critical Gap: | $T_c = 5.5$ sec
 Potential Capacity: | $C_{p9} = 757$ pcph
 Actual Capacity: | $C_{m9} = C_{p9} = 757$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: | $V_{c4} = V_3 + V_2 = 23 + 674 = 697$ vph
 Critical Gap: | $T_c = 5.5$ sec
 Potential Capacity: | $C_{p4} = 487$ pcph
 Impedance Factor: | $F_4 = 0.970$
 Actual Capacity: | $C_{m4} = C_{p4} = 487$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: | $V_{c7} = 1/2 V_3 + V_2 + V_5 + V_4 = 0 + 674 + 1474 + 24 = 2172$ vph
 Critical Gap: | $T_c = 7.0$ sec
 Potential Capacity: | $C_{p7} = 60$ pcph
 Actual Capacity: | $C_{m7} = C_{p7} \times F_4 = 58$ pcph
 Shared Lane Capacity: | $C_{sh} = 69$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	58	69	11	E
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	24	487	463	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN RD.

Peak Period: PM

Minor Street: MOND ST.

Scenario: CUMULATIVE BASE

INPUT VOLUMES AND DATA

Major Street

Average Speed: 30 mph

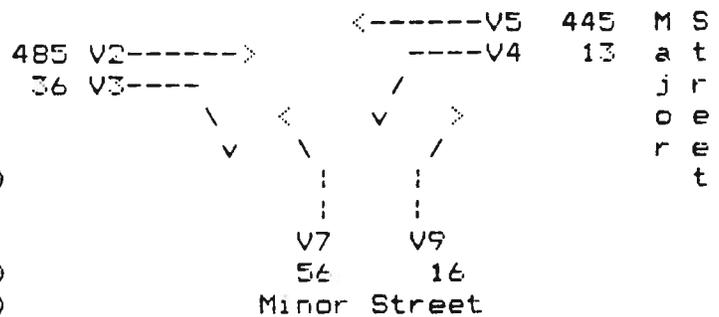
Num of Lanes-V2: 2

Rgt Trn Lane-V3: 1 (0=N,1=Y)

Minor Street

Stop or Yield: 0 (0=S,1=Y)

Shared Lane-LR: 1 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	|	$Vc9 = 1/2 V3 + V2 =$	$0 + 243 =$	243 vph
Critical Gap:	|	$Tc =$		5.5 sec
Potential Capacity:	|	$Cp9 =$		847 pcph
Actual Capacity:	|	$Cm9 = Cp9 =$		847 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	|	$Vc4 = V3 + V2 =$	$36 + 485 =$	521 vph
Critical Gap:	|	$Tc =$		5.5 sec
Potential Capacity:	|	$Cp4 =$		619 pcph
Impedance Factor:	|	$F4 =$	0.990	
Actual Capacity:	|	$Cm4 = Cp4 =$		619 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	|	$Vc7 = 1/2 V3 + V2 + V5 + V4 =$	$0 + 485 + 445 + 13 =$	943 vph
Critical Gap:	|	$Tc =$		7.0 sec
Potential Capacity:	|	$Cp7 =$		212 pcph
Actual Capacity:	|	$Cm7 = Cp7 \times F4 =$		210 pcph
Shared Lane Capacity:	|	$Csh =$		252 pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	72	252	180	D
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	13	619	606	A

13-Aug-90

Kaku Associates

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MAJESTIC FINES DR.

Peak Period: PM

Minor Street: MERIDIAN BLVD.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

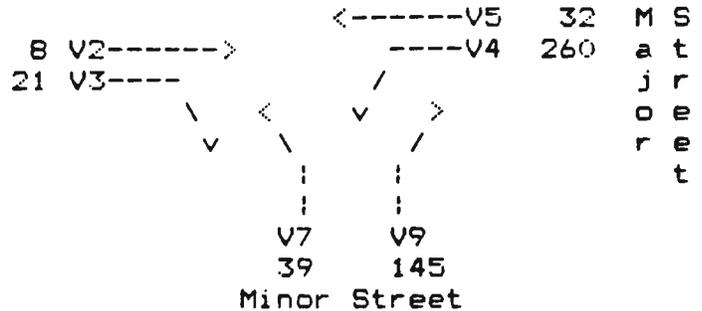
INPUT VOLUMES AND DATA

Major Street

Average Speed: 25 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street

Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: | $V_{c9} = 1/2 V_3 + V_2 = 11 + 8 = 19$ vph
 Critical Gap: | $T_c = 5.5$ sec
 Potential Capacity: | $C_{p9} = 1080$ pcph
 Actual Capacity: | $C_{m9} = C_{p9} = 1080$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: | $V_{c4} = V_3 + V_2 = 21 + 8 = 29$ vph
 Critical Gap: | $T_c = 5.0$ sec
 Potential Capacity: | $C_{p4} = 1177$ pcph
 Impedance Factor: | $F_4 = 0.845$
 Actual Capacity: | $C_{m4} = C_{p4} = 1177$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: | $V_{c7} = 1/2 V_3 + V_2 + V_5 + V_4 = 11 + 8 + 32 + 260 = 311$ vph
 Critical Gap: | $T_c = 6.5$ sec
 Potential Capacity: | $C_{p7} = 623$ pcph
 Actual Capacity: | $C_{m7} = C_{p7} \times F_4 = 526$ pcph
 Shared Lane Capacity: | $C_{sh} = NA$ pcph

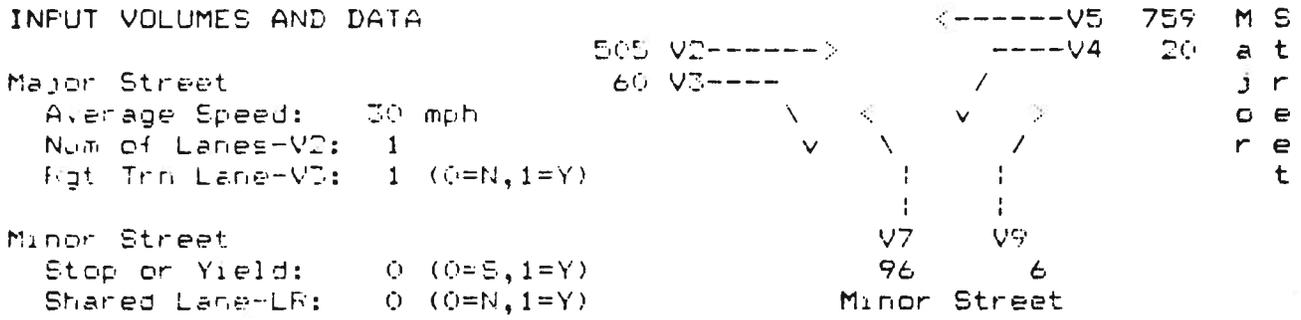
RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	39	526	487	A
Right Turn from Minor Street (V9)	145	1080	935	A
Left Turn from Major Street (V4)	260	1177	917	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD. Peak Period: PM
 Minor Street: CHATEAU RD.
 Scenario: CUMULATIVE BASE

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	Vc9 = 1/2 V3 + V2 =	0 + 505 =	505 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp9 =		631 pcph
Actual Capacity:	Cm9 = Cp9 =		631 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	Vc4 = V3 + V2 =	60 + 505 =	565 vph
Critical Gap:	Tc =		5.0 sec
Potential Capacity:	Cp4 =		656 pcph
Impedance Factor:	F4 =	0.980	
Actual Capacity:	Cm4 = Cp4 =		656 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	Vc7 = 1/2 V3 + V2 + V5 + V4 =	0 + 505 + 759 + 20 =	1284 vph
Critical Gap:	Tc =		6.5 sec
Potential Capacity:	Cp7 =		149 pcph
Actual Capacity:	Cm7 = Cp7 x F4 =		146 pcph
Shared Lane Capacity:	Csh =		NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	96	146	50	E
Right Turn from Minor Street (V9)	6	631	625	A
Left Turn from Major Street (V4)	20	656	636	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN BLVD.

Peak Period: PM

Minor Street: MOND ST.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA

Major Street

Average Speed: 35 mph

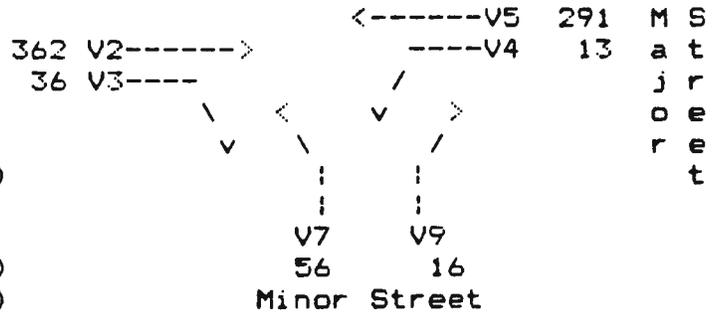
Num of Lanes-V2: 2

Rgt Trn Lane-V3: 1 (0=N,1=Y)

Minor Street

Stop or Yield: 0 (0=S,1=Y)

Shared Lane-LR: 1 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	|	$Vc9 = 1/2 V3 + V2 =$	$0 + 181 =$	181 vph
Critical Gap:	|	$Tc =$		5.5 sec
Potential Capacity:	|	$Cp9 =$		910 pcph
Actual Capacity:	|	$Cm9 = Cp9 =$		910 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	|	$Vc4 = V3 + V2 =$	$36 + 362 =$	398 vph
Critical Gap:	|	$Tc =$		5.5 sec
Potential Capacity:	|	$Cp4 =$		702 pcph
Impedance Factor:	|	$F4 =$	0.990	
Actual Capacity:	|	$Cm4 = Cp4 =$		702 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	|	$Vc7 = 1/2 V3 + V2 + V5 + V4 =$	$0 + 362 + 291 + 13 =$	666 vph
Critical Gap:	|	$Tc =$		7.0 sec
Potential Capacity:	|	$Cp7 =$		342 pcph
Actual Capacity:	|	$Cm7 = Cp7 \times F4 =$		339 pcph
Shared Lane Capacity:	|	$Csh =$		394 pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	72	394	322	B
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	13	702	689	A

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: OLD MAMMOTH RD.
 Minor Street: CHATEAU RD.
 Scenario: CUMULATIVE BASE

Peak Period: PM

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	$1/2 V3 + V2 +$	:	$1/2 V6 + V5 +$
	$V1 + V6 +$	:	$V4 + V3 +$
	$V5 + V4 = Vc8$	:	$V2 + V1 = Vc11$
	$0 + 825 +$	:	$0 + 957 +$
	$11 + 201 +$	:	$50 + 4 +$
	$957 + 50 = 2044$ vph	:	$825 + 11 = 1847$ vph
Critical Gap:	$Tc = 6.0$ sec	:	$Tc = 6.0$ sec
Potential Capacity:	$Cp8 = 90$ pcph	:	$Cp11 = 98$ pcph
Impedance Factor:	$PF8 = 0.980$	:	$PF11 = 0.930$
Actual Capacity:	$Cm8 = Cp8 \times$	:	$Cm11 = Cp11 \times$
	$F1 \times F4 = 82$ pcph	:	$F4 \times F1 = 90$ pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	$Vc8 + V11 +$	:	$Vc11 + V8 +$
	$V12 = Vc7$	:	$V9 = Vc10$
	$1843 + 11 +$	:	$1843 + 3 +$
	$3 = 1857$ vph	:	$38 = 1884$ vph
Critical Gap:	$Tc = 6.5$ sec	:	$Tc = 6.5$ sec
Potential Capacity:	$Cp7 = 77$ pcph	:	$Cp10 = 76$ pcph
Actual Capacity:	$Cm7 = Cp7 \times$	:	$Cm10 = Cp10 \times$
	$F1 \times F4 \times$	:	$F4 \times F1 \times$
	$F11 \times F12 = 65$ pcph	:	$F8 \times F9 = 64$ pcph

SHARED LANE CAPACITIES

Two Movements (L+T):	Csh = 69 pcph	:	Csh = 66 pcph
Two Movements (T+R):	Csh = NA pcph	:	Csh = NA pcph
Three Movements:	Csh = NA pcph	:	Csh = NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	NA	NA	NA	
Through from Minor Street (V8)	11	69	58	E
Right Turn from Minor Street (V9)	38	416	378	B
Left Turn from Minor Street (V10)	NA	NA	NA	
Through from Minor Street (V11)	114	66	-48	F
Right Turn from Minor Street (V12)	3	347	344	B
Left Turn from Major Street (V1)	11	327	316	B
Left Turn from Major Street (V4)	50	486	436	A

09-Aug-90

Kaku Associates

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD.

Peak Period: PM

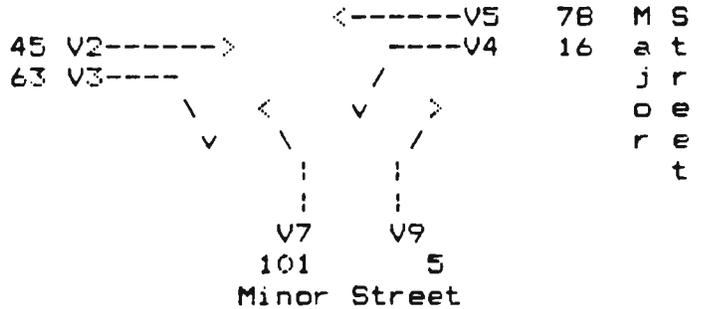
Minor Street: CHATEAU RD.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

INPUT VOLUMES AND DATA

Major Street

Average Speed: 35 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 1 (0=N,1=Y)



Minor Street

Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)

STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: | $V_{c9} = 1/2 V_3 + V_2 = 0 + 45 = 45$ vph
 Critical Gap: | $T_c = 5.5$ sec
 Potential Capacity: | $C_{p9} = 1053$ pcph
 Actual Capacity: | $C_{m9} = C_{p9} = 1053$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: | $V_{c4} = V_3 + V_2 = 63 + 45 = 108$ vph
 Critical Gap: | $T_c = 5.0$ sec
 Potential Capacity: | $C_{p4} = 1087$ pcph
 Impedance Factor: | $F_4 = 0.995$
 Actual Capacity: | $C_{m4} = C_{p4} = 1087$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: | $V_{c7} = 1/2 V_3 + V_2 + V_5 + V_4 = 0 + 45 + 78 + 16 = 139$ vph
 Critical Gap: | $T_c = 6.5$ sec
 Potential Capacity: | $C_{p7} = 783$ pcph
 Actual Capacity: | $C_{m7} = C_{p7} \times F_4 = 779$ pcph
 Shared Lane Capacity: | $C_{sh} = NA$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	101	779	678	A
Right Turn from Minor Street (V9)	5	1053	1048	A
Left Turn from Major Street (V4)	16	1087	1071	A

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: MINARET RD.

Peak Period: PM

Minor Street: OLD MAMMOTH RD.

Scenario: CUMULATIVE BASE

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	1/2 V3 + V2 +		:	1/2 V6 + V5 +	
	V1 + V6 +		:	V4 + V3 +	
	V5 + V4 =	Vc8	:	V2 + V1 =	Vc11
	103 + 373 +		:	30 + 362 +	
	143 + 60 +		:	386 + 205 +	
	362 + 386 =	1427 vph	:	373 + 143 =	1499 vph
Critical Gap:	Tc =	6.0 sec	:	Tc =	6.0 sec
Potential Capacity:	Cp8 =	155 pcph	:	Cp11 =	140 pcph
Impedance Factor:	F8 =	0.000	:	F11 =	0.000
Actual Capacity:	Cm8 = Cp8 x		:	Cm11 = Cp11 x	
	F1 x F4 =	65 pcph	:	F4 x F1 =	59 pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	Vc8 + V11 +		:	Vc11 + V8 +	
	V12 =	Vc7	:	V9 =	Vc10
	1427 + 489 +		:	1499 + 291 +	
	224 =	2140 vph	:	456 =	2246 vph
Critical Gap:	Tc =	6.5 sec	:	Tc =	6.5 sec
Potential Capacity:	Cp7 =	75 pcph	:	Cp10 =	75 pcph
Actual Capacity:	Cm7 = Cp7 x		:	Cm10 = Cp10 x	
	F1 x F4 x		:	F4 x F1 x	
	F11 x F12 =	0 pcph	:	F8 x F9 =	0 pcph

SHARED LANE CAPACITIES

Two Movements (L+T):	Csh =	NA pcph	:	Csh =	NA pcph
Two Movements (T+R):	Csh =	NA pcph	:	Csh =	83 pcph
Three Movements:	Csh =	NA pcph	:	Csh =	NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	123	0	-123	F
Through from Minor Street (V8)	291	65	-226	F
Right Turn from Minor Street (V9)	456	651	195	D
Left Turn from Minor Street (V10)	13	0	-13	F
Through from Minor Street (V11)	713	83	-630	F
Right Turn from Minor Street (V12)	NA	NA	NA	
Left Turn from Major Street (V1)	143	775	632	A
Left Turn from Major Street (V4)	386	647	261	C

UN SIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: OLD MAMMOTH RD.

Peak Period: PM

Minor Street: CHATEAU RD.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	1/2 V3 + V2 + V1 + V6 + V5 + V4 = Vc8 0 + 302 + 11 + 211 + 471 + 50 = 1045 vph	:	1/2 V6 + V5 + V4 + V3 + V2 + V1 = Vc11 0 + 471 + 50 + 4 + 302 + 11 = 838 vph
Critical Gap:	Tc = 6.0 sec	:	Tc = 6.0 sec
Potential Capacity:	Cp8 = 259 pcph	:	Cp11 = 349 pcph
Impedance Factor:	F8 = 0.995	:	F11 = 0.980
Actual Capacity:	Cm8 = Cp8 x F1 x F4 = 247 pcph	:	Cm11 = Cp11 x F4 x F1 = 333 pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	Vc8 + V11 + V12 = Vc7 834 + 11 + 3 = 848 vph	:	Vc11 + V8 + V9 = Vc10 834 + 3 + 38 = 875 vph
Critical Gap:	Tc = 6.5 sec	:	Tc = 6.5 sec
Potential Capacity:	Cp7 = 291 pcph	:	Cp10 = 280 pcph
Actual Capacity:	Cm7 = Cp7 x F1 x F4 x F11 x F12 = 272 pcph	:	Cm10 = Cp10 x F4 x F1 x F8 x F9 = 258 pcph

SHARED LANE CAPACITIES

Two Movements (L+T):	Csh = 265 pcph	:	Csh = 263 pcph
Two Movements (T+R):	Csh = NA pcph	:	Csh = NA pcph
Three Movements:	Csh = NA pcph	:	Csh = NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	NA	NA	NA	
Through from Minor Street (V8)	11	265	254	C
Right Turn from Minor Street (V9)	38	788	750	A
Left Turn from Minor Street (V10)	NA	NA	NA	
Through from Minor Street (V11)	119	263	144	D
Right Turn from Minor Street (V12)	3	654	651	A
Left Turn from Major Street (V1)	11	577	566	A
Left Turn from Major Street (V4)	50	884	834	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: LAKE MARY RD.

Peak Period: PM

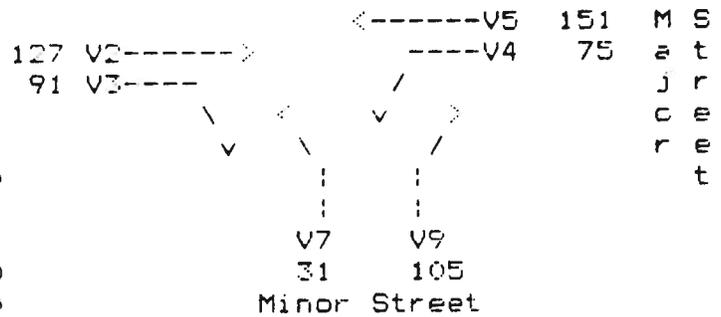
Minor Street: KELLEY RD.

Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: $Vc9 = 1/2 V3 + V2 = 46 + 127 = 173$ vph
 Critical Gap: $Tc = 5.5$ sec
 Potential Capacity: $Cp9 = 918$ pcph
 Actual Capacity: $Cm9 = Cp9 = 918$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: $Vc4 = V3 + V2 = 91 + 127 = 218$ vph
 Critical Gap: $Tc = 5.0$ sec
 Potential Capacity: $Cp4 = 972$ pcph
 Impedance Factor: $F4 = 0.950$
 Actual Capacity: $Cm4 = Cp4 = 972$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: $Vc7 = 1/2 V3 + V2 + V5 + V4 = 46 + 127 + 151 + 75 = 399$ vph
 Critical Gap: $Tc = 6.5$ sec
 Potential Capacity: $Cp7 = 566$ pcph
 Actual Capacity: $Cm7 = Cp7 \times F4 = 538$ pcph
 Shared Lane Capacity: $Csh = NA$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	31	538	507	A
Right Turn from Minor Street (V9)	105	918	813	A
Left Turn from Major Street (V4)	75	972	897	A

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: OLD MAMMOTH RD.

Peak Period: PM

Minor Street: MINARET RD.

Scenario: EXISTING (SAT) BASE 17,000 SAOT

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	1/2 V3 + V2 + V1 + V6 + V5 + V4 = Vc8 85 + 242 + 26 + 8 + 177 + 42 = 580 vph	:	1/2 V6 + V5 + V4 + V3 + V2 + V1 = Vc11 4 + 177 + 42 + 169 + 242 + 26 = 660 vph
Critical Gap:	Tc = 6.0 sec	:	Tc = 6.0 sec
Potential Capacity:	Cp8 = 494 pcph	:	Cp11 = 444 pcph
Impedance Factor:	F8 = 0.995	:	F11 = 0.990
Actual Capacity:	Cm8 = Cp8 x F1 x F4 = 470 pcph	:	Cm11 = Cp11 x F4 x F1 = 422 pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	Vc8 + V11 + V12 = Vc7 580 + 11 + 26 = 617 vph	:	Vc11 + V8 + V9 = Vc10 660 + 3 + 81 = 744 vph
Critical Gap:	Tc = 6.5 sec	:	Tc = 6.5 sec
Potential Capacity:	Cp7 = 415 pcph	:	Cp10 = 341 pcph
Actual Capacity:	Cm7 = Cp7 x F1 x F4 x F11 x F12 = 383 pcph	:	Cm10 = Cp10 x F4 x F1 x F8 x F9 = 300 pcph

SHARED LANE CAPACITIES

Two Movements (L+T):	Csh = NA pcph	:	Csh = NA pcph
Two Movements (T+R):	Csh = NA pcph	:	Csh = 677 pcph
Three Movements:	Csh = NA pcph	:	Csh = NA pcph

RESERVE CAPACITY AND LOS

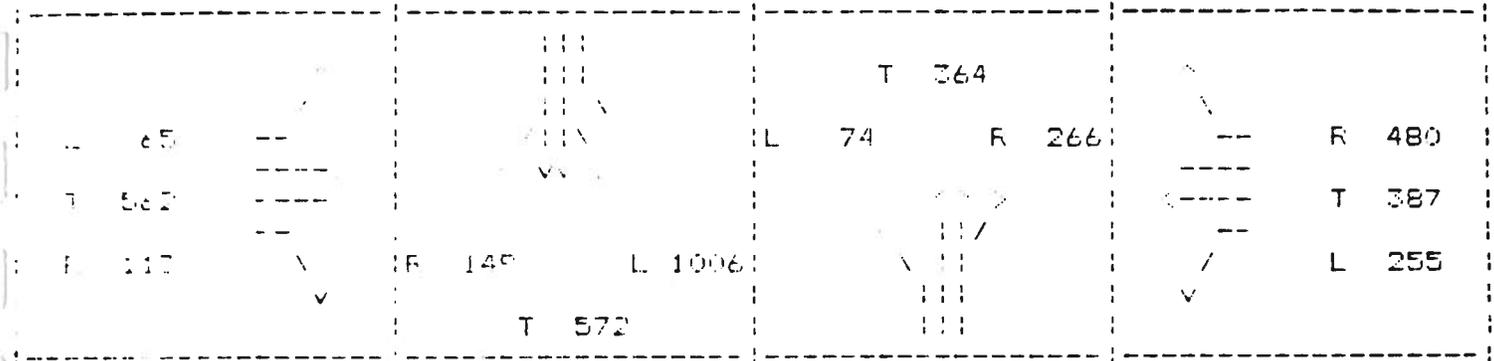
Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	63	383	320	B
Through from Minor Street (V8)	3	470	467	A
Right Turn from Minor Street (V9)	81	766	685	A
Left Turn from Minor Street (V10)	13	300	287	C
Through from Minor Street (V11)	37	677	640	A
Right Turn from Minor Street (V12)	NA	NA	NA	
Left Turn from Major Street (V1)	26	1006	980	A
Left Turn from Major Street (V4)	42	785	743	A

LODESTAR EIR

CUMULATIVE BASE + LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS
 Intersection: 5 MINARET RD. & MAIN

9/12/90

Lane Configuration and Turn Volumes

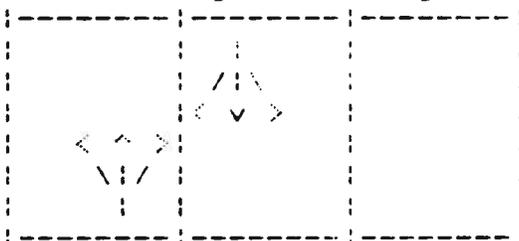


Appr	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	E-L	1	74	315
	TR	2	317	
SB	LTR	3	576	576
	TR	2	317	281
	TL	1	74	
EB	EYL	1	65	281
	T	2	281	
	EXR	1	113	
WB	EYL	1	255	255
	T	2	194	
	EXR	1	480	
Total Critical Volume				1427

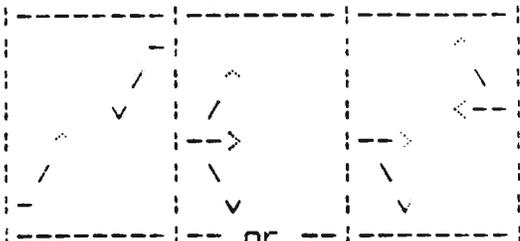
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1427
 No. of Critical Phases = 4
 Level of Service = F
 Volume/Capacity = $\frac{1427}{1170} = 1.22$

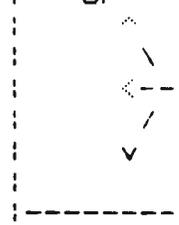
N/S Signal Phasing



E/W Signal Phasing



6 Phase Signal



UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

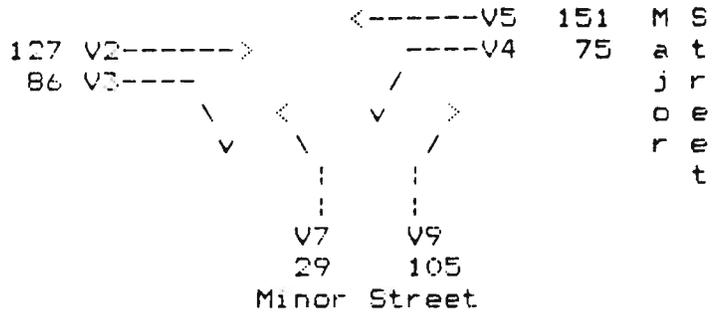
Major Street: LAKE MARY RD.
 Minor Street: KELLEY RD.
 Scenario: CUMULATIVE BASE

Peak Period: PM

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: $V_{c9} = 1/2 V3 + V2 = 43 + 127 = 170$ vph
 Critical Gap: $T_c = 5.5$ sec
 Potential Capacity: $C_{p9} = 922$ pcph
 Actual Capacity: $C_{m9} = C_{p9} = 922$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: $V_{c4} = V3 + V2 = 86 + 127 = 213$ vph
 Critical Gap: $T_c = 5.0$ sec
 Potential Capacity: $C_{p4} = 977$ pcph
 Impedance Factor: $F_4 = 0.950$
 Actual Capacity: $C_{m4} = C_{p4} = 977$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: $V_{c7} = 1/2 V3 + V2 + V5 + V4 = 43 + 127 + 151 + 75 = 396$ vph
 Critical Gap: $T_c = 6.5$ sec
 Potential Capacity: $C_{p7} = 568$ pcph
 Actual Capacity: $C_{m7} = C_{p7} \times F_4 = 540$ pcph
 Shared Lane Capacity: $C_{sh} = NA$ pcph

RESERVE CAPACITY AND LOS

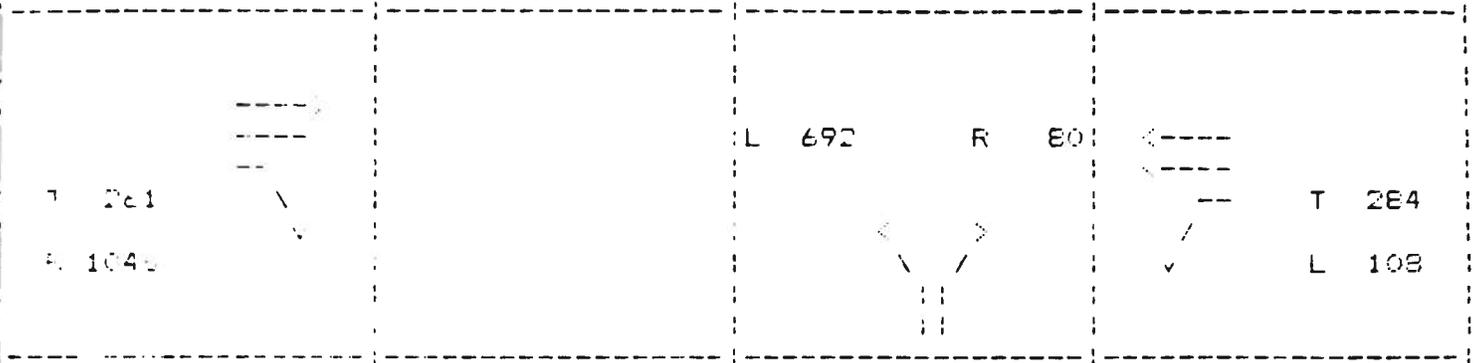
Movement	Volume (V)	Capacity (Cm)	Reserve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	29	540	511	A
Right Turn from Minor Street (V9)	105	922	817	A
Left Turn from Major Street (V4)	75	977	902	A

LODESTAR EIR

CUMULATIVE BASE + LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS
 Intersection: 7 OLD MAMMOTH & MAIN

9/12/90

Lane Configuration and Turn Volumes



Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NE	EXL	1	692	692
	EXR	1	80	
SE	T	2	131	131
	EXR	1	1046	1223
SW	EXL	1	108	108
	T	2	142	

Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Total Critical Volume

~~534~~
 $1154 = 0.91$
~~1275~~

Critical Volume = 931
 No of Critical Phases = 2
 Level of Service = **E**
 Volume/Capacity = ~~0.62~~

0.91

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

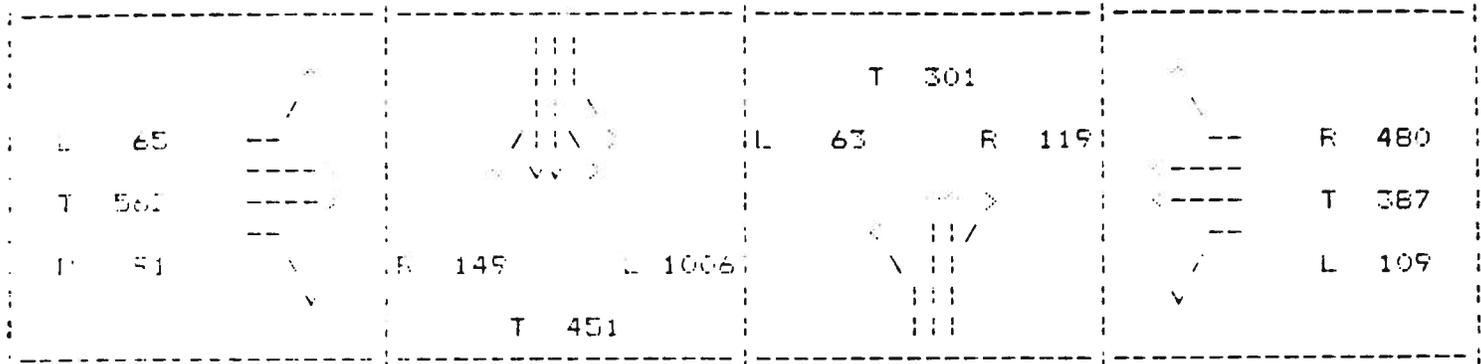
Program Licensed To: Kaku Associates

LODESTAR EIR

CUMULATIVE BASE PM PEAK LOS
WINTER WEEKEND CONDITIONS
Intersection: 5 MINARET RD. & MAIN

9/12/90

Lane Configuration and Turn Volumes

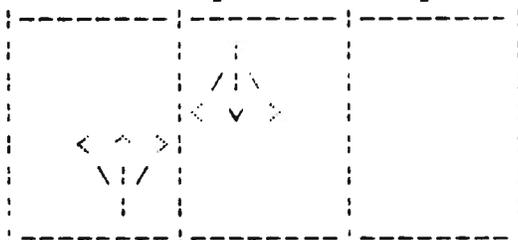


Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	63	210
	TR	2	210	
SB	LTR	3	535	535
	EXL	1	65	281
	T	2	281	
	EXR	1	91	
WB	EXL	1	109	109
	T	2	194	
	EXR	1	480	
Total Critical Volume				<u>1135</u> + 0.97

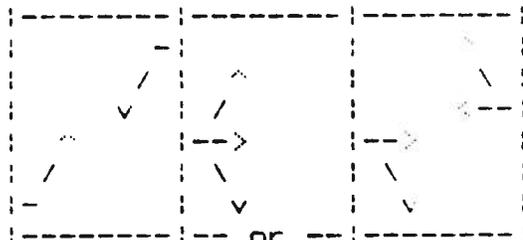
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1135
 No of Critical Phases = 4
 Level of Service = **BE**
 Volume/Capacity = 0.83
 0.97

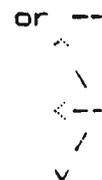
N/S Signal Phasing



E/W Signal Phasing



6 Phase Signal



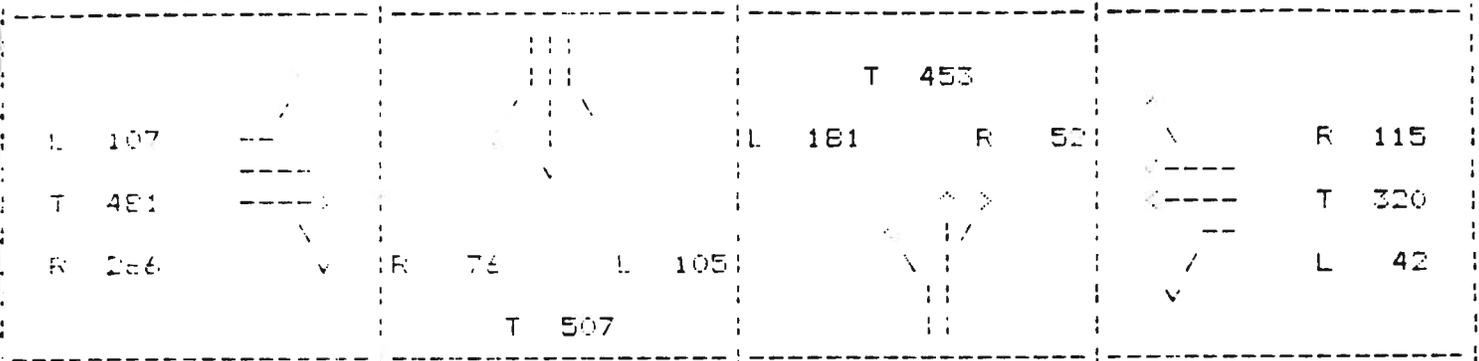
Program Licensed To: Kaku Associates

LODESTAR EIR

CUMULATIVE BASE + LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS
 Intersection: 9 MINARET RD. & MERIDIAN

9/12/90

Lane Configuration and Turn Volumes:

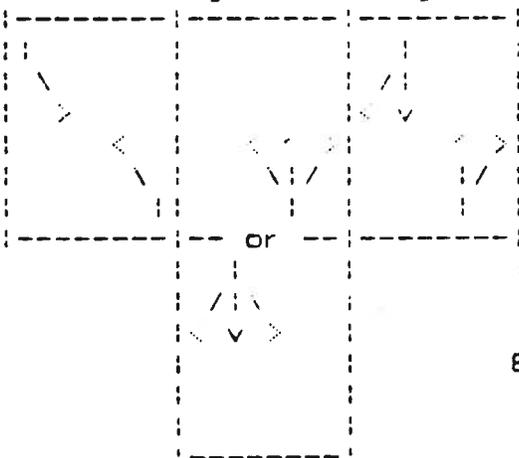


Approach	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	181	181
	TR	1	505	
SE	EXL	1	105	507
	T	1	507	
	EXR	1	76	
EW	EXL	1	107	384
	TR	2	384	
WB	EXL	1	42	42
	TR	2	218	
Total Critical Volume				1114

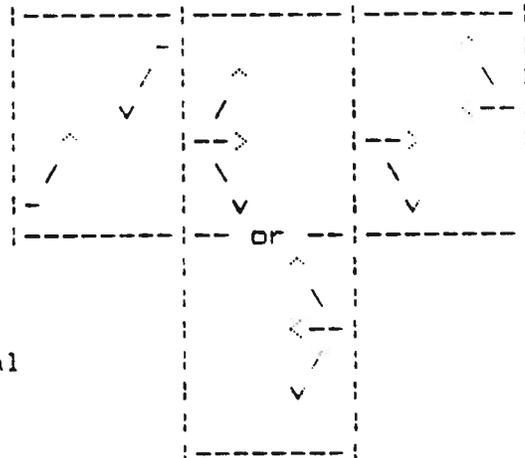
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1114
 No. of Critical Phases = 4
 Level of Service = **E**
 Volume/Capacity = $\frac{1114}{1170} = 0.95$

N/S Signal Phasing



E/W Signal Phasing



Program Licensed To: Kaku Associates

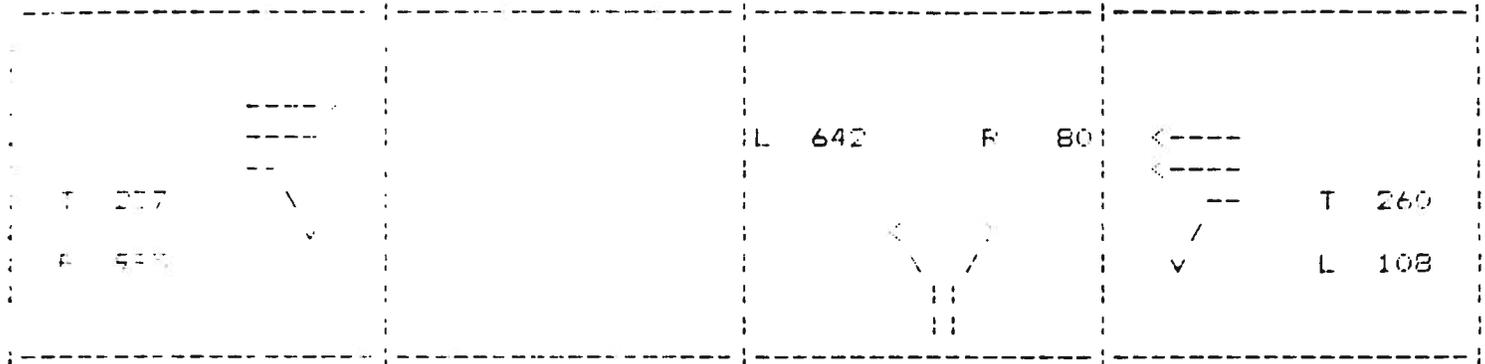
LODESTAR EIR

CUMULATIVE BASE PM PEAK LOS
WINTER WEEKEND CONDITIONS

9/12/90

Intersection: 7 OLD MAMMOTH & MAIN

Lane Configuration and Turn Volumes



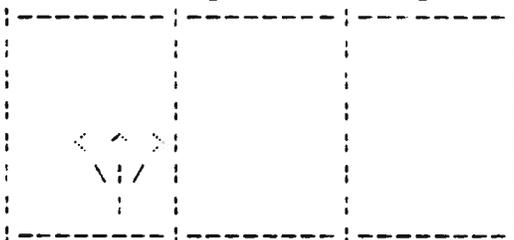
Approach	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	642	642
	EXR	1	80	
EB	T	2	119	119
	EAF	1	995	
WB	EXL	1	108	108
	T	2	130	
Total Critical Volume				1103

Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume	=	1103
No. of Critical Phases	=	2
Level of Service	=	D
Volume/Capacity	=	0.87

1275 ± 0.87

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

Program Licensed To: Kafu Associates

LODESTAR EIR

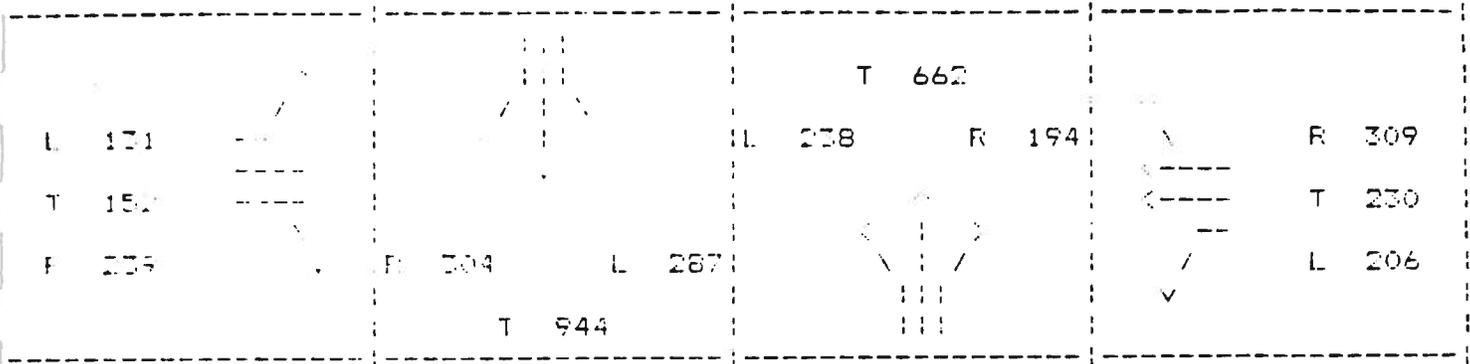
CUMULATIVE BASE + LODESTAR PM PEAK LOS

9/12/90

WINTER WEEKEND CONDITIONS

Intersection: 11 OLD MAMMOTH & MERIDIAN

Lane Configuration and Turn Volumes



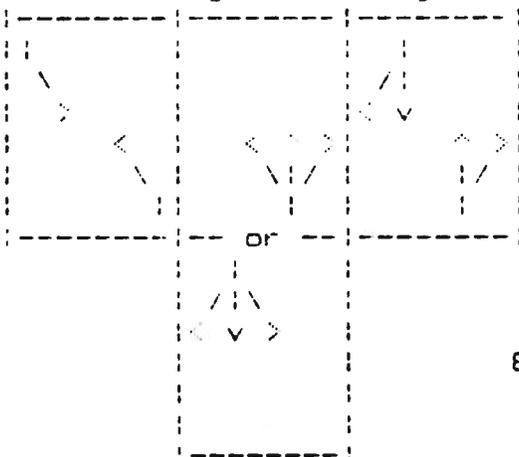
Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	239	239
	T	1	662	
	EXR	1	194	
SB	EXL	1	287	944
	T	1	944	
	EXR	1	304	
EB	EXL	1	131	131
	T	1	152	
	R	1	239	
WB	EXL	1	206	230
	T	1	230	
	R	1	309	

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

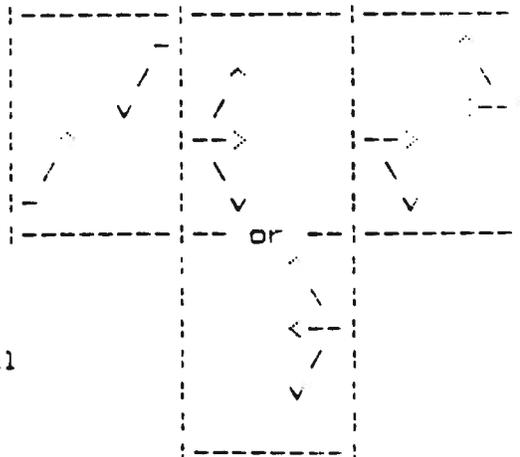
Total Critical Volume = 1543
 $\frac{1543}{1170} = 1.32$

Critical Volume = 1543
 No of Critical Phases = 4
 Level of Service = FF
 Volume/Capacity = $\frac{1543}{1170} = 1.32$

N/S Signal Phasing



E/W Signal Phasing



8 Phase Signal

Program Licensed To: Kaku Associates

LODESTAR EIR

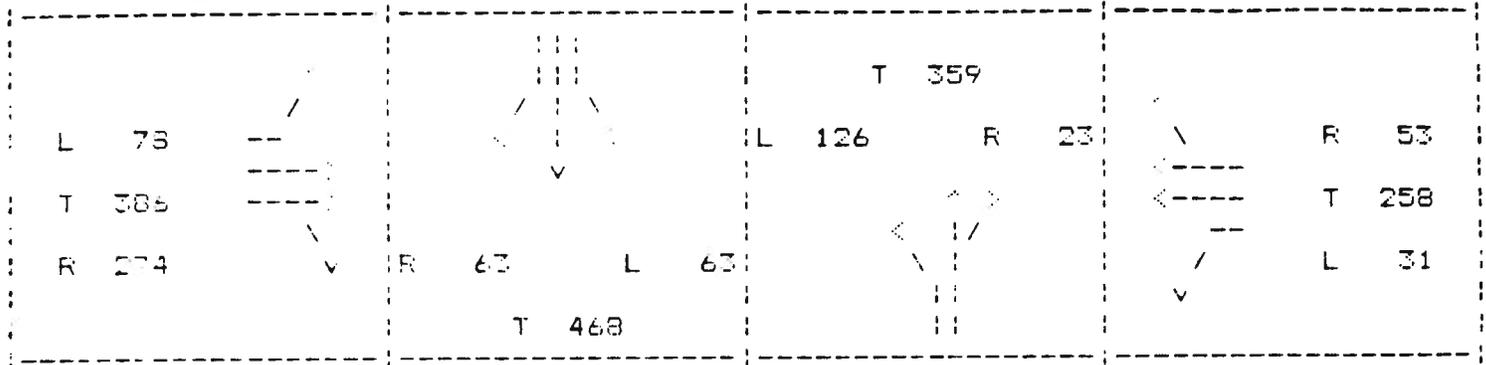
CUMULATIVE BASE PM PEAK LOS

9/12/90

WINTER WEEKEND CONDITIONS

Intersection: 9 MINARET RD. & MERIDIAN

Lane Configuration and Turn Volumes

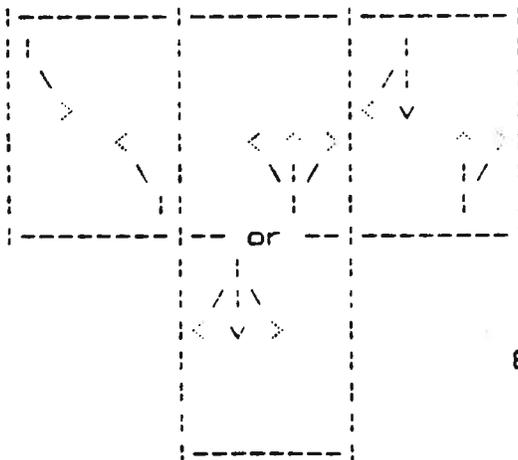


Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	126	126
	TR	1	382	
SE	EXL	1	63	
	T	1	468	468
	EXR	1	63	
EE	EXL	1	78	
	TR	2	330	330
WB	EXL	1	31	
	TR	2	156	31
Total Critical Volume				955

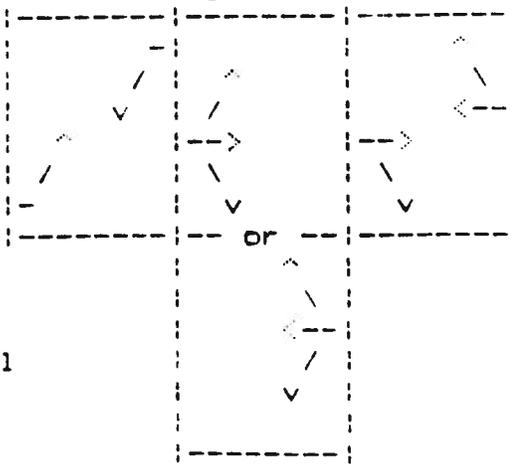
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 955
 No of Critical Phases = 4
 Level of Service = *B*
 Volume/Capacity = $\frac{955}{1170} = 0.82$

N/S Signal Phasing



E/W Signal Phasing



12-Sep-90

Kaku Associates

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

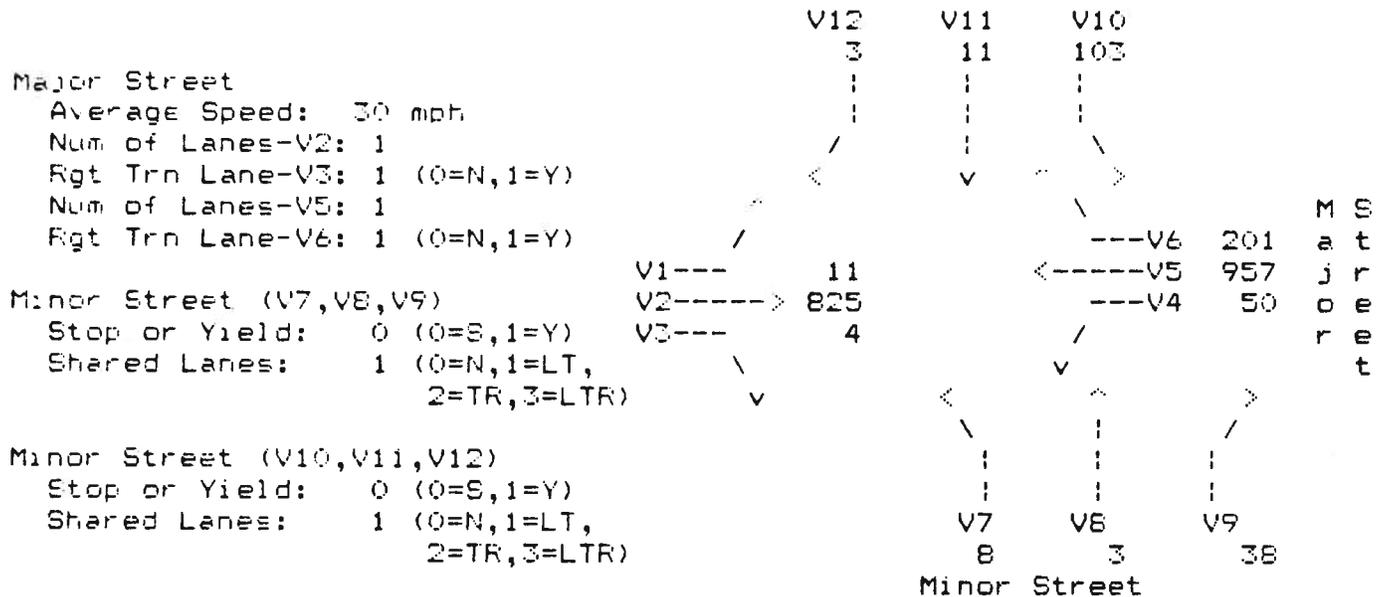
Major Street: OLD MAMMOTH RD.

Peak Period: PM

Minor Street: CHATEAU RD.

Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

Conflicting Flows:	$1/2 V3 + V2 = Vc9$	$1/2 V6 + V5 = Vc12$
	$0 + 825 = 825$ vph	$0 + 957 = 957$ vph
Critical Gap:	$Tc = 5.5$ sec	$Tc = 5.5$ sec
Potential Capacity:	$Cp9 = 416$ pcph	$Cp12 = 347$ pcph
Impedance Factor:	$F9 = 0.940$	$F12 = 0.995$
Actual Capacity:	$Cm9 = Cp9 = 416$ pcph	$Cm12 = Cp12 = 347$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 = Vc4$	$V6 + V5 = Vc1$
	$4 + 825 = 829$ vph	$201 + 957 = 1158$ vph
Critical Gap:	$Tc = 5.0$ sec	$Tc = 5.0$ sec
Potential Capacity:	$Cp4 = 486$ pcph	$Cp1 = 327$ pcph
Impedance Factor:	$F4 = 0.935$	$F1 = 0.980$
Actual Capacity:	$Cm4 = Cp4 = 486$ pcph	$Cm1 = Cp1 = 327$ pcph

continued

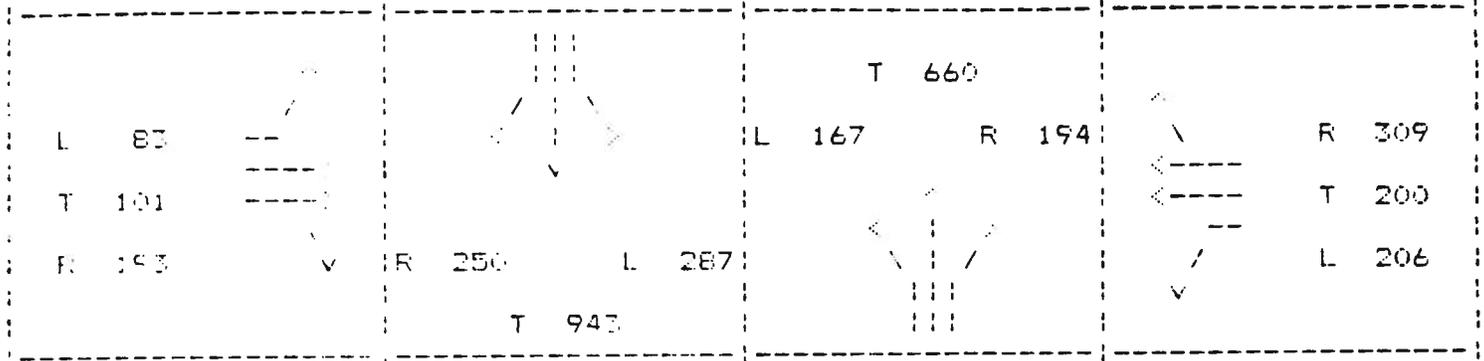
Program Licensed To: Kaku Associates

LODESTAR EIR

CUMULATIVE BASE PM PEAK LOS
 WINTER WEEKEND CONDITIONS
 Intersection: 11 OLD MAMMOTH & MERIDIAN

9/12/90

Lane Configuration and Turn Volumes

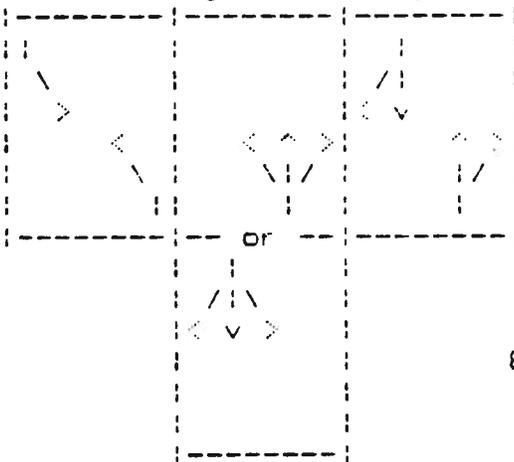


Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NS	EXL	1	167	167
	T	1	660	
	EXR	1	194	
SE	EXL	1	287	
	T	1	943	943
	EXR	1	250	
EE	EXL	1	83	
	T	1	101	101
	R	1	193	
WE	EXL	1	206	206
	T	1	200	
	R	1	309	
Total Critical Volume				1417

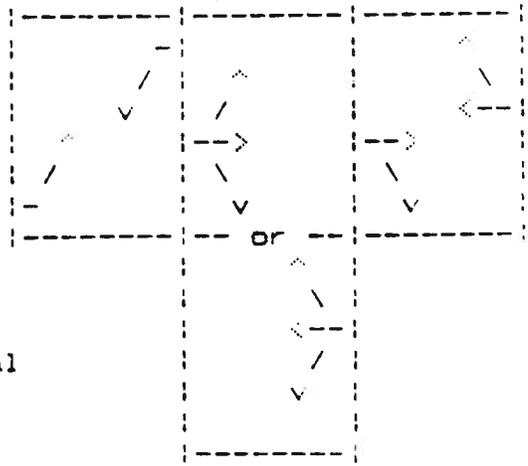
Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1417
 No of Critical Phases = 4
 Level of Service = F
 Volume/Capacity = $\frac{1417}{1170} = 1.21$

N/S Signal Phasing



E/W Signal Phasing



8 Phase Signal

12-Sep-90

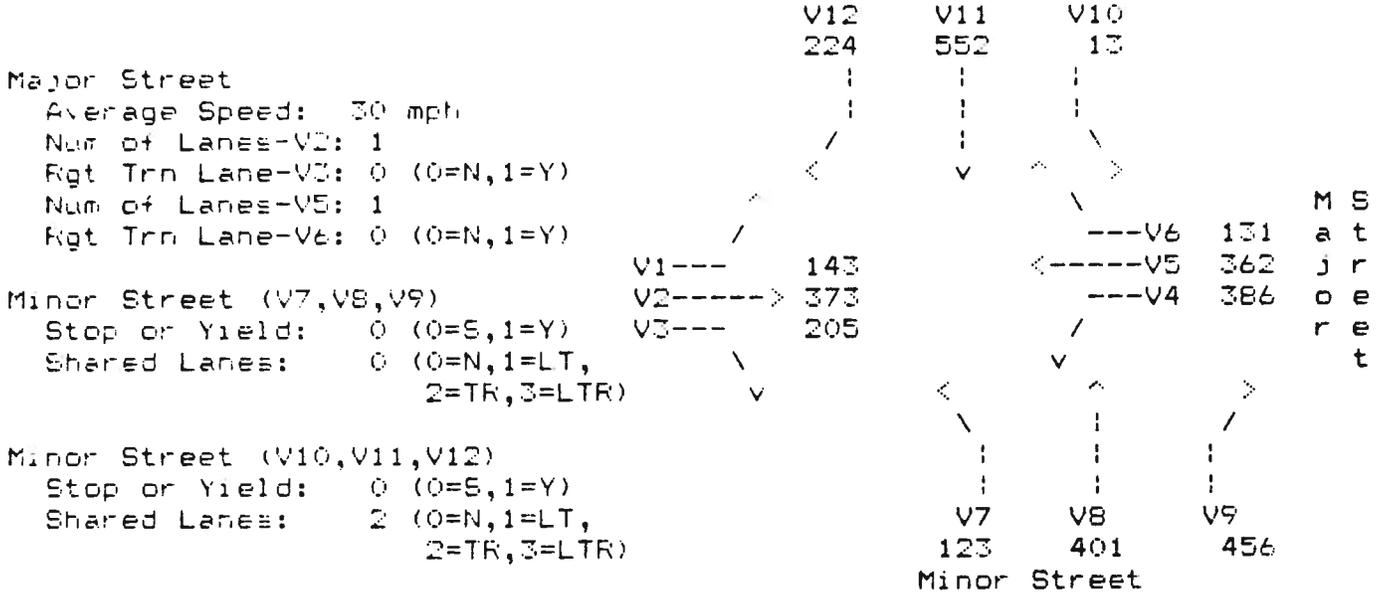
Kaku Associates

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD.
Minor Street: OLD MAMMOTH RD.
Scenario: CUMULATIVE PLUS PROJECT

Peak Period: PM

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

Conflicting Flows:	$1/2 V3 + V2 =$	$Vc9$	:	$1/2 V6 + V5 =$	$Vc12$
	$103 + 373 =$	476 vph	:	$66 + 362 =$	428 vph
Critical Gap:	$Tc =$	5.5 sec	:	$Tc =$	5.5 sec
Potential Capacity:	$Cp9 =$	651 pcph	:	$Cp12 =$	682 pcph
Impedance Factor:	$F9 =$	0.375	:	$F12 =$	0.740
Actual Capacity:	$Cm9 = Cp9 =$	651 pcph	:	$Cm12 = Cp12 =$	682 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 =$	$Vc4$	:	$V6 + V5 =$	$Vc1$
	$205 + 373 =$	578 vph	:	$131 + 362 =$	493 vph
Critical Gap:	$Tc =$	5.0 sec	:	$Tc =$	5.0 sec
Potential Capacity:	$Cp4 =$	647 pcph	:	$Cp1 =$	711 pcph
Impedance Factor:	$F4 =$	0.480	:	$F1 =$	0.860
Actual Capacity:	$Cm4 = Cp4 =$	647 pcph	:	$Cm1 = Cp1 =$	711 pcph

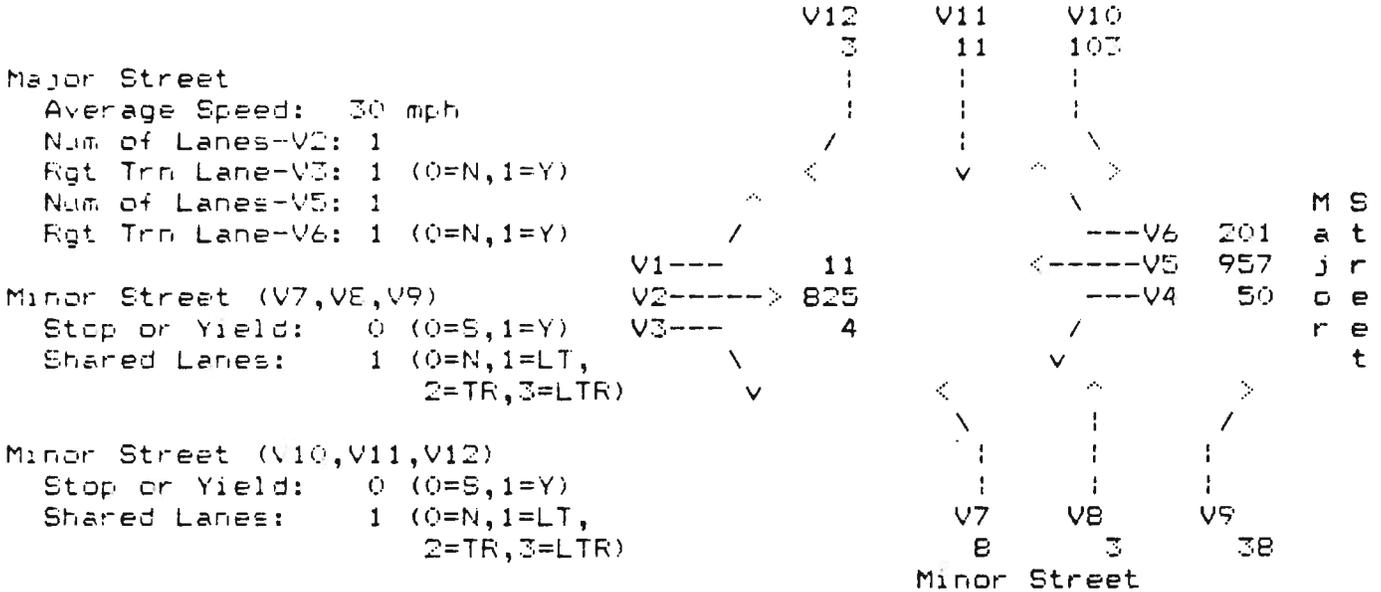
continued

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: OLD MAMMOTH RD.
 Minor Street: CHATEAU RD.
 Scenario: CUMULATIVE BASE

Peak Period: PM

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

Conflicting Flows:	$1/2 V3 + V2 = Vc9$	:	$1/2 V6 + V5 = Vc12$
	$0 + 825 = 825$ vph	:	$0 + 957 = 957$ vph
Critical Gap:	$Tc = 5.5$ sec	:	$Tc = 5.5$ sec
Potential Capacity:	$Cp9 = 416$ pcph	:	$Cp12 = 347$ pcph
Impedance Factor:	$F9 = 0.940$	:	$F12 = 0.995$
Actual Capacity:	$Cm9 = Cp9 = 416$ pcph	:	$Cm12 = Cp12 = 347$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 = Vc4$	:	$V6 + V5 = Vc1$
	$4 + 825 = 829$ vph	:	$201 + 957 = 1158$ vph
Critical Gap:	$Tc = 5.0$ sec	:	$Tc = 5.0$ sec
Potential Capacity:	$Cp4 = 486$ pcph	:	$Cp1 = 327$ pcph
Impedance Factor:	$F4 = 0.935$	:	$F1 = 0.980$
Actual Capacity:	$Cm4 = Cp4 = 486$ pcph	:	$Cm1 = Cp1 = 327$ pcph

continued

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD. Peak Period: PM
 Minor Street: LODESTAR ACCESS #1
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA

Major Street Average Speed: 30 mph Num of Lanes-V2: 2 Rgt Trn Lane-V3: 0 (0=N,1=Y)	639 V2-----> 63 V3-----> \ < \ < V7 V9 20 81 Minor Street	<-----V5 812 M S -----V4 111 a t j r o e r e t	
Minor Street Stop or Yield: 0 (0=S,1=Y) Shared Lane-LR: 0 (0=N,1=Y)			

STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	Vc9 = 1/2 V3 + V2 =	32 + 288 =	320 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp9 =		772 pcph
Actual Capacity:	Cm9 = Cp9 =		772 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	Vc4 = V3 + V2 =	63 + 639 =	702 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp4 =		484 pcph
Impedance Factor:	P4 =		0.835
Actual Capacity:	Cm4 = Cp4 =		484 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	Vc7 = 1/2 V3 + V2 + V5 + V4 =	32 + 639 + 812 + 111 =	1594 vph
Critical Gap:	Tc =		7.0 sec
Potential Capacity:	Cp7 =		81 pcph
Actual Capacity:	Cm7 = Cp7 x P4 =		68 pcph
Shared Lane Capacity:	Csh =		NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capac- ity (Cm)	Resrve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	20	68	48	E
Right Turn from Minor Street (V9)	81	772	691	A
Left Turn from Major Street (V4)	111	484	373	E

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: MINARET RD.

Peak Period: PM

Minor Street: LODESTAR ACCESS #2

Scenario: CUMULATIVE PLUS PROJECT

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	$1/2 V3 + V2 +$	:	$1/2 V6 + V5 +$
	$V1 + V8 +$	:	$V4 + V3 +$
	$V5 + V4 = Vc8$	:	$V2 + V1 = Vc11$
	$88 + 634 +$	:	$29 + 543 +$
	$23 + 58 +$	:	$97 + 175 +$
	$543 + 97 = 1443$ vph	:	$634 + 23 = 1501$ vph
Critical Gap:	$Tc = 6.5$ sec	:	$Tc = 6.5$ sec
Potential Capacity:	$Cp8 = 119$ pcph	:	$Cp11 = 110$ pcph
Impedance Factor:	$F8 = 1.000$	:	$F11 = 1.000$
Actual Capacity:	$Cm8 = Cp8 \times$	:	$Cm11 = Cp11 \times$
	$F1 \times F4 = 97$ pcph	:	$F4 \times F1 = 90$ pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	$Vc8 + V11 +$	:	$Vc11 + V8 +$
	$V12 = Vc7$	:	$V9 = Vc10$
	$1385 + 0 +$	:	$1326 + 0 +$
	$15 = 1400$ vph	:	$78 = 1404$ vph
Critical Gap:	$Tc = 7.0$ sec	:	$Tc = 7.0$ sec
Potential Capacity:	$Cp7 = 100$ pcph	:	$Cp10 = 100$ pcph
Actual Capacity:	$Cm7 = Cp7 \times$	:	$Cm10 = Cp10 \times$
	$F1 \times F4 \times$	:	$F4 \times F1 \times$
	$F11 \times F12 = 81$ pcph	:	$F8 \times F9 = 76$ pcph

SHARED LANE CAPACITIES

Two Movements (L+T):	$Csh = NA$ pcph	:	$Csh = NA$ pcph
Two Movements (T+R):	$Csh = 774$ pcph	:	$Csh = 818$ pcph
Three Movements:	$Csh = NA$ pcph	:	$Csh = NA$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	144	81	-63	F
Through from Minor Street (V8)	78	774	696	A
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Minor Street (V10)	26	76	50	E
Through from Minor Street (V11)	15	818	803	A
Right Turn from Minor Street (V12)	NA	NA	NA	
Left Turn from Major Street (V1)	23	559	536	A
Left Turn from Major Street (V4)	97	425	328	B

Program Licensed To: Kaku Associates

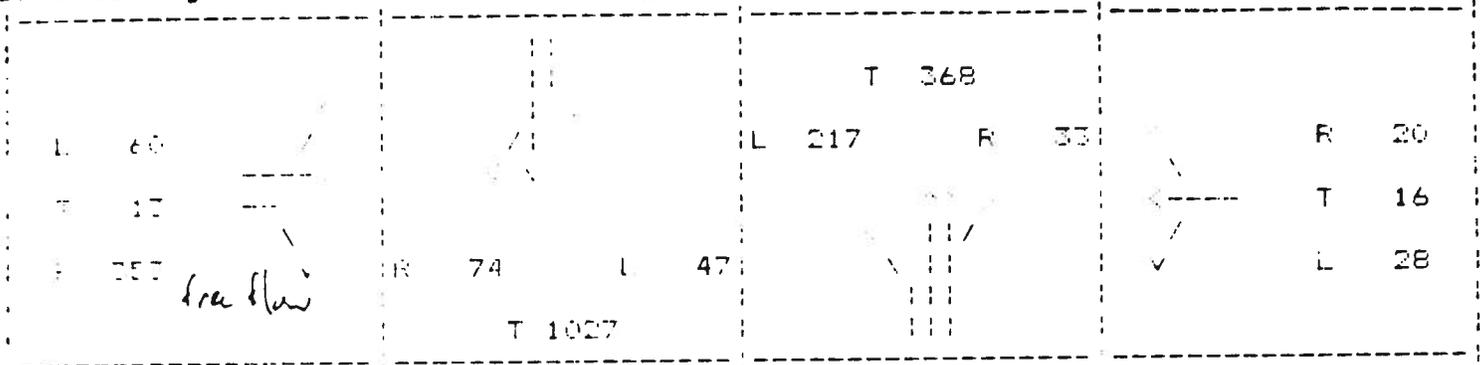
LODESTAR EIR

CUMULATIVE BASE + LODESTAR PM PEAK LOS
WINTER WEEKEND CONDITIONS

9/12/90

Intersection: 1 MINARET RD. & FOREST TRAIL (High Critical Volume Estimate)

Lane Configuration and Turn Volumes



Appr.	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	EVL	1	217	217
	TR	2	201	
SB	EVL	1	47	1101
	TR	1	1101	
EB	LT	1	73	73
	FR	1	353	
WB	LTR	1	64	64
Total Critical Volume				1455

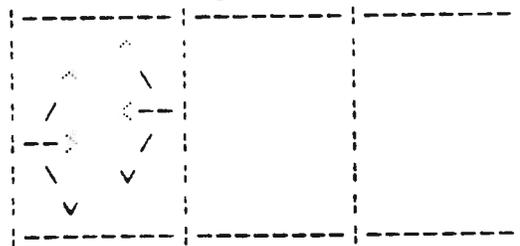
Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1455
 No. of Critical Phases = 2
 Level of Service = **RF**
 Volume/Capacity = $\frac{1455}{1111} = 1.31$

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

12-Sep-90

Kaku Associates

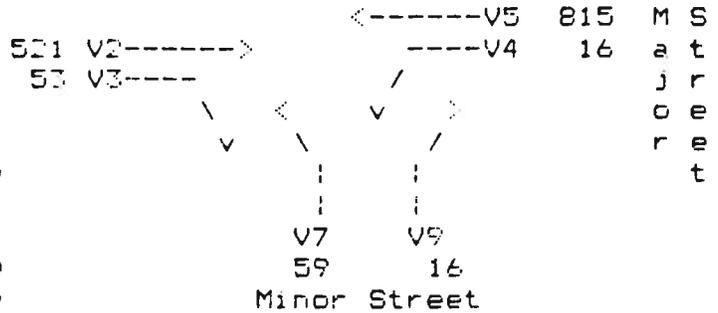
UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN BLVD. Peak Period: PM
 Minor Street: LODESTAR ACCESS #4
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 2
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	|	$V_{c9} = 1/2 V_3 + V_2 =$	$27 + 234 =$	261 vph
Critical Gap:	|	$T_c =$		5.5 sec
Potential Capacity:	|	$C_{p9} =$		829 pcph
Actual Capacity:	|	$C_{m9} = C_{p9} =$		829 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	|	$V_{c4} = V_3 + V_2 =$	$53 + 521 =$	574 vph
Critical Gap:	|	$T_c =$		5.5 sec
Potential Capacity:	|	$C_{p4} =$		580 pcph
Impedance Factor:	|	$F_4 =$	0.980	
Actual Capacity:	|	$C_{m4} = C_{p4} =$		580 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	|	$V_{c7} = 1/2 V_3 + V_2 + V_5 + V_4 =$	$27 + 521 + 815 + 16 =$	1379 vph
Critical Gap:	|	$T_c =$		7.0 sec
Potential Capacity:	|	$C_{p7} =$		105 pcph
Actual Capacity:	|	$C_{m7} = C_{p7} \times F_4 =$		103 pcph
Shared Lane Capacity:	|	$C_{sh} =$		NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	59	103	44	E
Right Turn from Minor Street (V9)	16	829	813	A
Left Turn from Major Street (V4)	16	580	564	A

Program Licensed To: Kaku Associates

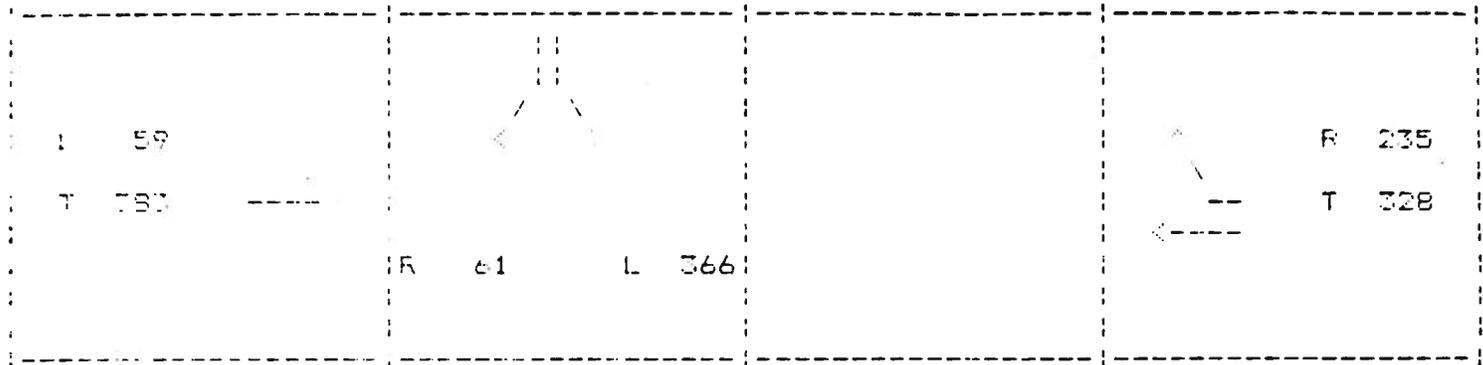
LODESTAR EIR

CUMULATIVE BASE + LODESTAR PM PEAK LOS
WINTER WEEKEND CONDITIONS

9/12/90

Intersection: 4 LAKEVIEW & LAKE MARY RD. (High Critical Volume Estimate)

Lane Configuration and Turn Volumes



Approach	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
SB	E/L	1	366	366
	E/R	1	61	
EB	L/T	1	442	442
WB	T	1	328	328
	E/R	1	235	
Total Critical Volume				1136

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1136
 No of Critical Phases = 2
 Level of Service = **D**
 Volume/Capacity = ~~0.75~~ **0.89**

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

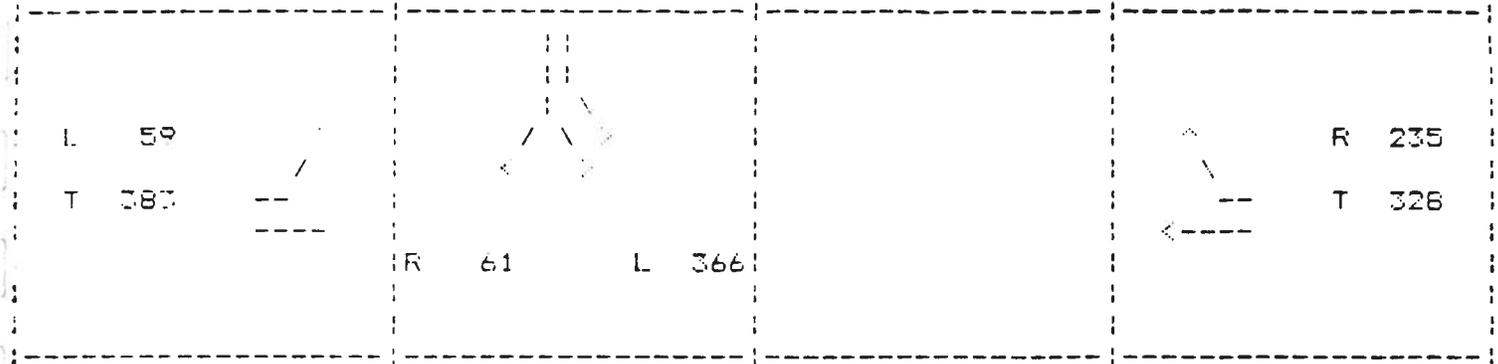
Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 4 LAKEVIEW & LAKE MARY RD.

9/12/90

Lane Configuration and Turn Volumes

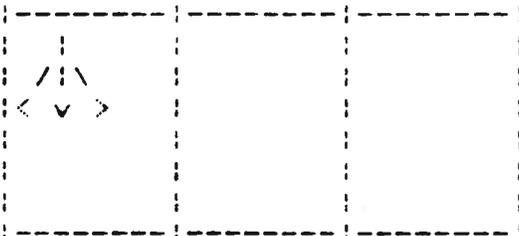


Approach	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
SP	LR	2	214	214
EE	EVL	1	59	59
	T	1	383	
WE	T	1	328	328
	EXR	1	235	
Total Critical Volume				<u>601</u>

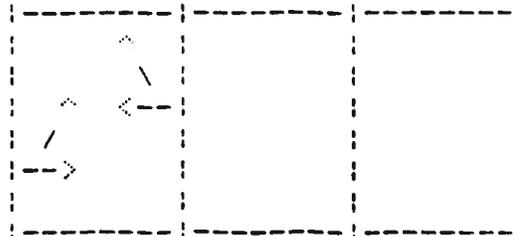
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 601
 No of Critical Phases = 2
 Level of Service = A
 Volume/Capacity = ~~0.40~~ 0.47

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

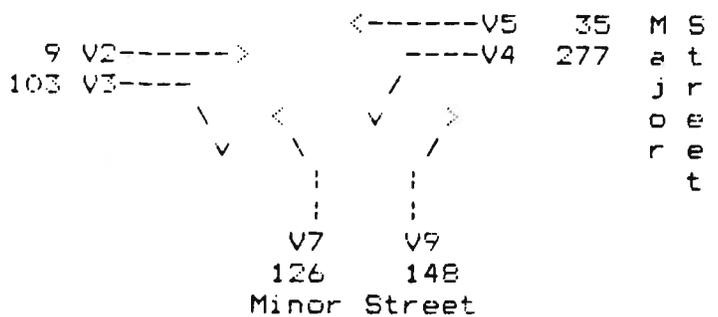
UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN RD. Peak Period: PM
 Minor Street: MAJESTIC FINES DR.
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	|	$Vc9 = 1/2 V3 + V2 =$	52 +	9 =	61 vph
Critical Gap:	|	$Tc =$			5.5 sec
Potential Capacity:	|	$Cp9 =$			1036 pcph
Actual Capacity:	|	$Cm9 = Cp9 =$			1036 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	|	$Vc4 = V3 + V2 =$	103 +	9 =	112 vph
Critical Gap:	|	$Tc =$			5.0 sec
Potential Capacity:	|	$Cp4 =$			1082 pcph
Impedance Factor:	|	$F4 =$			0.810
Actual Capacity:	|	$Cm4 = Cp4 =$			1082 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	|	$Vc7 = 1/2 V3 + V2 + V5 + V4 =$	52 +	9 +	35 +	277 =	373 vph
Critical Gap:	|	$Tc =$					6.5 sec
Potential Capacity:	|	$Cp7 =$					583 pcph
Actual Capacity:	|	$Cm7 = Cp7 \times F4 =$					472 pcph
Shared Lane Capacity:	|	$Csh =$					NA pcph

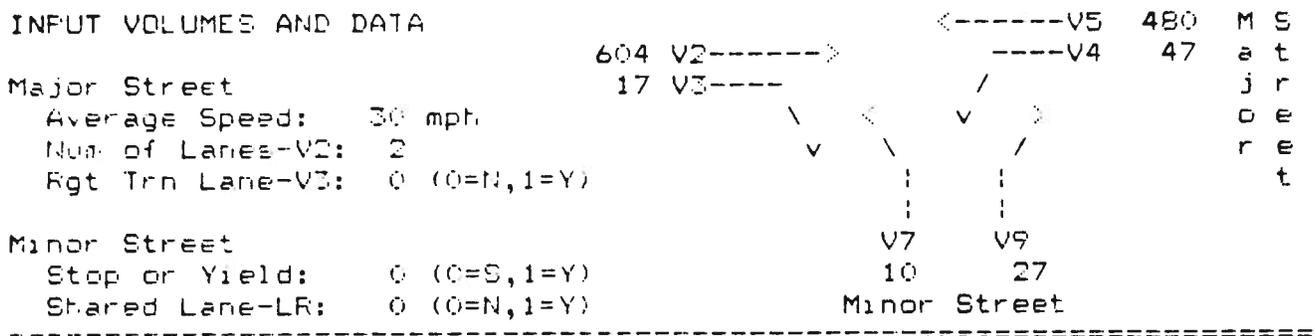
RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	126	472	346	B
Right Turn from Minor Street (V9)	148	1036	888	A
Left Turn from Major Street (V4)	277	1082	805	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN BLVD. Peak Period: PM
 Minor Street: LODESTAR ACCESS #6
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	Vc9 = 1/2 V3 + V2 =	9 + 294 =	303 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp9 =		787 pcph
Actual Capacity:	Cm9 = Cp9 =		787 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	Vc4 = V3 + V2 =	17 + 604 =	621 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp4 =		544 pcph
Impedance Factor:	F4 =	0.940	
Actual Capacity:	Cm4 = Cp4 =		544 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	Vc7 = 1/2 V3 + V2 + V5 + V4 =	9 + 604 + 480 + 47 =	1140 vph
Critical Gap:	Tc =		7.0 sec
Potential Capacity:	Cp7 =		159 pcph
Actual Capacity:	Cm7 = Cp7 x F4 =		149 pcph
Shared Lane Capacity:	Csh =		NA pcph

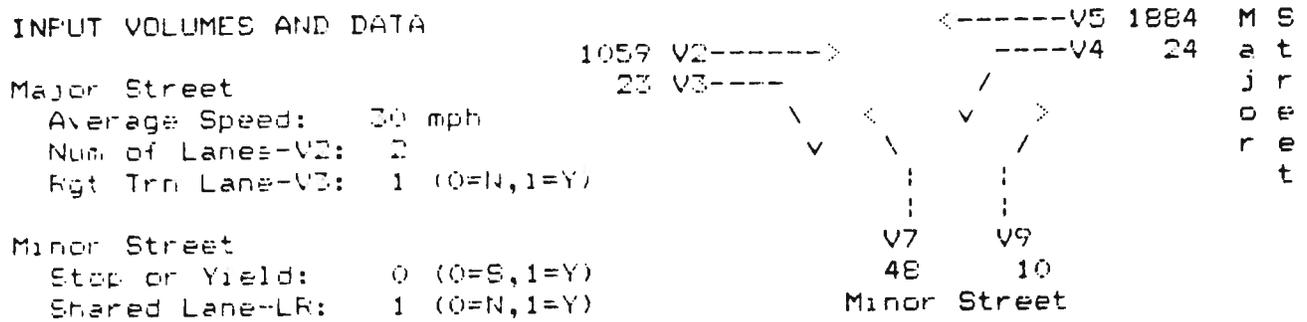
RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	10	149	139	D
Right Turn from Minor Street (V9)	27	787	760	A
Left Turn from Major Street (V4)	47	544	497	A

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MAIN ST. Peak Period: FM
 Minor Street: SIERRA BLVD.
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	Vc9 = 1/2 V3 + V2 =	0 + 530 =	530 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp9 =		613 pcph
Actual Capacity:	Cm9 = Cp9 =		613 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	Vc4 = V3 + V2 =	23 + 1059 =	1082 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp4 =		296 pcph
Impedance Factor:	F4 =	0.950	
Actual Capacity:	Cm4 = Cp4 =		296 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	Vc7 = 1/2 V3 + V2 + V5 + V4 =	0 + 1059 + 1884 + 24 =	2967 vph
Critical Gap:	Tc =		7.0 sec
Potential Capacity:	Cp7 =		60 pcph
Actual Capacity:	Cm7 = Cp7 x F4 =		57 pcph
Shared Lane Capacity:	Csh =		68 pcph

RESERVE CAPACITY AND LOS

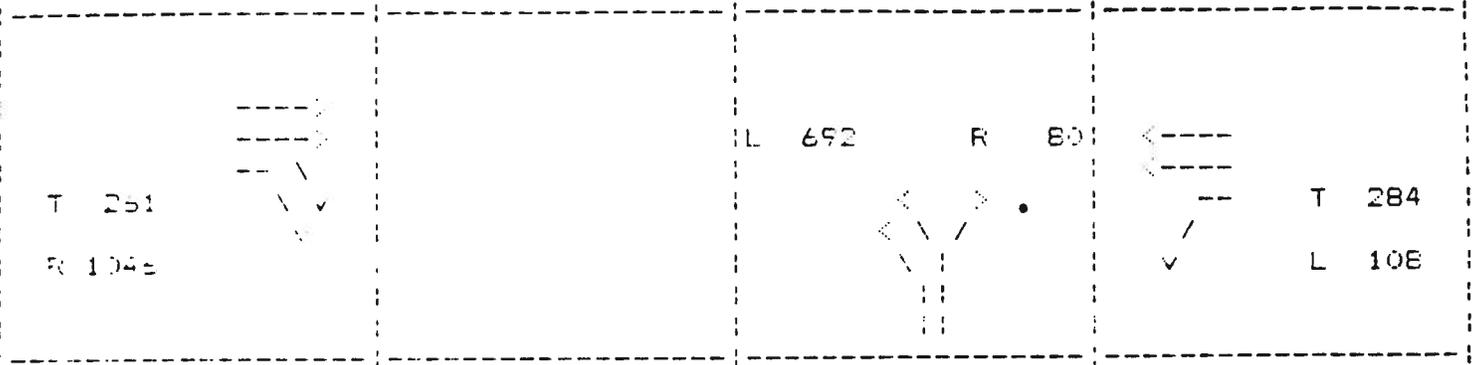
Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	58	68	10	E
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	24	296	272	C

LODESTAR

CUMULATIVE PLUS LODESTAR FM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 7 OLD MAMMOTH & MAIN

9/12/90

Lane Configuration and Turn Volumes



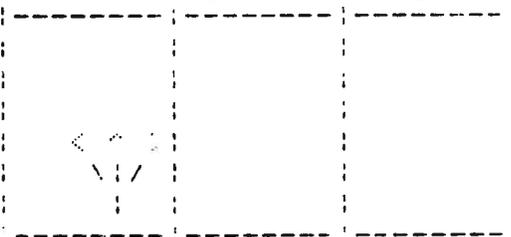
Appr	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NE	LR	2	386	386
EW	T	1	261	261
	EXF	2	523	
WE	EXL	1	108	108
	T	2	142	

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Total Critical Volume = $\frac{755}{1275} = 0.59$

Critical Volume = 755
 No of Critical Phases = 2
 Level of Service = A
 Volume/Capacity = $\frac{755}{1275} = 0.59$

N/S Signal Phasing



E/W Signal Phasing

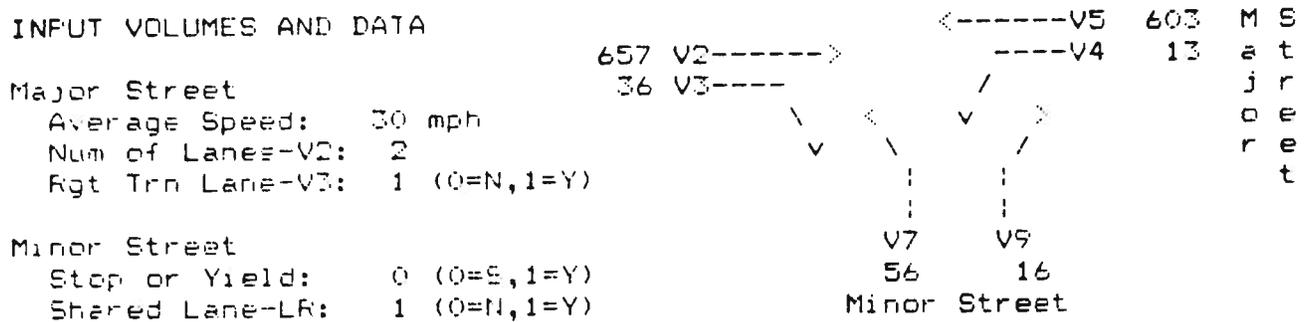


2 Phase Signal

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN RD. Peak Period: PM
 Minor Street: MONO ST.
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	Vc9 = 1/2 V3 + V2 =	0 + 329 =	329 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp9 =		764 pcph
Actual Capacity:	Cm9 = Cp9 =		764 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	Vc4 = V3 + V2 =	36 + 657 =	693 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp4 =		490 pcph
Impedance Factor:	F4 =	0.980	
Actual Capacity:	Cm4 = Cp4 =		490 pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	Vc7 = 1/2 V3 + V2 + V5 + V4 =	0 + 657 + 603 + 13 =	1273 vph
Critical Gap:	Tc =		7.0 sec
Potential Capacity:	Cp7 =		132 pcph
Actual Capacity:	Cm7 = Cp7 x F4 =		129 pcph
Shared Lane Capacity:	Csh =		158 pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	72	158	86	E
Right Turn from Minor Street (V9)	NA	NA	NA	
Left Turn from Major Street (V4)	13	490	477	A

Program Licensed To: Palu Associates

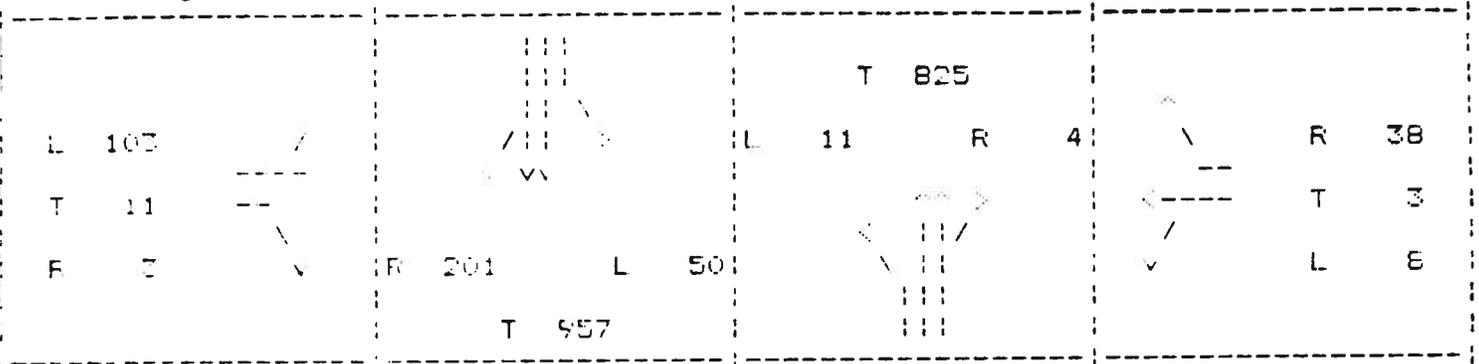
LODESTAR

CUMULATIVE PLUS LODESTAR FM PEAK LOS
WINTER WEEKEND CONDITIONS, WITH MITIGATIONS

9/12/90

Intersection: 13 OLD MAMMOTH & CHATEAU RD. (High Critical Volume Estimate)

Lane Configuration and Turn Volumes



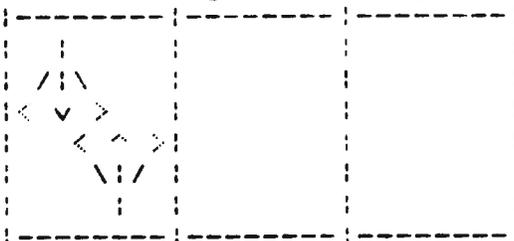
Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	11	11
	TR	2	415	
EB	EXL	1	50	
	TR	2	579	579
EB	LT	1	114	114
	EXR	1	3	
WB	LT	1	11	11
	EXR	1	38	

Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

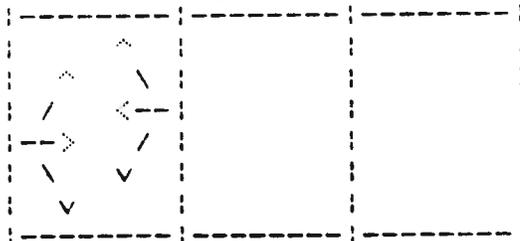
Total Critical Volume = $\frac{715}{1275} = 0.56$

Critical Volume = 715
 No of Critical Phases = 2
 Level of Service = A
 Volume/Capacity = $\frac{715}{1275} = 0.56$

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: OLD MAMMOTH RD.

Peak Period: PM

Minor Street: CHATEAU RD.

Scenario: CUMULATIVE PLUS PROJECT

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	1/2 V3 + V2 + V1 + V6 + V5 + V4 = Vc8 0 + 825 + 11 + 201 + 957 + 50 = 2044 vph	1/2 V6 + V5 + V4 + V3 + V2 + V1 = Vc11 0 + 957 + 50 + 4 + 825 + 11 = 1847 vph
Critical Gap:	Tc = 6.0 sec	Tc = 6.0 sec
Potential Capacity:	Cp8 = 90 pcph	Cp11 = 98 pcph
Impedance Factor:	P8 = 0.980	P11 = 0.930
Actual Capacity:	Cm8 = Cp8 x P1 x P4 = 82 pcph	Cm11 = Cp11 x P4 x P1 = 90 pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	Vc8 + V11 + V12 = Vc7 1843 + 11 + 3 = 1857 vph	Vc11 + V8 + V9 = Vc10 1843 + 3 + 38 = 1884 vph
Critical Gap:	Tc = 6.5 sec	Tc = 6.5 sec
Potential Capacity:	Cp7 = 77 pcph	Cp10 = 76 pcph
Actual Capacity:	Cm7 = Cp7 x P1 x P4 x P11 x P12 = 65 pcph	Cm10 = Cp10 x P4 x P1 x P8 x P9 = 64 pcph

SHAPED LANE CAPACITIES

Two Movements (L+T):	Csh = 69 pcph	Csh = 66 pcph
Two Movements (T+R):	Csh = NA pcph	Csh = NA pcph
Three Movements:	Csh = NA pcph	Csh = NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	NA	NA	NA	
Through from Minor Street (V8)	11	69	58	E
Right Turn from Minor Street (V9)	38	416	378	B
Left Turn from Minor Street (V10)	NA	NA	NA	
Through from Minor Street (V11)	114	66	-48	F
Right Turn from Minor Street (V12)	3	347	344	B
Left Turn from Major Street (V1)	11	327	316	B
Left Turn from Major Street (V4)	50	486	436	A

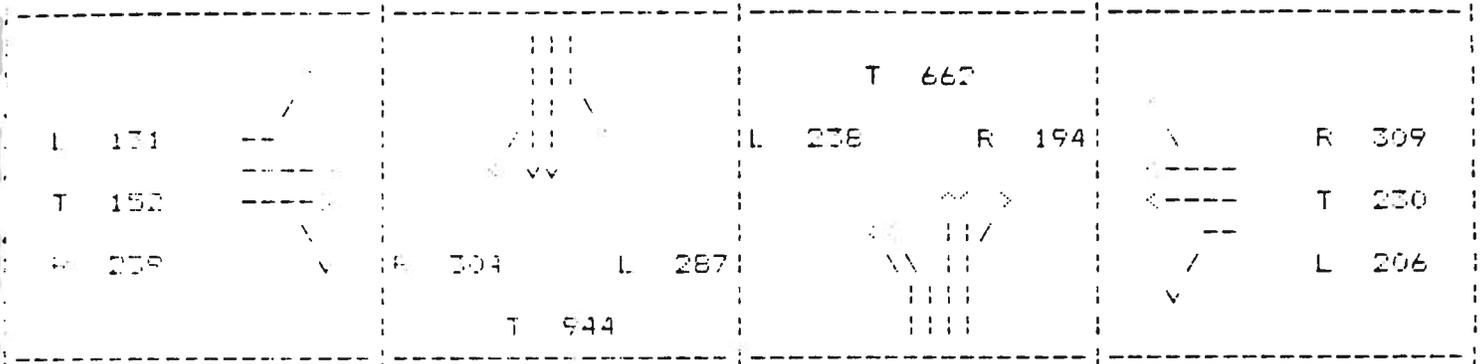
Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 11 OLD MAMMOTH & MERIDIAN

9/12/90

Lane Configuration and Turn Volumes

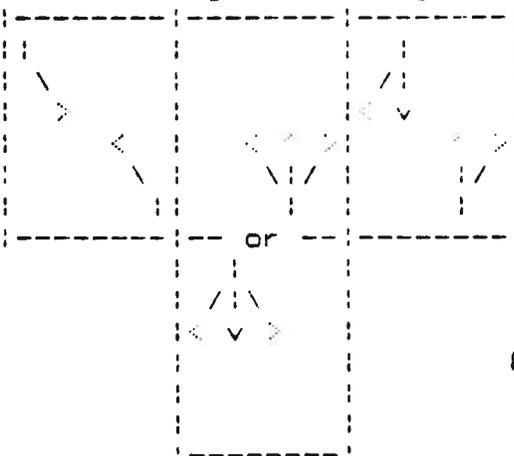


Approach	Lane Group	No. of Lanes	For Lane Volume	Critical Volume
NB	EXL	2	119	119
	TR	2	428	
SB	E L	1	267	
	TR	2	624	624
EB	EXL	1	171	131
	T	1	152	
	R	1	239	
WB	EXL	1	206	
	T	1	230	230
	R	1	309	
Total Critical Volume				$\frac{1104}{1170} = 0.94$

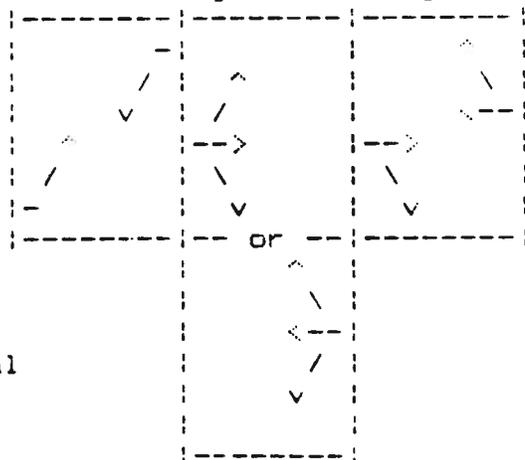
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1104
 No of Critical Phases = 4
 Level of Service = ~~FE~~
 Volume/Capacity = $\frac{1104}{1170} = 0.94$

N/S Signal Phasing



E/W Signal Phasing



B Phase Signal

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MINARET RD.

Peak Period: PM

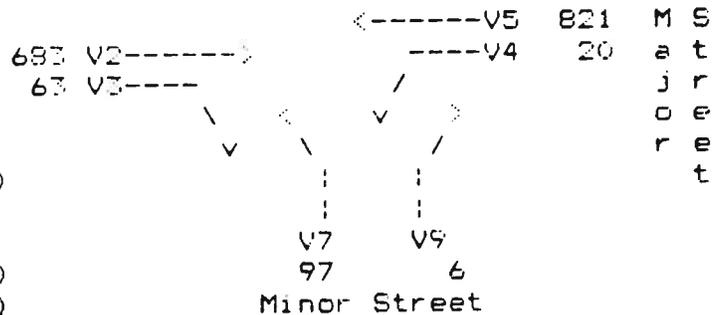
Minor Street: CHATEAU RD.

Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 1
 Rgt Trn Lane-V3: 1 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: $V_{c9} = 1/2 V_3 + V_2 = 0 + 683 = 683$ vph
 Critical Gap: $T_c = 5.5$ sec
 Potential Capacity: $C_{p9} = 498$ pcph
 Actual Capacity: $C_{m9} = C_{p9} = 498$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: $V_{c4} = V_3 + V_2 = 63 + 683 = 746$ vph
 Critical Gap: $T_c = 5.0$ sec
 Potential Capacity: $C_{p4} = 535$ pcph
 Impedance Factor: $F_4 = 0.975$
 Actual Capacity: $C_{m4} = C_{p4} = 535$ pcph

STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: $V_{c7} = 1/2 V_3 + V_2 + V_5 + V_4 = 0 + 683 + 821 + 20 = 1524$ vph
 Critical Gap: $T_c = 6.5$ sec
 Potential Capacity: $C_{p7} = 106$ pcph
 Actual Capacity: $C_{m7} = C_{p7} \times F_4 = 103$ pcph
 Shared Lane Capacity: $C_{sh} = NA$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	97	103	6	E
Right Turn from Minor Street (V9)	6	498	492	A
Left Turn from Major Street (V4)	20	535	515	A

Program Licensed To: Kaku Associates

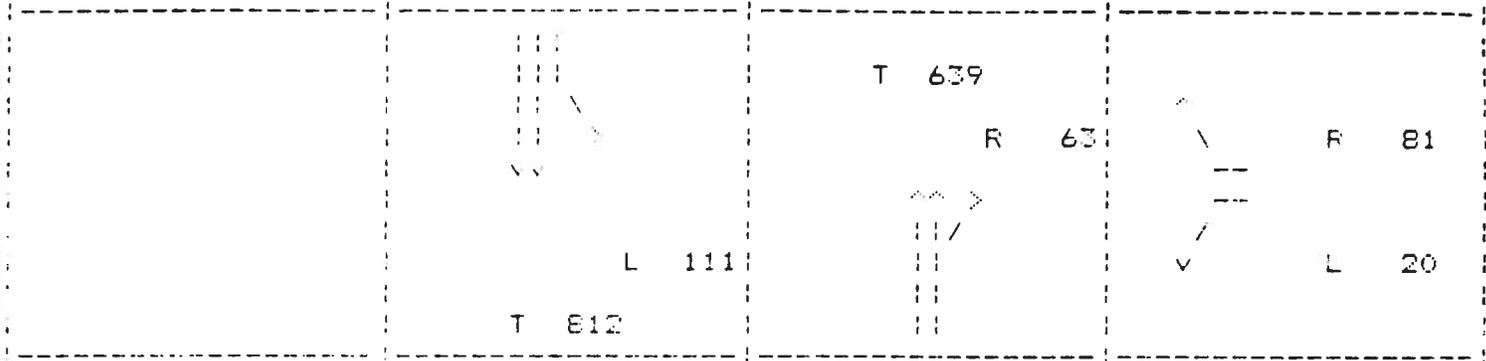
LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
Intersection: 53 MINARET RD & LODESTAR

9/13/90

(ACCESS = 1)

Lane Configuration and Turn Volumes

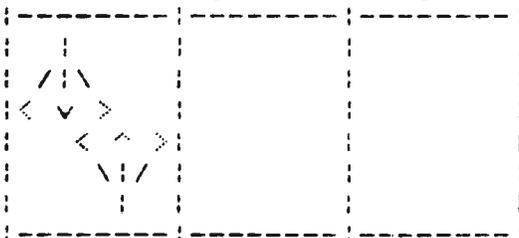


Appr	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume	Maximum Total Critical Volumes				
					Level of Service	Two Phase	Three Phase	Four Phase	
NB	TR	2	351	351	A	900	855	825	
					B	1050	1000	965	
	SB	EXL	1	111	111	C	1200	1140	1100
						D	1350	1275	1225
		T	2	406		E	1500	1425	1375
						F	NA	NA	NA
WE	EXL	1	20	20	Critical Volume = 482				
					EYE	1	81		No of Critical Phases = 2
Total Critical Volume				482	Level of Service = A				
				1275	Volume/Capacity = 0.32				
					0.38				

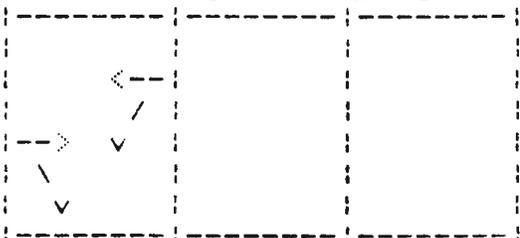
= 0.38

0.38

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS (Page 2)

Major Street: MINARET RD.

Peak Period: PM

Minor Street: OLD MAMMOTH RD.

Scenario: CUMULATIVE PLUS PROJECT

STEP 3: THROUGH FROM MINOR STREET (V8,V11)

Conflicting Flows:	$1/2 V3 + V2 + V1 + V6 + V5 + V4 = Vc8$	:	$1/2 V6 + V5 + V4 + V3 + V2 + V1 = Vc11$
	103 + 373 + 143 + 131 + 362 + 386 = 1498 vph	:	66 + 362 + 386 + 205 + 373 + 143 = 1535 vph
Critical Gap:	Tc = 6.0 sec	:	Tc = 6.0 sec
Potential Capacity:	Cp8 = 140 pcph	:	Cp11 = 133 pcph
Impedance Factor:	FE = 0.000	:	F11 = 0.000
Actual Capacity:	$Cm8 = Cp8 \times F1 \times F4 = 58$ pcph	:	$Cm11 = Cp11 \times F4 \times F1 = 55$ pcph

STEP 4: LEFT TURN FROM MINOR STREET (V7,V10)

Conflicting Flows:	$Vc8 + V11 + V12 = Vc7$	:	$Vc11 + V8 + V9 = Vc10$
	1498 + 552 + 224 = 2274 vph	:	1535 + 401 + 456 = 2392 vph
Critical Gap:	Tc = 6.5 sec	:	Tc = 6.5 sec
Potential Capacity:	Cp7 = 75 pcph	:	Cp10 = 75 pcph
Actual Capacity:	$Cm7 = Cp7 \times F1 \times F4 \times F11 \times F12 = 0$ pcph	:	$Cm10 = Cp10 \times F4 \times F1 \times F8 \times F9 = 0$ pcph

SHARED LANE CAPACITIES

Two Movements (L+T):	Csh = NA pcph	:	Csh = NA pcph
Two Movements (T+R):	Csh = NA pcph	:	Csh = 75 pcph
Three Movements:	Csh = NA pcph	:	Csh = NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	123	0	-123	F
Through from Minor Street (V8)	401	58	-343	F
Right Turn from Minor Street (V9)	456	651	195	D
Left Turn from Minor Street (V10)	13	0	-13	F
Through from Minor Street (V11)	776	75	-701	F
Right Turn from Minor Street (V12)	NA	NA	NA	
Left Turn from Major Street (V1)	143	711	568	A
Left Turn from Major Street (V4)	386	647	261	C

APPENDIX A
INTERSECTION CONFIGURATIONS

13-Sep-90

Kaku Associates

UNSIGNALIZED FOUR-LEG INTERSECTION LEVEL OF SERVICE ANALYSIS

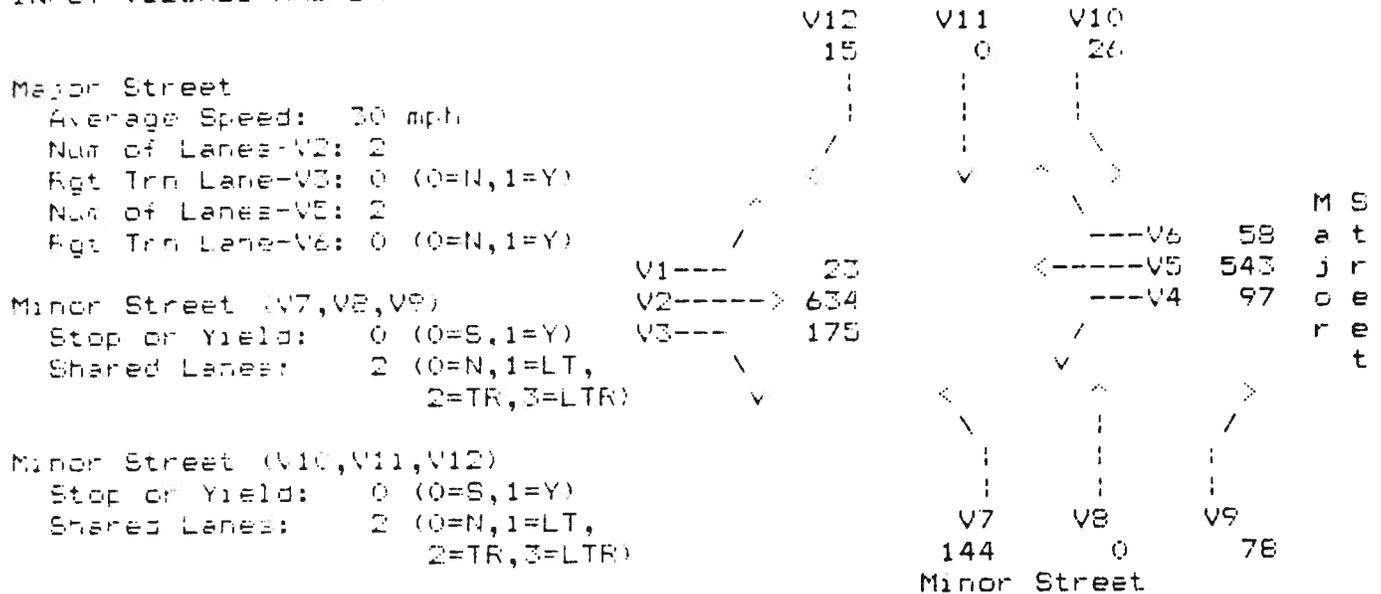
Major Street: MINARET RD.

Peak Period: PM

Minor Street: LODESTAR ACCESS #2

Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9,V12)

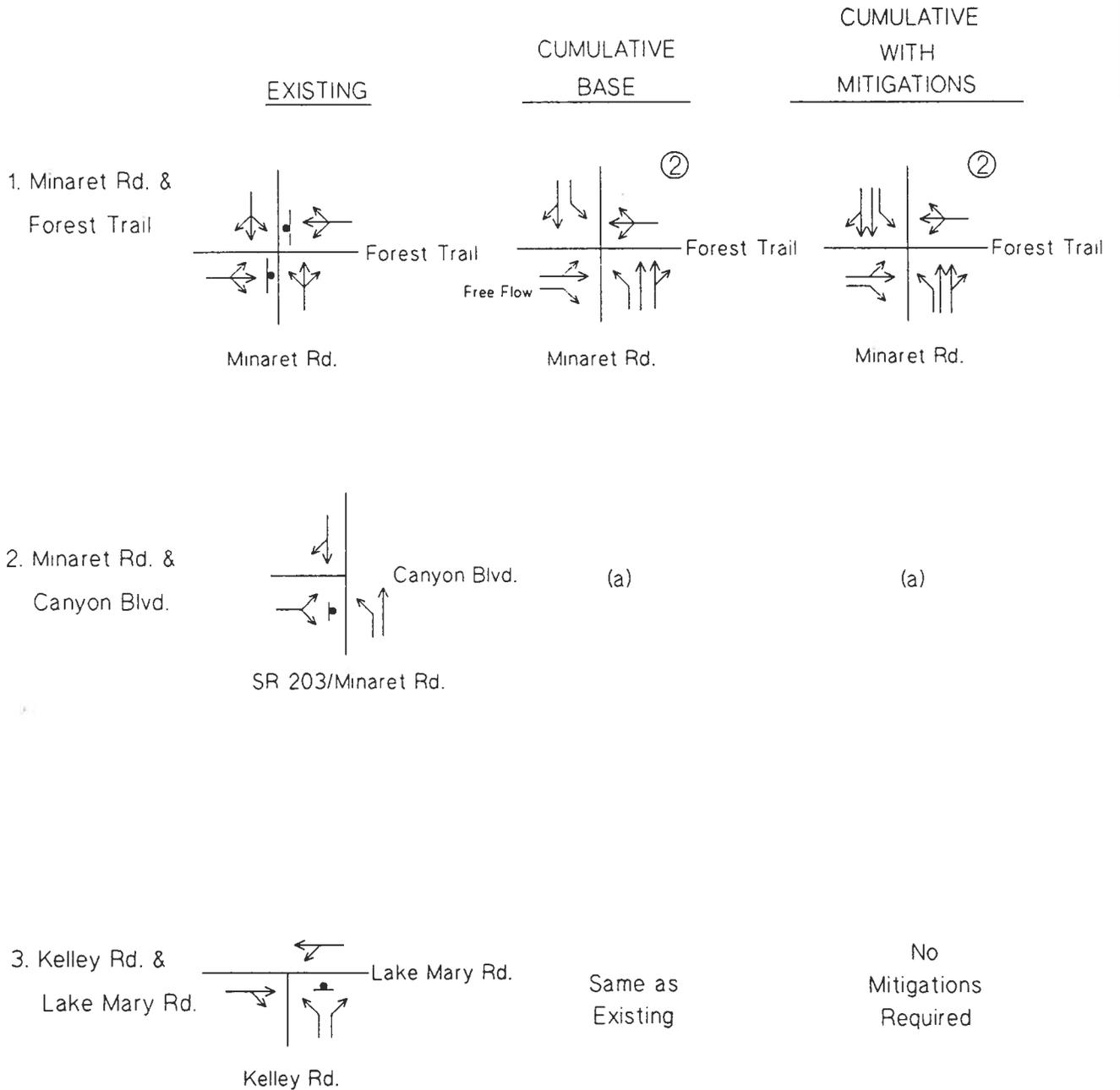
Conflicting Flows:	$1/2 V3 + V2 = Vc9$	:	$1/2 V6 + V5 = Vc12$
	$88 + 230 = 318$ vph	:	$29 + 243 = 272$ vph
Critical Gap:	$Tc = 5.5$ sec	:	$Tc = 5.5$ sec
Potential Capacity:	$Cp9 = 774$ pcph	:	$Cp12 = 818$ pcph
Impedance Factor:	$F9 = 0.935$	:	$F12 = 0.990$
Actual Capacity:	$Cm9 = Cp9 = 774$ pcph	:	$Cm12 = Cp12 = 818$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4,V1)

Conflicting Flows:	$V3 + V2 = Vc4$	:	$V6 + V5 = Vc1$
	$175 + 634 = 809$ vph	:	$58 + 543 = 601$ vph
Critical Gap:	$Tc = 5.5$ sec	:	$Tc = 5.5$ sec
Potential Capacity:	$Cp4 = 425$ pcph	:	$Cp1 = 559$ pcph
Impedance Factor:	$F4 = 0.835$	:	$F1 = 0.975$
Actual Capacity:	$Cm4 = Cp4 = 425$ pcph	:	$Cm1 = Cp1 = 559$ pcph

continued

Intersection Configurations



LEGEND:

② Number of Signal Phases.

▸ Stop Sign

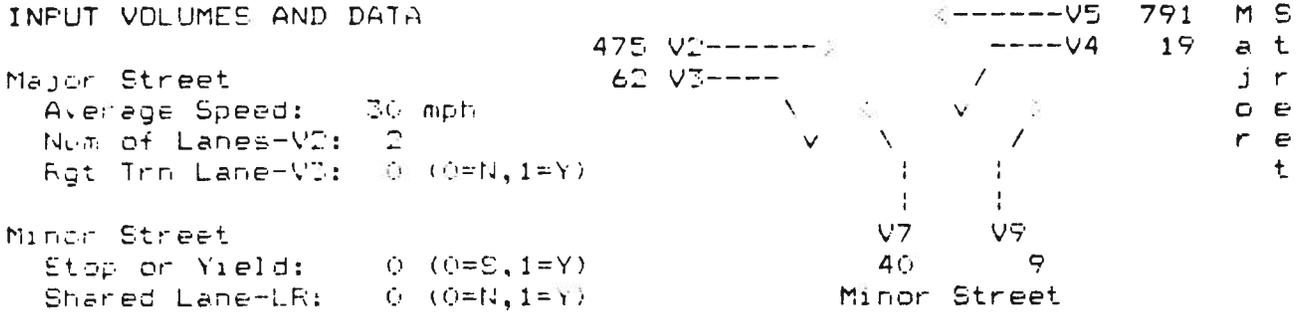
* Functions as a separate turn lane, although not striped.

a. Intersection to be vacated in conjunction with North Village Specific Plan

UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN BLVD. Peak Period: PM
 Minor Street: LODESTAR ACCESS #3
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow:	Vc9 = 1/2 V3 + V2 =	31 + 207 =	238 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp9 =		852 pcph
Actual Capacity:	Cm9 = Cp9 =		852 pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow:	Vc4 = V3 + V2 =	62 + 475 =	537 vph
Critical Gap:	Tc =		5.5 sec
Potential Capacity:	Cp4 =		607 pcph
Impedance Factor:	F4 =	0.980	
Actual Capacity:	Cm4 = Cp4 =		607 pcph

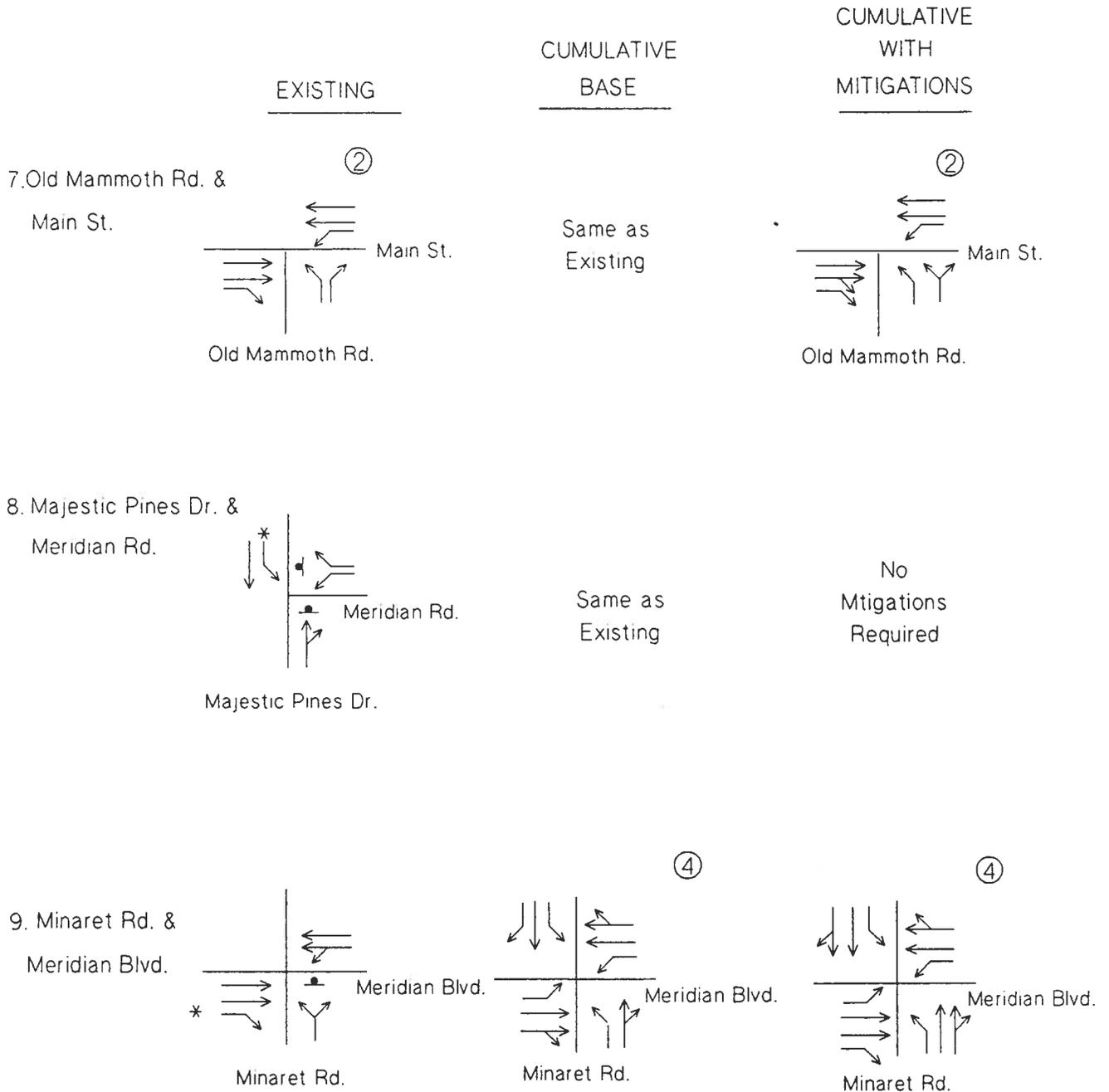
STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow:	Vc7 = 1/2 V3 + V2 + V5 + V4 =	31 + 475 + 791 + 19 =	1316 vph
Critical Gap:	Tc =		7.0 sec
Potential Capacity:	Cp7 =		121 pcph
Actual Capacity:	Cm7 = Cp7 x F4 =		119 pcph
Shared Lane Capacity:	Csh =		NA pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capcty (Cr)	LOS
Left Turn from Minor Street (V7)	40	119	79	E
Right Turn from Minor Street (V9)	9	852	843	A
Left Turn from Major Street (V4)	19	607	588	A

Intersection Configurations



LEGEND:

② Number of Signal Phases.

▮ Stop Sign

* Functions as a separate turn lane, although not striped.

12-Sep-90

Kaku Associates

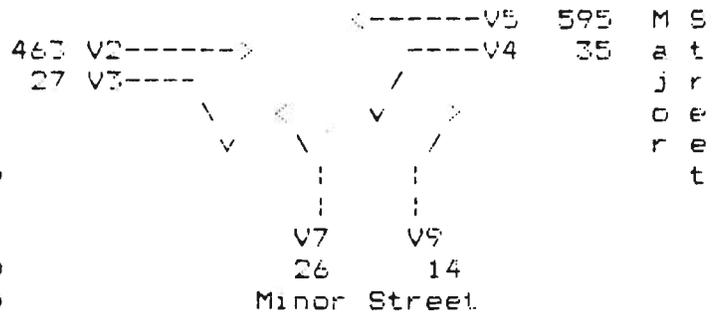
UNSIGNALIZED "T" INTERSECTION LEVEL OF SERVICE ANALYSIS

Major Street: MERIDIAN BLVD. Peak Period: PM
 Minor Street: LODESTAR ACCESS #5
 Scenario: CUMULATIVE PLUS PROJECT

INPUT VOLUMES AND DATA

Major Street
 Average Speed: 30 mph
 Num of Lanes-V2: 2
 Rgt Trn Lane-V3: 0 (0=N,1=Y)

Minor Street
 Stop or Yield: 0 (0=S,1=Y)
 Shared Lane-LR: 0 (0=N,1=Y)



STEP 1: RIGHT TURN FROM MINOR STREET (V9)

Conflicting Flow: | $V_{c9} = 1/2 V3 + V2 = 14 + 218 = 232$ vph
 Critical Gap: | $T_c = 5.5$ sec
 Potential Capacity: | $C_{p9} = 858$ pcph
 Actual Capacity: | $C_{m9} = C_{p9} = 858$ pcph

STEP 2: LEFT TURN FROM MAJOR STREET (V4)

Conflicting Flow: | $V_{c4} = V3 + V2 = 27 + 463 = 490$ vph
 Critical Gap: | $T_c = 5.5$ sec
 Potential Capacity: | $C_{p4} = 642$ pcph
 Impedance Factor: | $F_4 = 0.970$
 Actual Capacity: | $C_{m4} = C_{p4} = 642$ pcph

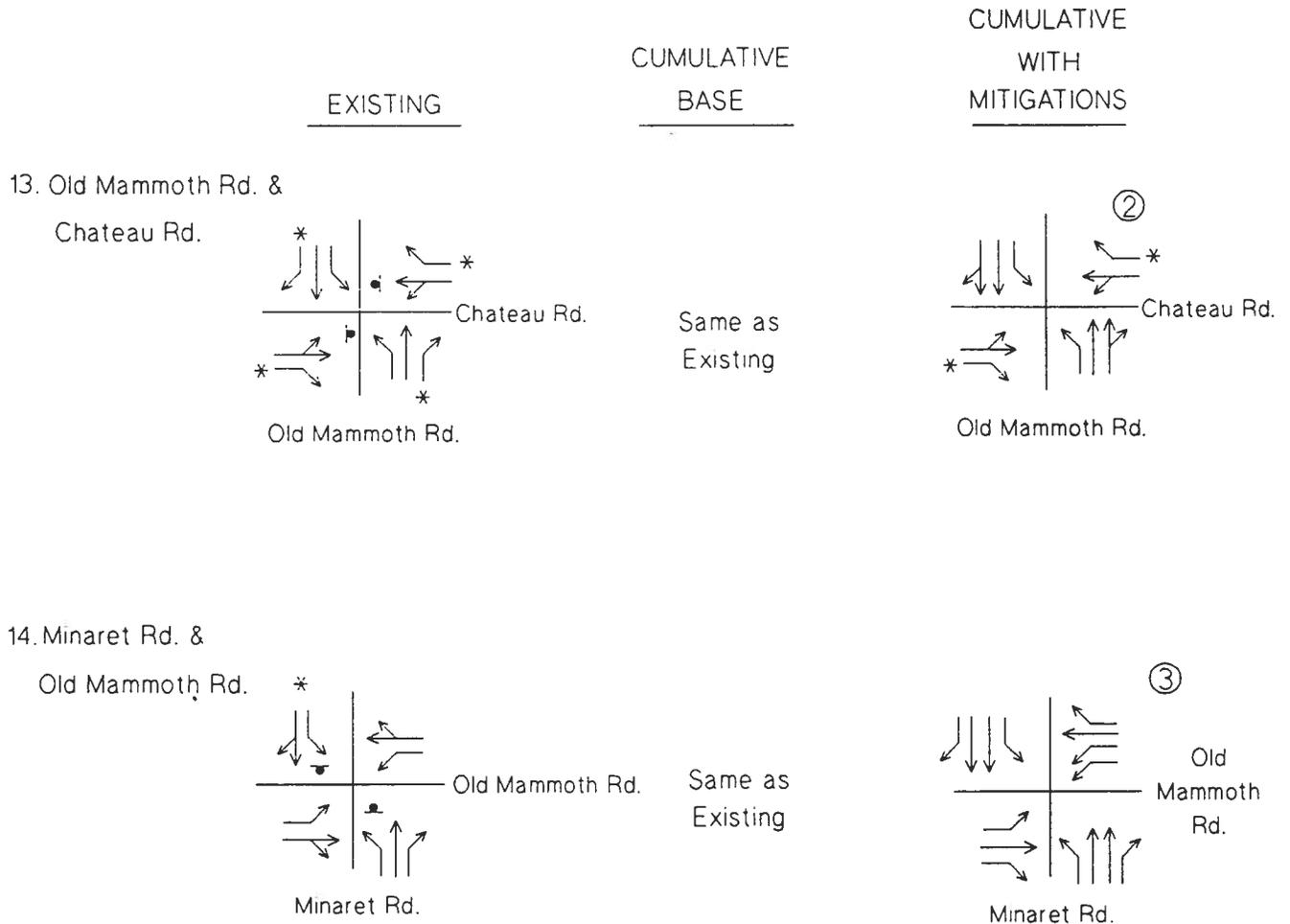
STEP 3: LEFT TURN FROM MINOR STREET (V7)

Conflicting Flow: | $V_{c7} = 1/2 V3 + V2 + V5 + V4 = 14 + 463 + 595 + 35 = 1107$ vph
 Critical Gap: | $T_c = 7.0$ sec
 Potential Capacity: | $C_{p7} = 164$ pcph
 Actual Capacity: | $C_{m7} = C_{p7} \times F_4 = 159$ pcph
 Shared Lane Capacity: | $C_{sh} = NA$ pcph

RESERVE CAPACITY AND LOS

Movement	Volume (V)	Capacity (Cm)	Reserve Capacity (Cr)	LOS
Left Turn from Minor Street (V7)	26	159	133	D
Right Turn from Minor Street (V9)	14	858	844	A
Left Turn from Major Street (V4)	35	642	607	A

Intersection Configurations



LEGEND:

② Number of Signal Phases.

▶ Stop Sign

* Functions as a separate turn lane, although not striped.

Program Licensed To: Kaku Associates

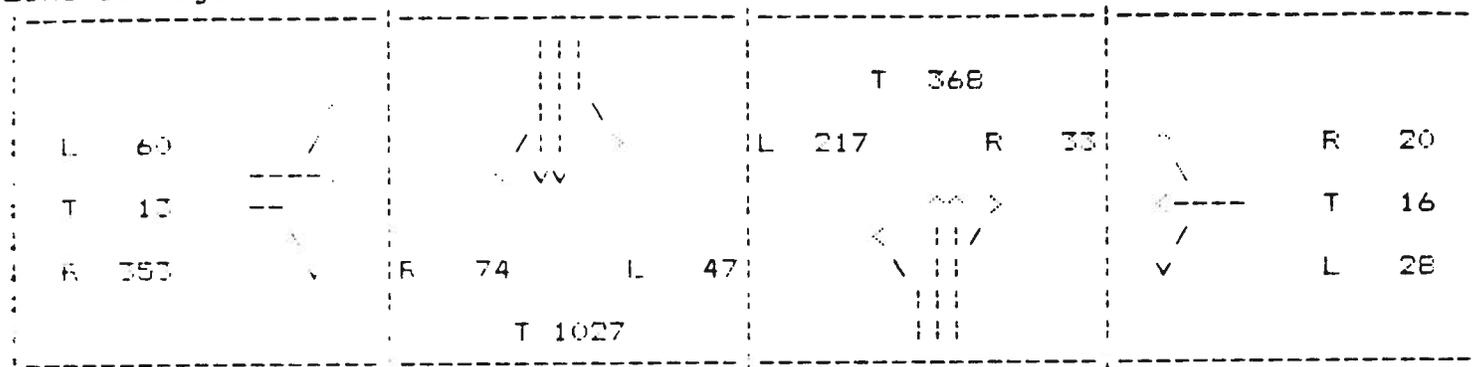
LODESTAR

CUMULATIVE PLUS LODESTAR FM PEAK LOS
WINTER WEEKEND CONDITIONS, WITH MITIGATIONS

9/12/90

Intersection: 1 MINARET RD. & FOREST TRAIL (High Critical Volume Estimate)

Lane Configuration and Turn Volumes



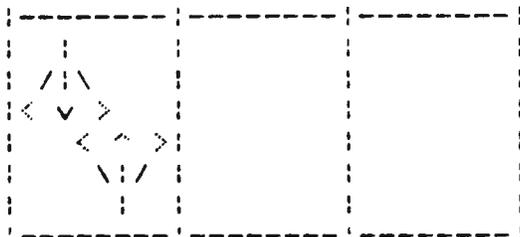
Approach	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NE	EXL	1	217	217
	TR	2	201	
SE	EXL	1	47	
	TR	2	551	551
EB	LT	1	73	73
	EXR	1	357	+27
WE	LTR	1	64	64
Total Critical Volume				905

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

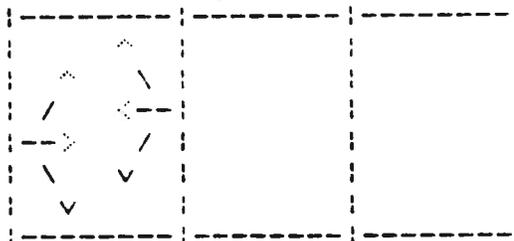
Critical Volume = ~~905~~ 932
 No of Critical Phases = ~~2~~ 3
 Level of Service = ~~B~~ C
 Volume/Capacity = ~~0.60~~ 0.73

$\frac{932}{1275} = 0.73$

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

APPENDIX B

WINTER WEEKEND PM PEAK HOUR INTERSECTION TURNING MOVEMENTS

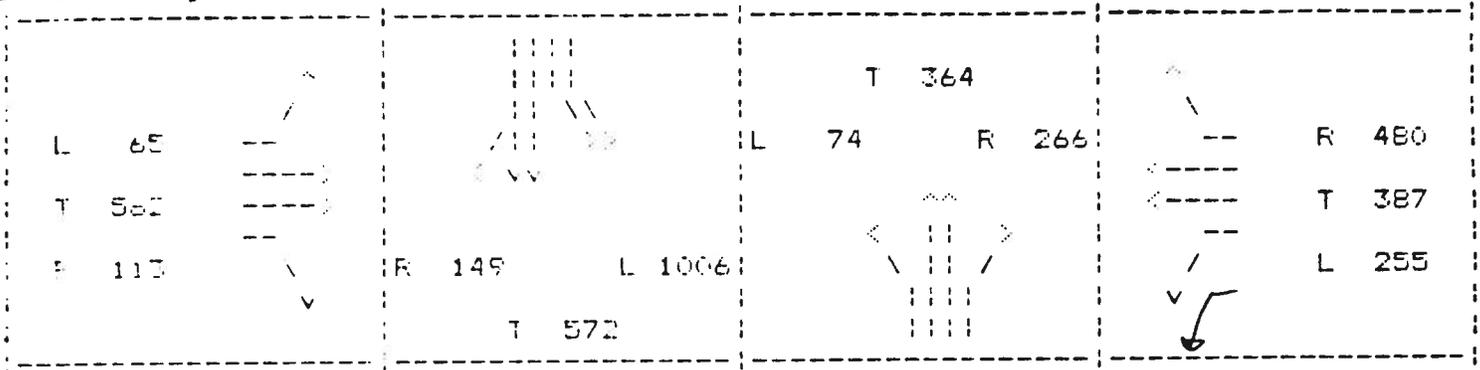
Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 5 MINARET RD. & MAIN

9/12/90

Lane Configuration and Turn Volumes

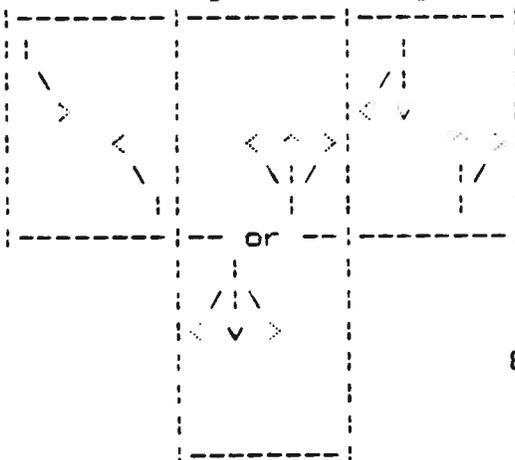


Appro	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	74	182
	T	2	182	
	EXR	1	266	
SB	EYL	2	503	503
	TR	2	361	
EB	EXL	1	65	281
	T	2	281	
	EXR	1	113	
WB	EXL	2	128	128
	T	2	194	
	EXR	1	480	
Total Critical Volume				1221

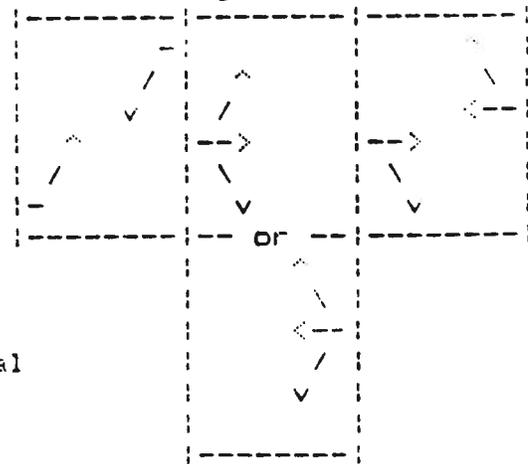
Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume = 1221
 No of Critical Phases = 4
 Level of Service = **E**
 Volume/Capacity = ~~0.89~~ **0.94**

N/S Signal Phasing



E/W Signal Phasing



8 Phase Signal

Program Licensed To: Kaku Associates

LODESTAR

LODESTAR PROJECT GENERATED PM PEAK TURNING MOVEMENTS
PEAK WINTER WEEKEND CONDITIONS

9/14/90

INTERSECTION		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
NO	STREETS	L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	-	17	-	-	74	-	-	-	-	-	-	-
		[	17]		[	74]		[]		[]	
3	KELLY RD. & LAKE MARY RD.	2	-	-	-	-	-	-	-	5	-	-	-
		[	2]		[	]		[	5]		[]	
4	LAKEVIEW & LAKE MARY RD.	-	-	-	22	-	-	-	-	-	-	-	11
		[	]		[	22]		[	]		[	11]	
5	MINARET RD. & MAIN	11	63	147	-	121	-	-	-	22	146	-	-
		[	221]		[	121]		[	22]		[	146]	
6	SIERRA & MAIN	-	-	-	-	-	-	-	129	-	-	130	-
		[	]		[	]		[	129]		[	130]	
7	OLD MAMMOTH & MAIN	50	-	-	-	-	-	-	24	51	-	24	-
		[	50]		[	]		[	75]		[	24]	
8	MAJ. PINES & MERIDIAN	-	-	-	5	-	-	-	-	-	-	-	2
		[	]		[	5]		[	]		[	2]	
9	MINARET RD. & MERIDIAN	55	94	29	42	39	13	29	95	12	11	62	62
		[	178]		[	94]		[	136]		[	135]	
10	MOND ST. & MERIDIAN	-	-	-	-	-	-	-	158	-	-	172	-
		[	]		[	]		[	158]		[	172]	
11	OLD MAMMOTH & MERIDIAN	71	2	-	-	1	54	48	51	46	-	30	-
		[	73]		[	55]		[	145]		[	30]	
12	MINARET RD. & CHATEAU RD.	-	178	3	-	62	-	-	-	-	1	-	-
		[	181]		[	62]		[	]		[	1]	
14	MINARET RD. & OLD MAMMOTH	-	110	-	-	63	-	-	-	-	-	-	71
		[	110]		[	63]		[	]		[	71]	

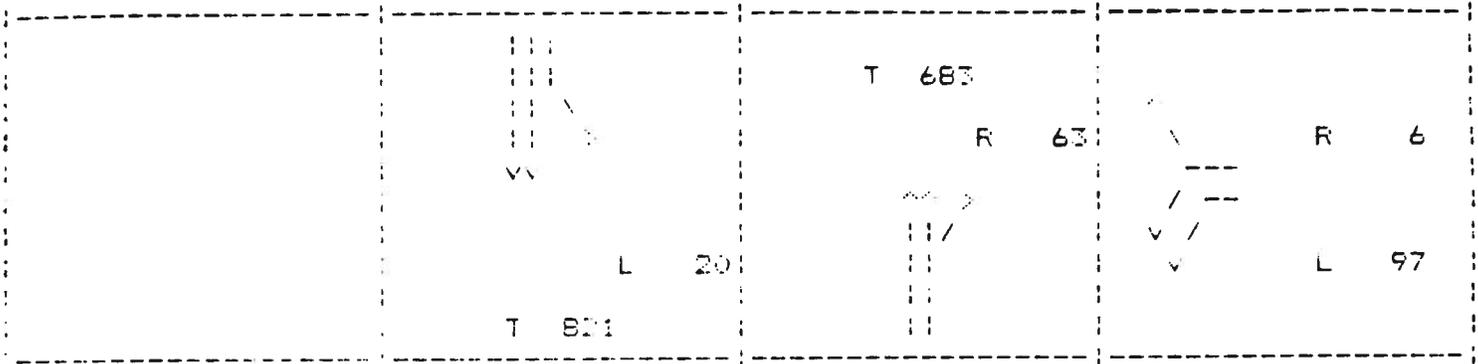
Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR FM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 12 MINARET RD. & CHATEAU RD.

9/12/90

Lane Configuration and Turn Volumes

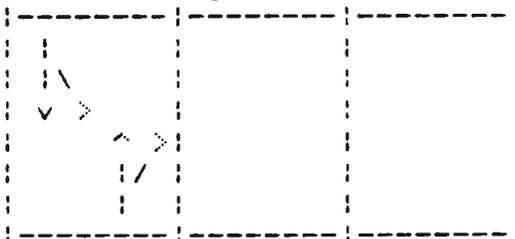


Approach	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	TR	2	373	
SB	EXL	1	20	
	T	2	411	411
WB	LR	2	52	52
Total Critical Volume				463 1275 = 0.36

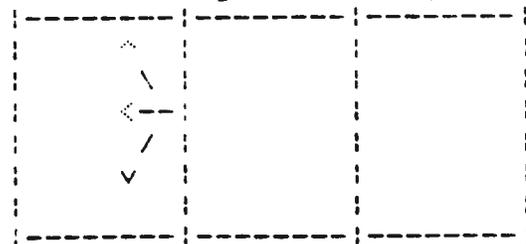
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume	=	463
No of Critical Phases	=	2
Level of Service	=	A
Volume/Capacity	=	0.31 0.36

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

Program Licensed To: Kaku Associates

LODESTAR EIR

EXISTING (SAT) PM PEAK HOUR TURNING VOLUMES

8/10/90

INTERSECTION		NORTHBOUND			SOUTHBOUND			EASTBOUND			WESTBOUND		
NO	STREETS	L	T	R	L	T	R	L	T	R	L	T	R
1	MINARET RD. & FOREST TRAIL	71	364	31	24	786	20	2	7	58	20	2	9
		[	466]		[	830]		[	67]		[	31]	
2	MINARET RD. & CANYON BLVD.	183	224	-	-	694	68	64	-	369	-	-	-
		[	407]		[	762]		[	433]		[]	
3	KELLY RD. & LAKE MARY RD.	22	-	91	-	-	-	-	111	69	66	123	-
		[	113]		[	]		[	180]		[	189]	
4	LAKEVIEW & LAKE MARY RD.	-	-	-	214	-	63	63	349	-	-	289	161
		[	]		[	277]		[	412]		[	450]	
5	MINARET RD. & MAIN	2	2	19	881	24	141	59	427	11	15	255	376
		[	23]		[	1046]		[	497]		[	646]	
6	SIERRA & MAIN	-	-	-	48	-	10	24	1474	-	-	674	23
		[	]		[	58]		[	1498]		[	697]	
7	OLD MAMMOTH & MAIN	429	-	75	-	-	-	-	177	770	103	207	-
		[	504]		[	]		[	947]		[	310]	
8	MAJ. PINES & MERIDIAN	-	8	21	260	32	-	-	-	-	39	-	145
		[	29]		[	292]		[	]		[	184]	
9	MINARET RD. & MERIDIAN	24	-	23	-	-	-	-	292	57	31	285	-
		[	47]		[	]		[	349]		[	316]	
10	MOND ST. & MERIDIAN	-	-	-	56	-	16	13	291	-	-	362	36
		[	]		[	72]		[	304]		[	398]	
11	OLD MAMMOTH & MERIDIAN	110	326	93	271	641	229	56	71	127	113	178	300
		[	529]		[	1141]		[	254]		[	591]	
12	MINARET RD. & CHATEAU RD.	-	45	63	16	78	-	-	-	-	101	-	5
		[	108]		[	94]		[	]		[	106]	
13	OLD MAMMOTH & CHATEAU RD.	11	302	4	50	471	211	108	11	3	8	3	38
		[	317]		[	732]		[	122]		[	49]	
14	MINARET RD. & OLD MAMMOTH	63	3	81	13	11	26	26	242	169	42	177	8
		[	147]		[	50]		[	437]		[	227]	

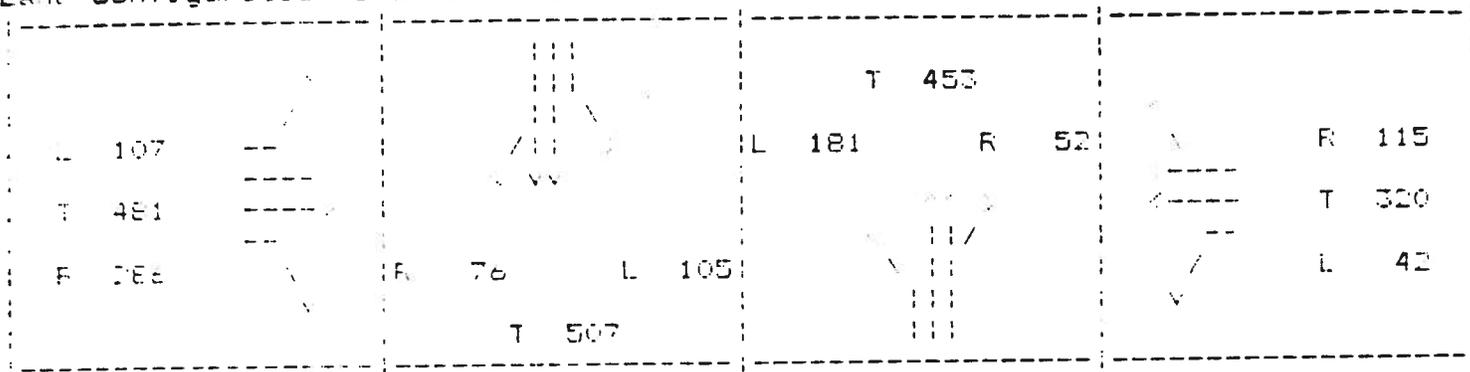
Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 9 MINARET RD. & MERIDIAN

9/12/90

Lane Configuration and Turn Volumes



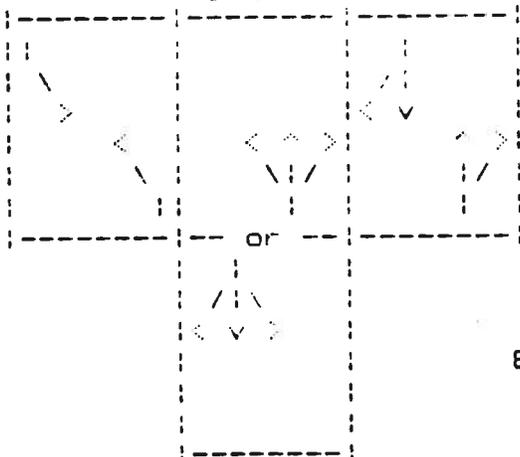
Approach	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	EXL	1	181	181
	TR	2	253	
SB	EXL	1	105	
	TR	2	292	292
EB	EXL	1	107	107
	T	2	241	
	EXR	1	288	
WB	EXL	1	42	
	TR	2	218	218
Total Critical Volume				798

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

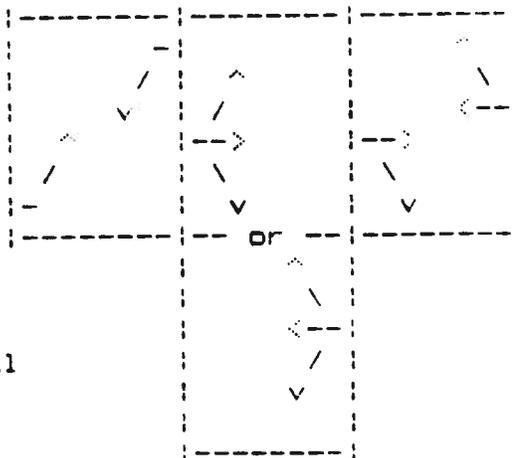
Critical Volume = 798
 No of Critical Phases = 4
 Level of Service = **AB**
 Volume/Capacity = ~~0.58~~
 0.68

1170 \div 0.68

N/S Signal Phasing



E/W Signal Phasing



6 Phase Signal

APPENDIX C

WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVEL OF SERVICE WORKSHEETS

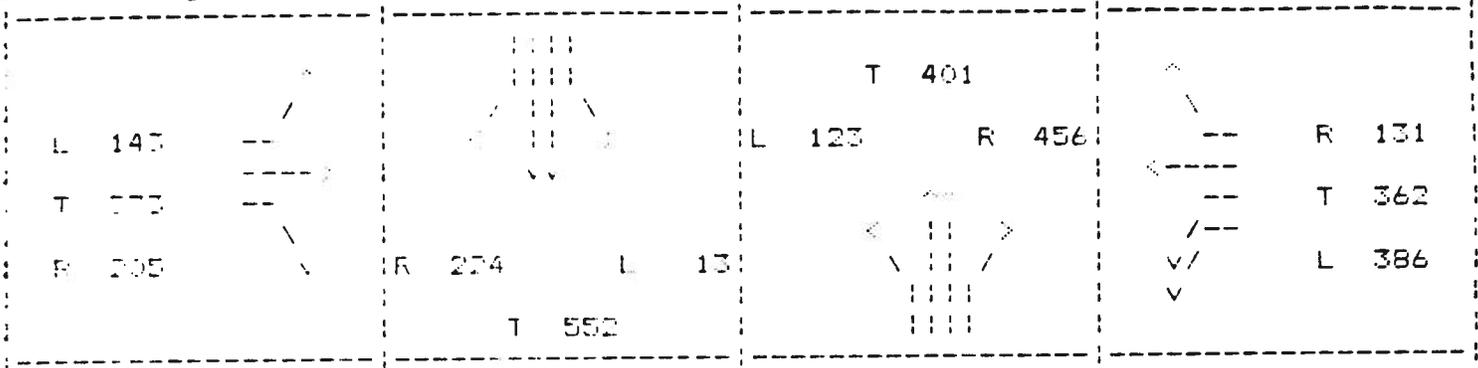
Program Licensed To: Kaku Associates

LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
 WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
 Intersection: 14 MINARET RD. & OLD MAMMOTH

9/12/90

Lane Configuration and Turn Volumes



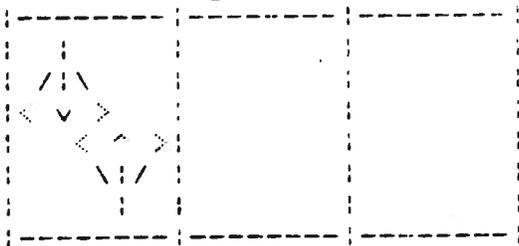
Appr	Lane Group	No. of Lanes	Per Lane Volume	Critical Volume
NB	EW	1	123	123
	T	2	201	
	EXR	1	456	
SB	EW	1	131	276
	T	2	276	
	EXR	1	224	
EB	EW	1	145	373
	T	1	373	
	EXR	1	205	
WB	EW	2	193	193
	T	1	362	
	EXR	1	131	
Total Critical Volume				<u>965</u>

$\frac{965}{1210} = 0.80$

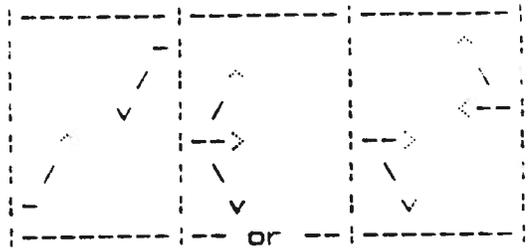
Maximum Total Critical Volumes			
Level of Service	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

Critical Volume	=	965
No. of Critical Phases	=	3
Level of Service	=	<u>FC</u>
Volume/Capacity	=	<u>0.80</u>

N/S Signal Phasing

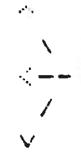


E/W Signal Phasing



5 Phase Signal

or



APPENDIX C
WINTER WEEKEND PM PEAK HOUR INTERSECTION LEVEL OF SERVICE WORKSHEETS

The peak hour levels of service at signalized intersections in the study area were determined utilizing the "Critical Movement Analysis - Planning Method."¹ Under this method, the constraining, or critical, hourly traffic movements are identified and aggregated to yield the "sum of critical volumes" for the intersection. The sum of critical volumes is divided by the practical hourly capacity of the intersection for the number of critical signal phases to determine the intersection volume to capacity (V/C) ratio, which indicates the percentage of the total intersection capacity which is utilized by the given traffic flows.

The CMA methodology normally uses a volume of 1,500 vehicles per lane per hour of green time as the capacity for a two-phase traffic signal, with per lane capacities of 1,425 and 1,375 vehicles per hour for signals with three and four critical signal phases, respectively. However, adverse weather and street surface conditions experienced in Mammoth Lakes during winter months can substantially reduce street and intersection capacities. This is due to such factors as reductions in speed and increased caution, use of tire chains, presence of snow removal equipment on the streets, etc., during poor weather conditions. To present a "worst case" analysis and ensure that the street system capacity is sufficient to accommodate traffic volumes during snow and ice conditions, a reduced capacity value of 1,275 vehicles per lane per hour of green was used in this study for two phase signals (15% lower than the standard capacity value), with a corresponding 15% reductions in capacity for three and four phase signals. With this modification, the guidelines used to identify the

¹ Source: Transportation Research Board, Transportation Research Circular No. 212, Interim Materials on Highway Capacity, January 1980, pp. 5 to 23.

Program Licensed To: Kaku Associates

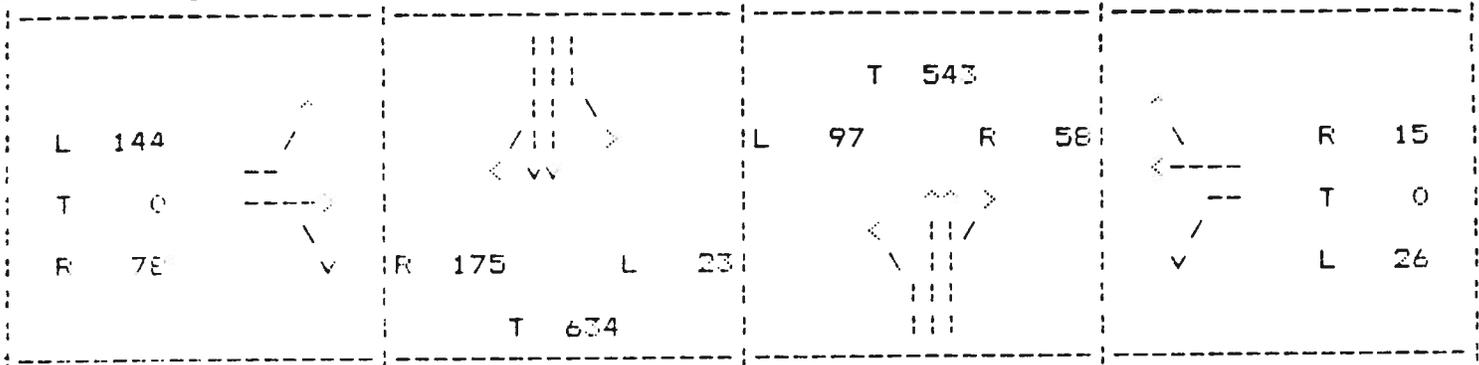
LODESTAR

CUMULATIVE PLUS LODESTAR PM PEAK LOS
WINTER WEEKEND CONDITIONS, WITH MITIGATIONS
Intersection: 55 MINARET RD & LODESTAR

9/13/90

(ACCESS #2)

Lane Configuration and Turn Volumes



Appr	Lane Group	No of Lanes	Per Lane Volume	Critical Volume
NE	EXL	1	97	97
	TR	2	301	
SE	EXL	1	23	
	TR	2	405	405
EE	EXL	1	144	144
	TR	1	78	
WE	EXL	1	26	
	TR	1	15	15
Total Critical Volume				661

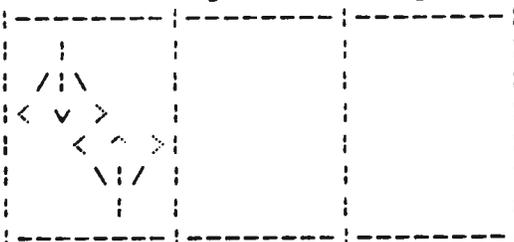
$\frac{661}{1275} = 0.52$

Level of Service	Maximum Total Critical Volumes		
	Two Phase	Three Phase	Four Phase
A	900	855	825
B	1050	1000	965
C	1200	1140	1100
D	1350	1275	1225
E	1500	1425	1375
F	NA	NA	NA

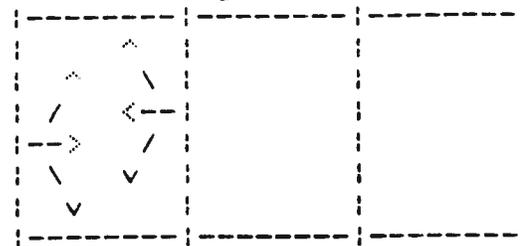
Critical Volume	=	661
No of Critical Phases	=	2
Level of Service	=	A
Volume/Capacity	=	0.44

0.52

N/S Signal Phasing



E/W Signal Phasing



2 Phase Signal

TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

		Minimum Requirements					
		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
		Major Street	Minor Street	Urban	Rural	Urban	Rural
Major Street: MINARET RD.							
Minor Street: FOREST TRAIL							
Scenario: EXISTING (SAT) BASE 17,000 SAOT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME							
Number of Lanes on Each Approach							
Major Street:	1	Major Street	Minor Street				
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	498	1	1	500	350	150	105
Major Street (Approach 2):	280	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	40	1	>=2	500	350	200	140
WARRANT 1 SATISFIED?	NO	Minimum Req.		500	NA	150	NA
		Test Amount		778	NA	40	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC							
Number of Lanes on Each Approach							
Major Street:	1	Major Street	Minor Street				
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	498	1	1	750	525	75	53
Major Street (Approach 2):	280	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	40	1	>=2	750	525	100	70
WARRANT 2 SATISFIED?	NO	Minimum Req.		750	NA	75	NA
		Test Amount		778	NA	40	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled?	NO						
Warrant 2 80% Fulfilled?	NO						
WARRANT 8 SATISFIED?	NO	Warrants 1 and 2 Both 80% Fulfilled					
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

Major Street: MINARET RD.			
Minor Street: FOREST TRAIL			
Scenario: EXISTING (SAT) BASE 17,000 SAOT			
Urban/Rural: U (U=urban, R=rural)			
=====			
WARRANT 9-FOUR HOUR VOLUME			

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		

Vehicles Per Hour (4th Highest Hour)			
Major Street (Approach 1):	706	Major Street Left Turn (See Note 1):	0
Major Street (Approach 2):	396	Minor Street (Higher Volume App.):	57
	-----		-----
Major Street Total (Both Approaches):	1102	Minor Street Total:	57
Minimum Volume on Major Street to Satisfy Warrant (see Note 2):	380	Minimum Volume on Minor Street to Satisfy Warrant (see Note 2):	90

WARRANT 9 SATISFIED?	NO		
=====			
WARRANT 11-PEAK HOUR VOLUME			

Number of Lanes on Each Approach			
Major Street:	1		
Minor Street:	1		

Vehicles Per Hour (Peak Hour)			
Major Street (Approach 1):	830	Major Street Left Turn (See Note 1):	0
Major Street (Approach 2):	466	Minor Street (Higher Volume App.):	67
	-----		-----
Major Street Total (Both Approaches):	1296	Minor Street Total:	67
Minimum Volume on Major Street to Satisfy Warrant (see Note 3):	450	Minimum Volume on Minor Street to Satisfy Warrant (see Note 3):	130

WARRANT 11 SATISFIED?	NO		
=====			
NOTES:			
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.			
2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.			
3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.			
4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.			
=====			

APPENDIX D
TRAFFIC SIGNAL WARRANT WORKSHEETS

APPENDIX D
TRAFFIC SIGNAL WARRANT WORKSHEETS

Traffic signal warrants from the California Department of Transportation Traffic Manual (December 1986) and the U.S. Department of Transportation, Federal Highway Administration Manual on Uniform Traffic Control Devices (March 1986) were utilized to assess the need for traffic signals at those locations for which signals were evaluated as potential traffic mitigation measures.

Signal warrants 1, 2 and 8 are based on the eighth-highest hour of traffic through the intersection, with the projected volumes on both the major and minor street approaches during the eighth-highest hour compared to recognized standards for signalization. These warrants consist of:

- o Warrant 1, Minimum Vehicular Volume - The Minimum Vehicular Volume warrant determines whether the total projected volumes on both streets during the eighth-highest-hour are sufficiently high to warrant a signal;
- o Warrant 2, Interruption of Continuous Traffic - The Interruption of Continuous Traffic warrant determines whether the major street volumes during the eighth-highest-hour are so high that they effectively prohibit minor street traffic from entering the intersection; and
- o Warrant 8, Combination of Warrants - A combination of Warrants 1 and 2, in which the intersection is said to satisfy warrants if neither Warrants 1 nor 2 are fully satisfied, but both are fulfilled by 80 percent or more.

Warrant 9 (Four Hour Volumes) is based on the fourth-highest hour of traffic through the intersection, while Warrant 11 (Peak Hour Volume) is based on the single highest hour in the day.

Generally, an intersection which meets warrants should be considered for signalization, although special conditions at a particular location could indicate that a signal may not be desirable. Conversely, a traffic signal may

alleviate special conditions at a location which does not otherwise meet signal warrants. As stated in the Caltrans Traffic Manual:

"The satisfaction of a warrant is not necessarily justification for a signal. Delay, congestion, confusion or other evidence of the need for right of way assignment must be shown." (Caltrans, Traffic Manual, December 1986, pages 9-5, 9-6 and 9-7)

Thus, use of these signal warrants in a long-range planning study such as the current study is only intended as a general guide, and does not, in and of itself, justify installation of a traffic signal without further engineering studies at the time traffic volumes appear to warrant the signal.

Note that traffic volumes during the eighth-highest hour of traffic through the intersection (Warrants 1, 2 and 8) were estimated assuming that the eighth-highest hour of traffic would be approximately 60 percent of the projected single highest peak hour of traffic. Traffic volumes during the fourth-highest hour of traffic through the intersection (Warrant 9) were estimated assuming that the fourth-highest hour of traffic would be approximately 85 percent of the projected single highest peak hour of traffic.

The remainder of this appendix contains the traffic signal warrant worksheets used to assess the need for traffic signals at unsignalized intersections with stop-controlled movements operating under poor conditions (LOS D, E or F). Under estimated existing winter weekend conditions, these locations are as follows:

- o Minaret Road/Forest Trail
- o Minaret Road/Canyon Boulevard
- o Lakeview Road/Lake Mary Road
- o Sierra Boulevard/Main Street
- o Old Mammoth Road/Chateau Road

Under projected cumulative plus project winter weekend conditions, these locations consist of the following:

- o Sierra Boulevard/Main Street
- o Mono Street/Meridian Boulevard
- o Minaret Road/Chateau Road

- o Old Mammoth Road/Chateau Road
- o Minaret Road/Old Mammoth Road
- o Minaret Road/Lodestar access number 1
- o Minaret Road/Lodestar access number 2
- o Meridian Boulevard/Lodestar access number 3
- o Meridian Boulevard/Lodestar access number 4
- o Meridian Boulevard/Lodestar access number 5
- o Meridian Boulevard/Lodestar access number 6

As can be seen in the following pages, traffic volumes at the intersections of Minaret Road/Canyon Boulevard and Lakeview Road/Lake Mary Road satisfy warrants under the estimated existing conditions. The projected traffic volumes at the intersections of Minaret Road/Chateau Road, Old Mammoth Road/Chateau Road and Minaret Road/Old Mammoth Road would satisfy warrants under the projected cumulative conditions.

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
: Major Street: MINARET RD.
: Minor Street: FOREST TRAIL
: Scenario: EXISTING (SAT) BASE 17,000 SAOT
=====
:
: Requested Volumes
: for Satisfy Applicable
: Warrant Number and Name Analysis? Warrant? Time Period
:-----
: 1-Minimum Vehicular Volume YES NO 8th Highest Hour
: 2-Interruption of Cont. Traffic YES NO 8th Highest Hour
: 8-Combination of Warrants 1 & 2 YES NO 8th Highest Hour
:
: 9-Four Hour Volume YES NO 4th Highest Hour
:
: 11-Peak Hour Volume YES NO Peak Hour
:
: Estimated Average Daily Traffic
: Minimum Vehicular Volume NO n/a Daily
: Interruption of Cont. Traffic NO n/a Daily
: Combination of Warrants NO n/a Daily
:-----
    
```


TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

		Minimum Requirements					
		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
		Major Street	Minor Street	Urban	Rural	Urban	Rural
Major Street: MINARET RD.							
Minor Street: CANYON BLVD.							
Scenario: EXISTING (SAT) BASE 17,000 SAOT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME							
Number of Lanes on Each Approach							
Major Street:	1	Major Street	Minor Street				
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	457	1	1	500	350	150	105
Major Street (Approach 2):	244	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	260	1	>=2	500	350	200	140
WARRANT 1 SATISFIED? YES		Minimum Req.		500	NA	150	NA
		Test Amount		701	NA	260	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC							
Number of Lanes on Each Approach							
Major Street:	1	Major Street	Minor Street				
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	457	1	1	750	525	75	53
Major Street (Approach 2):	244	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	260	1	>=2	750	525	100	70
WARRANT 2 SATISFIED? NO		Minimum Req.		750	NA	75	NA
		Test Amount		701	NA	260	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled? YES							
Warrant 2 80% Fulfilled? YES							
WARRANT 8 SATISFIED? YES		Warrants 1 and 2 Both 80% Fulfilled					
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
Major Street:  MINARET RD.
Minor Street:  CANYON BLVD.
Scenario:      EXISTING (SAT) BASE 17,000 SAOT
Urban/Rural:   U (U=urban, R=rural)
=====
    
```

WARRANT 9-FOUR HOUR VOLUME

```

=====
Number of Lanes on Each Approach
Major Street:      1
Minor Street:      1
=====
Vehicles Per Hour (4th Highest Hour)
Major Street (Approach 1):  648      Major Street Left Turn (See Note 1):  0
Major Street (Approach 2):  346      Minor Street (Higher Volume App.):  368
-----
Major Street Total (Both Approaches):  994      Minor Street Total:  368
=====
Minimum Volume on Major Street
to Satisfy Warrant (see Note 2):  380      Minimum Volume on Minor Street
to Satisfy Warrant (see Note 2):  110
=====
    
```

WARRANT 9 SATISFIED? YES

WARRANT 11-PEAK HOUR VOLUME

```

=====
Number of Lanes on Each Approach
Major Street:      1
Minor Street:      1
=====
Vehicles Per Hour (Peak Hour)
Major Street (Approach 1):  762      Major Street Left Turn (See Note 1):  0
Major Street (Approach 2):  407      Minor Street (Higher Volume App.):  433
-----
Major Street Total (Both Approaches):  1169      Minor Street Total:  433
=====
Minimum Volume on Major Street
to Satisfy Warrant (see Note 3):  450      Minimum Volume on Minor Street
to Satisfy Warrant (see Note 3):  160
=====
    
```

WARRANT 11 SATISFIED? YES

NOTES:

1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.
2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
Major Street:  MINARET RD.
Minor Street:  CANYON BLVD.
Scenario:      EXISTING (SAT) BASE 17,000 SAOT
=====

```

Warrant Number and Name	Requested for Analysis?	Volumes Satisfy Warrant?	Applicable Time Period
1-Minimum Vehicular Volume	YES	YES	8th Highest Hour
2-Interruption of Cont. Traffic	YES	NO	8th Highest Hour
8-Combination of Warrants 1 & 2	YES	YES	8th Highest Hour
9-Four Hour Volume	YES	YES	4th Highest Hour
11-Peak Hour Volume	YES	YES	Peak Hour
Estimated Average Daily Traffic			
Minimum Vehicular Volume	NO	n/a	Daily
Interruption of Cont. Traffic	NO	n/a	Daily
Combination of Warrants	NO	n/a	Daily

```

=====

```


TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

		Minimum Requirements					
		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
Major Street: LAKE MARY RD.							
Minor Street: LAKEVIEW							
Scenario: EXISTING (SAT) BASE 17,000 SAOT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME							
Number of Lanes on Each Approach				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
Major Street:	1	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street				
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	247	1	1	500	350	150	105
Major Street (Approach 2):	270	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	166	1	>=2	500	350	200	140
WARRANT 1 SATISFIED? YES		Minimum Req.		500	NA	150	NA
		Test Amount		517	NA	166	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC							
Number of Lanes on Each Approach				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
Major Street:	1	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street				
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	247	1	1	750	525	75	53
Major Street (Approach 2):	270	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	166	1	>=2	750	525	100	70
WARRANT 2 SATISFIED? NO		Minimum Req.		750	NA	75	NA
		Test Amount		517	NA	166	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled?	YES						
Warrant 2 80% Fulfilled?	NO						
WARRANT 8 SATISFIED? NO		Warrants 1 and 2 Both 80% Fulfilled					
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street: LAKE MARY RD.
: Minor Street: LAKEVIEW
: Scenario: EXISTING (SAT) BASE 17,000 SADT
: Urban/Rural: U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 1
: Minor Street: 1
=====
: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1): 350      Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 383      Minor Street (Higher Volume App.): 235
:                               -----
: Major Street Total (Both Approaches): 733      Minor Street Total: 235
:
: Minimum Volume on Major Street      Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2): 380      to Satisfy Warrant (see Note 2): 170
=====

```

WARRANT 9 SATISFIED? YES

WARRANT 11-PEAK HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 1
: Minor Street: 1
=====
: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1): 412      Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 450      Minor Street (Higher Volume App.): 277
:                               -----
: Major Street Total (Both Approaches): 862      Minor Street Total: 277
:
: Minimum Volume on Major Street      Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3): 450      to Satisfy Warrant (see Note 3): 250
=====

```

WARRANT 11 SATISFIED? YES

NOTES:

- ```

=====
: 1. Heavier left-turn movement from the major street may be included with minor street volume
: if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
: Traffic Control Devices," March 1986.
=====

```

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
: Major Street: LAKE MARY RD.
: Minor Street: LAKEVIEW
: Scenario: EXISTING (SAT) BASE 17,000 SADT
=====
:
: Requested Volumes
: for Satisfy Applicable
: Warrant Number and Name Analysis? Warrant? Time Period
:-----
: 1-Minimum Vehicular Volume YES YES 8th Highest Hour
: 2-Interruption of Cont. Traffic YES NO 8th Highest Hour
: 8-Combination of Warrants 1 & 2 YES NO 8th Highest Hour
:
: 9-Four Hour Volume YES YES 4th Highest Hour
:
: 11-Peak Hour Volume YES YES Peak Hour
:
: Estimated Average Daily Traffic
: Minimum Vehicular Volume NO n/a Daily
: Interruption of Cont. Traffic NO n/a Daily
: Combination of Warrants NO n/a Daily
:-----

```



TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

|                                                                                                                                                                                                                    |     | Minimum Requirements                |              |                                         |       |                                            |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-------------------------------------|--------------|-----------------------------------------|-------|--------------------------------------------|-------|
|                                                                                                                                                                                                                    |     | # of Lanes on Each Approach         |              | Vehicles Per Hour (eighth highest hour) |       |                                            |       |
| Major Street: MAIN ST.                                                                                                                                                                                             |     |                                     |              |                                         |       |                                            |       |
| Minor Street: SIERRA BLVD.                                                                                                                                                                                         |     |                                     |              |                                         |       |                                            |       |
| Scenario: EXISTING (SAT) BASE 17,000 SAOT                                                                                                                                                                          |     |                                     |              |                                         |       |                                            |       |
| Urban/Rural: U (U=urban, R=rural)                                                                                                                                                                                  |     |                                     |              |                                         |       |                                            |       |
| <b>WARRANT 1-MINIMUM VEHICULAR VOLUME</b>                                                                                                                                                                          |     |                                     |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                                     |              |                                         |       |                                            |       |
| Major Street:                                                                                                                                                                                                      | 2   | Major Street                        | Minor Street | Urban                                   | Rural | Urban                                      | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                              | Street       |                                         |       |                                            |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                                     |              |                                         |       |                                            |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 899 | 1                                   | 1            | 500                                     | 350   | 150                                        | 105   |
| Major Street (Approach 2):                                                                                                                                                                                         | 418 | >=2                                 | 1            | 600                                     | 420   | 150                                        | 105   |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                                 | >=2          | 600                                     | 420   | 200                                        | 140   |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 35  | 1                                   | >=2          | 500                                     | 350   | 200                                        | 140   |
| WARRANT 1 SATISFIED?                                                                                                                                                                                               | NO  | Minimum Req.                        |              | 600                                     | NA    | 150                                        | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                         |              | 1317                                    | NA    | 35                                         | NA    |
| <b>WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC</b>                                                                                                                                                                |     |                                     |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                                     |              |                                         |       |                                            |       |
| Major Street:                                                                                                                                                                                                      | 2   | Major Street                        | Minor Street | Urban                                   | Rural | Urban                                      | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                              | Street       |                                         |       |                                            |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                                     |              |                                         |       |                                            |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 899 | 1                                   | 1            | 750                                     | 525   | 75                                         | 53    |
| Major Street (Approach 2):                                                                                                                                                                                         | 418 | >=2                                 | 1            | 900                                     | 630   | 75                                         | 53    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                                 | >=2          | 900                                     | 630   | 100                                        | 70    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 35  | 1                                   | >=2          | 750                                     | 525   | 100                                        | 70    |
| WARRANT 2 SATISFIED?                                                                                                                                                                                               | NO  | Minimum Req.                        |              | 900                                     | NA    | 75                                         | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                         |              | 1317                                    | NA    | 35                                         | NA    |
| <b>WARRANT 8-COMBINATION</b>                                                                                                                                                                                       |     |                                     |              |                                         |       |                                            |       |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |     |                                     |              |                                         |       |                                            |       |
| Warrant 1 80% Fulfilled?                                                                                                                                                                                           | NO  |                                     |              |                                         |       |                                            |       |
| Warrant 2 80% Fulfilled?                                                                                                                                                                                           | NO  |                                     |              |                                         |       |                                            |       |
| WARRANT 8 SATISFIED?                                                                                                                                                                                               | NO  | Warrants 1 and 2 Both 80% Fulfilled |              |                                         |       |                                            |       |
| <b>NOTES:</b>                                                                                                                                                                                                      |     |                                     |              |                                         |       |                                            |       |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |     |                                     |              |                                         |       |                                            |       |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |     |                                     |              |                                         |       |                                            |       |

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street: MAIN ST.
: Minor Street: SIERRA BLVD.
: Scenario: EXISTING (SAT) BASE 17,000 SAOT
: Urban/Rural: U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1
=====
: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1): 1273 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 592 Minor Street (Higher Volume App.): 49
: -----
: Major Street Total (Both Approaches): 1865 Minor Street Total: 49
:
: Minimum Volume on Major Street Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2): 390 to Satisfy Warrant (see Note 2): 80
=====

```

WARRANT 9 SATISFIED? NO

WARRANT 11-PEAK HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1
=====
: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1): 1498 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 697 Minor Street (Higher Volume App.): 58
: -----
: Major Street Total (Both Approaches): 2195 Minor Street Total: 58
:
: Minimum Volume on Major Street Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3): 510 to Satisfy Warrant (see Note 3): 100
=====

```

WARRANT 11 SATISFIED? NO

NOTES:

1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.
2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
	Major Street: MAIN ST.	
	Minor Street: SIERRA BLVD.	
	Scenario: EXISTING (SAT) BASE 17,000 SAOT	
=====		
	Requested Volumes	
	for Satisfy Applicable	
	Warrant Number and Name Analysis? Warrant? Time Period	

	1-Minimum Vehicular Volume YES NO 8th Highest Hour	
	2-Interruption of Cont. Traffic YES NO 8th Highest Hour	
	8-Combination of Warrants 1 & 2 YES NO 8th Highest Hour	
	9-Four Hour Volume YES NO 4th Highest Hour	
	11-Peak Hour Volume YES NO Peak Hour	
	Estimated Average Daily Traffic	
	Minimum Vehicular Volume NO n/a Daily	
	Interruption of Cont. Traffic NO n/a Daily	
	Combination of Warrants NO n/a Daily	

```



TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

|                                                                                                                                                                                                                    |     | Minimum Requirements        |              |                                         |       |                                            |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------|--------------|-----------------------------------------|-------|--------------------------------------------|-------|
| Major Street: OLD MAMMOTH RD.                                                                                                                                                                                      |     | # of Lanes on Each Approach |              | Vehicles Per Hour (eighth highest hour) |       |                                            |       |
| Minor Street: CHATEAU RD.                                                                                                                                                                                          |     |                             |              |                                         |       |                                            |       |
| Scenario: EXISTING (SAT) BASE 17,000 SADT                                                                                                                                                                          |     |                             |              |                                         |       |                                            |       |
| Urban/Rural: U (U=urban, R=rural)                                                                                                                                                                                  |     |                             |              |                                         |       |                                            |       |
| <b>WARRANT 1-MINIMUM VEHICULAR VOLUME</b>                                                                                                                                                                          |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |
| Major Street:                                                                                                                                                                                                      | 1   | Major Street                | Minor Street | Urban                                   | Rural | Urban                                      | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       |                                         |       |                                            |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 190 | 1                           | 1            | 500                                     | 350   | 150                                        | 105   |
| Major Street (Approach 2):                                                                                                                                                                                         | 439 | >=2                         | 1            | 600                                     | 420   | 150                                        | 105   |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 600                                     | 420   | 200                                        | 140   |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 73  | 1                           | >=2          | 500                                     | 350   | 200                                        | 140   |
| <b>WARRANT 1 SATISFIED? NO</b>                                                                                                                                                                                     |     | Minimum Req.                |              | 500                                     | NA    | 150                                        | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                 |              | 629                                     | NA    | 73                                         | NA    |
| <b>WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC</b>                                                                                                                                                                |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |
| Major Street:                                                                                                                                                                                                      | 1   | Major Street                | Minor Street | Urban                                   | Rural | Urban                                      | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       |                                         |       |                                            |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 190 | 1                           | 1            | 750                                     | 525   | 75                                         | 53    |
| Major Street (Approach 2):                                                                                                                                                                                         | 439 | >=2                         | 1            | 900                                     | 630   | 75                                         | 53    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 900                                     | 630   | 100                                        | 70    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 73  | 1                           | >=2          | 750                                     | 525   | 100                                        | 70    |
| <b>WARRANT 2 SATISFIED? NO</b>                                                                                                                                                                                     |     | Minimum Req.                |              | 750                                     | NA    | 75                                         | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                 |              | 629                                     | NA    | 73                                         | NA    |
| <b>WARRANT 8-COMBINATION</b>                                                                                                                                                                                       |     |                             |              |                                         |       |                                            |       |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |     |                             |              |                                         |       |                                            |       |
| Warrant 1 80% Fulfilled?                                                                                                                                                                                           | NO  |                             |              |                                         |       |                                            |       |
| Warrant 2 80% Fulfilled?                                                                                                                                                                                           | YES |                             |              |                                         |       |                                            |       |
| <b>WARRANT 8 SATISFIED? NO</b>                                                                                                                                                                                     |     |                             |              | Warrants 1 and 2 Both 80% Fulfilled     |       |                                            |       |
| <b>NOTES:</b>                                                                                                                                                                                                      |     |                             |              |                                         |       |                                            |       |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |     |                             |              |                                         |       |                                            |       |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |     |                             |              |                                         |       |                                            |       |

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street: OLD MAMMOTH RD.
: Minor Street: CHATEAU RD.
: Scenario: EXISTING (SAT) BASE 17,000 SADT
: Urban/Rural: U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 1
: Minor Street: 1
=====

```

```

: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1): 269 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 622 Minor Street (Higher Volume App.): 104
: -----
: Major Street Total (Both Approaches): 891 Minor Street Total: 104
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 2): 380 Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2): 130
=====

```

WARRANT 9 SATISFIED? NO

WARRANT 11-PEAK HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 1
: Minor Street: 1
=====

```

```

: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1): 317 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 732 Minor Street (Higher Volume App.): 122
: -----
: Major Street Total (Both Approaches): 1049 Minor Street Total: 122
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 3): 450 Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3): 190
=====

```

WARRANT 11 SATISFIED? NO

- ```

=====
: NOTES:
: 1. Heavier left-turn movement from the major street may be included with minor street volume
:    if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
:    U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
:    Traffic Control Devices," March 1986.
=====
    
```

TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

		Minimum Requirements						
		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)				
				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)		
		Major Street	Minor Street	Urban	Rural	Urban	Rural	
WARRANT 1-MINIMUM VEHICULAR VOLUME								
Number of Lanes on Each Approach								
Major Street:	2	Major Street	Minor Street					
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural	
Vehicles Per Hour (8th Highest Hour)								
Major Street (Approach 1):	649	1	1	500	350	150	105	
Major Street (Approach 2):	1145	>=2	1	600	420	150	105	
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140	
Minor Street (Higher Volume App.):	35	1	>=2	500	350	200	140	
WARRANT 1 SATISFIED?		NO		Minimum Req.	600	NA	150	NA
				Test Amount	1794	NA	35	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC								
Number of Lanes on Each Approach								
Major Street:	2	Major Street	Minor Street					
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural	
Vehicles Per Hour (8th Highest Hour)								
Major Street (Approach 1):	649	1	1	750	525	75	53	
Major Street (Approach 2):	1145	>=2	1	900	630	75	53	
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70	
Minor Street (Higher Volume App.):	35	1	>=2	750	525	100	70	
WARRANT 2 SATISFIED?		NO		Minimum Req.	900	NA	75	NA
				Test Amount	1794	NA	35	NA
WARRANT 8-COMBINATION								
No one warrant satisfied but following warrants fulfilled 80% or more:								
Warrant 1 80% Fulfilled?		NO						
Warrant 2 80% Fulfilled?		NO						
WARRANT 8 SATISFIED?		NO		Warrants 1 and 2 Both 80% Fulfilled				
NOTES:								
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.								
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.								

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

: Major Street: MAIN ST.			
: Minor Street: SIERRA BLVD.			
: Scenario: CUMULATIVE PLUS PROJECT			
: Urban/Rural: U (U=urban, R=rural)			
: WARRANT 9-FOUR HOUR VOLUME			
: Number of Lanes on Each Approach			
: Major Street:		2	
: Minor Street:		1	
: Vehicles Per Hour (4th Highest Hour)			
: Major Street (Approach 1):		920	Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2):		1622	Minor Street (Higher Volume App.): 49
: Major Street Total (Both Approaches):		2542	Minor Street Total: 49
: Minimum Volume on Major Street to Satisfy Warrant (see Note 2):		390	Minimum Volume on Minor Street to Satisfy Warrant (see Note 2): 80
: WARRANT 9 SATISFIED?		NO	
: WARRANT 11-PEAK HOUR VOLUME			
: Number of Lanes on Each Approach			
: Major Street:		2	
: Minor Street:		1	
: Vehicles Per Hour (Peak Hour)			
: Major Street (Approach 1):		1082	Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2):		1908	Minor Street (Higher Volume App.): 58
: Major Street Total (Both Approaches):		2990	Minor Street Total: 58
: Minimum Volume on Major Street to Satisfy Warrant (see Note 3):		510	Minimum Volume on Minor Street to Satisfy Warrant (see Note 3): 100
: WARRANT 11 SATISFIED?		NO	
: NOTES:			
: 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.			
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.			
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.			
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.			

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
: Major Street: MAIN ST.
: Minor Street: SIERRA BLVD.
: Scenario: CUMULATIVE PLUS PROJECT
=====
:
: Requested Volumes
: for Satisfy Applicable
: Warrant Number and Name Analysis^ Warrant^ Time Period
-----
: 1-Minimum Vehicular Volume YES NO 8th Highest Hour
: 2-Interruption of Cont. Traffic YES NO 8th Highest Hour
: 3-Combination of Warrants 1 & 2 YES NO 8th Highest Hour
:
: 9-Four Hour Volume YES NO 4th Highest Hour
:
: 11-Peak Hour Volume YES NO Peak Hour
:
: Estimated Average Daily Traffic
: Minimum Vehicular Volume NO n/a Daily
: Interruption of Cont. Traffic NO n/a Daily
: Combination of Warrants NO n/a Daily
=====
    
```


TRAFFIC SIGNAL WARRANTS 1, 2 AND B
(Based on Eighth Highest Hour of Traffic)

		Minimum Requirements						
		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)				
				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)		
		Major Street	Minor Street	Urban	Rural	Urban	Rural	
Major Street: MERIDIAN RD.								
Minor Street: MONO ST.								
Scenario: CUMULATIVE PLUS PROJECT								
Urban/Rural: U (U=urban, R=rural)								
WARRANT 1-MINIMUM VEHICULAR VOLUME								
Number of Lanes on Each Approach								
Major Street:	2	Major Street	Minor Street					
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural	
Vehicles Per Hour (8th Highest Hour)								
Major Street (Approach 1):	416	1	1	500	350	150	105	
Major Street (Approach 2):	370	>=2	1	600	420	150	105	
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140	
Minor Street (Higher Volume App.):	47	1	>=2	500	350	200	140	
WARRANT 1 SATISFIED?		NO		Minimum Req.	600	NA	150	NA
				Test Amount	786	NA	43	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC								
Number of Lanes on Each Approach								
Major Street:	2	Major Street	Minor Street					
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural	
Vehicles Per Hour (8th Highest Hour)								
Major Street (Approach 1):	416	1	1	750	525	75	53	
Major Street (Approach 2):	370	>=2	1	900	630	75	53	
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70	
Minor Street (Higher Volume App.):	43	1	>=2	750	525	100	70	
WARRANT 2 SATISFIED?		NO		Minimum Req.	900	NA	75	NA
				Test Amount	786	NA	43	NA
WARRANT B-COMBINATION								
No one warrant satisfied but following warrants fulfilled 80% or more:								
Warrant 1 80% Fulfilled?		NO						
Warrant 2 80% Fulfilled?		NO						
WARRANT B SATISFIED?		NO						
		Warrants 1 and 2 Both 80% Fulfilled						
NOTES:								
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.								
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.								

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street:  MERIDIAN RD.
: Minor Street:  MONC ST.
: Scenario:      CUMULATIVE PLUS PROJECT
: Urban/Rural:  U (U=urban, R=rural)
=====
    
```

WARRANT 9-FOUR HOUR VOLUME

```

-----
: Number of Lanes on Each Approach
: Major Street:          2
: Minor Street:         1
-----
    
```

```

: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1):    589      Major Street Left Turn (See Note 1):    0
: Major Street (Approach 2):    524      Minor Street (Higher Volume App.):      61
:                               -----
: Major Street Total (Both Approaches): 1113      Minor Street Total:                    61
:
: Minimum Volume on Major Street to Satisfy Warrant (see Note 2): 390
: Minimum Volume on Minor Street to Satisfy Warrant (see Note 2): 120
-----
    
```

WARRANT 9 SATISFIED? NO

WARRANT 11-PEAK HOUR VOLUME

```

-----
: Number of Lanes on Each Approach
: Major Street:          2
: Minor Street:         1
-----
    
```

```

: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1):    693      Major Street Left Turn (See Note 1):    0
: Major Street (Approach 2):    616      Minor Street (Higher Volume App.):      72
:                               -----
: Major Street Total (Both Approaches): 1309      Minor Street Total:                    72
:
: Minimum Volume on Major Street to Satisfy Warrant (see Note 3): 510
: Minimum Volume on Minor Street to Satisfy Warrant (see Note 3): 190
-----
    
```

WARRANT 11 SATISFIED? NO

NOTES:

- ```

: 1. Heavier left-turn movement from the major street may be included with minor street volume
: if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
: Traffic Control Devices," March 1986.
=====

```

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
: Major Street: MERIDIAN RD.
: Minor Street: MONC ST.
: Scenario: CUMULATIVE PLUS PROJECT
=====
:
:
: Requested Volumes
: for Satisfy Applicable
: Warrant Number and Name Analysis? Warrant? Time Period
:-----
:
: 1-Minimum Vehicular Volume YES NO 8th Highest Hour
: 2-Interruption of Cont. Traffic YES NO 8th Highest Hour
: 6-Combination of Warrants 1 & 2 YES NO 8th Highest Hour
:
: 9-Four hour Volume YES NO 4th Highest Hour
:
: 11-Peak Hour Volume YES NO Peak Hour
:
: Estimated Average Daily Traffic
: Minimum Vehicular Volume NO n/a Daily
: Interruption of Cont. Traffic NO n/a Daily
: Combination of Warrants NO n/a Daily
:
=====

```



TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

| Major Street: MINARET RD.                                                                                                                                                                                          |     | Minimum Requirements        |              |                                         |       |                                            |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------|--------------|-----------------------------------------|-------|--------------------------------------------|-------|
| Minor Street: CHATEAU RD.                                                                                                                                                                                          |     | # of Lanes on Each Approach |              | Vehicles Per Hour (eighth highest hour) |       |                                            |       |
| Scenario: CUMULATIVE PLUS PROJECT                                                                                                                                                                                  |     |                             |              |                                         |       |                                            |       |
| Urban/Rural: U (U=urban, R=rural)                                                                                                                                                                                  |     |                             |              |                                         |       |                                            |       |
| WARRANT 1-MINIMUM VEHICULAR VOLUME                                                                                                                                                                                 |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |
| Major Street:                                                                                                                                                                                                      | 1   | Major Street                | Minor Street | Urban                                   | Rural | Urban                                      | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       |                                         |       |                                            |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 448 | 1                           | 1            | 500                                     | 350   | 150                                        | 105   |
| Major Street (Approach 2):                                                                                                                                                                                         | 505 | >=2                         | 1            | 600                                     | 420   | 150                                        | 105   |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 600                                     | 420   | 200                                        | 140   |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 62  | 1                           | >=2          | 500                                     | 350   | 200                                        | 140   |
| WARRANT 1 SATISFIED?                                                                                                                                                                                               | NO  | Minimum Req.                |              | 500                                     | NA    | 150                                        | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                 |              | 953                                     | NA    | 62                                         | NA    |
| WARRANT 2-INTERSECTION OF CONTINUOUS TRAFFIC                                                                                                                                                                       |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |
| Major Street:                                                                                                                                                                                                      | 1   | Major Street                | Minor Street | Urban                                   | Rural | Urban                                      | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       |                                         |       |                                            |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 445 | 1                           | 1            | 750                                     | 525   | 75                                         | 53    |
| Major Street (Approach 2):                                                                                                                                                                                         | 505 | >=2                         | 1            | 900                                     | 630   | 75                                         | 53    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 900                                     | 630   | 100                                        | 70    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 62  | 1                           | >=2          | 750                                     | 525   | 100                                        | 70    |
| WARRANT 2 SATISFIED?                                                                                                                                                                                               | NO  | Minimum Req.                |              | 750                                     | NA    | 75                                         | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                 |              | 953                                     | NA    | 62                                         | NA    |
| WARRANT 8-COMBINATION                                                                                                                                                                                              |     |                             |              |                                         |       |                                            |       |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |     |                             |              |                                         |       |                                            |       |
| Warrant 1 80% Fulfilled?                                                                                                                                                                                           | NO  |                             |              |                                         |       |                                            |       |
| Warrant 2 80% Fulfilled?                                                                                                                                                                                           | YES |                             |              |                                         |       |                                            |       |
| WARRANT 8 SATISFIED?                                                                                                                                                                                               | NO  |                             |              | Warrants 1 and 2 Both 80% Fulfilled     |       |                                            |       |
| NOTES:                                                                                                                                                                                                             |     |                             |              |                                         |       |                                            |       |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |     |                             |              |                                         |       |                                            |       |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |     |                             |              |                                         |       |                                            |       |

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
:: Major Street: MINARET RD.
:: Minor Street: CHATEAU RD.
:: Scenario: CUMULATIVE PLUS PROJECT
:: Urban/Rural: U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

=====
:: Number of Lanes on Each Approach
:: Major Street: 1
:: Minor Street: 1
=====

```

```

:: Vehicles Per Hour (4th Highest Hour)
:: Major Street (Approach 1): 634 Major Street Left Turn (See Note 1): 0
:: Major Street (Approach 2): 715 Minor Street (Higher Volume App.): 88
:: -----
:: Major Street Total (Both Approaches): 1349 Minor Street Total: 88
::
:: Minimum Volume on Major Street Minimum Volume on Minor Street
:: to Satisfy Warrant (see Note 2): 380 to Satisfy Warrant (see Note 2): 80
=====

```

WARRANT 9 SATISFIED? YES

WARRANT 11-PEAK HOUR VOLUME

```

=====
:: Number of Lanes on Each Approach
:: Major Street: 1
:: Minor Street: 1
=====

```

```

:: Vehicles Per Hour (Peak Hour)
:: Major Street (Approach 1): 746 Major Street Left Turn (See Note 1): 0
:: Major Street (Approach 2): 841 Minor Street (Higher Volume App.): 103
:: -----
:: Major Street Total (Both Approaches): 1587 Minor Street Total: 103
::
:: Minimum Volume on Major Street Minimum Volume on Minor Street
:: to Satisfy Warrant (see Note 3): 450 to Satisfy Warrant (see Note 3): 100
=====

```

WARRANT 11 SATISFIED? YES

NOTES:

- ```

=====
:: 1. Heavier left-turn movement from the major street may be included with minor street volume
::    if a separate signal phase is proposed for left-turn movements.
:: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
:: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
:: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
::    U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
::    Traffic Control Devices," March 1986.
=====
    
```

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
Major Street:  MINARET RD.
Minor Street:  CHATEAU RD.
Scenario:      CUMULATIVE PLUS PROJECT
=====

```

Warrant Number and Name	Requested for Analysis	Volumes Satisfy Warrant	Applicable Time Period
1-Minimum Vehicular Volume	YES	NO	8th Highest Hour
2-Interruption of Cont. Traffic	YES	NO	8th Highest Hour
8-Combination of Warrants 1 & 2	YES	NO	8th Highest Hour
9-Four Hour Volume	YES	YES	4th Highest Hour
11-Peak Hour Volume	YES	YES	Peak Hour
Estimated Average Daily Traffic			
Minimum Vehicular Volume	NO	n/a	Daily
Interruption of Cont. Traffic	NO	n/a	Daily
Combination of Warrants	NO	n/a	Daily

```

=====

```


TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

Major Street: OLD MAMMOTH RD.		Minimum Requirements					
Minor Street: CHATEAU RD.		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
Scenario: CUMULATIVE PLUS PROJECT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
Number of Lanes on Each Approach							
Major Street:	1	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street				
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	504	1	1	500	350	150	105
Major Street (Approach 2):	725	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	70	1	>=2	500	350	200	140
WARRANT 1 SATISFIED	NO	Minimum Req.		500	NA	150	NA
		Test Amount		1229	NA	70	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
Number of Lanes on Each Approach							
Major Street:	1	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street				
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	504	1	1	750	525	75	53
Major Street (Approach 2):	725	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	70	1	>=2	750	525	100	70
WARRANT 2 SATISFIED	NO	Minimum Req.		750	NA	75	NA
		Test Amount		1229	NA	70	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled	NO						
Warrant 2 80% Fulfilled	YES						
WARRANT 8 SATISFIED	NO			Warrants 1 and 2 Both 80% Fulfilled			
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street:  OLD MAMMOTH RD.
: Minor Street:  CHATEAU RD.
: Scenario:      CUMULATIVE PLUS PROJECT
: Urban/Rural:  U (U=urban, R=rural)
=====
    
```

WARRANT 9-FOUR HOUR VOLUME

```

-----
: Number of Lanes on Each Approach
: Major Street:          1
: Minor Street:         1
-----
    
```

```

: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1):    714      Major Street Left Turn (See Note 1):    0
: Major Street (Approach 2):   1027      Minor Street (Higher Volume App.):      99
:                               -----
: Major Street Total (Both Approaches): 1741      Minor Street Total:                     99
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 2):    380      Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2):      80
-----
    
```

WARRANT 9 SATISFIED? YES

WARRANT 11-PEAK HOUR VOLUME

```

-----
: Number of Lanes on Each Approach
: Major Street:          1
: Minor Street:         1
-----
    
```

```

: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1):    840      Major Street Left Turn (See Note 1):    0
: Major Street (Approach 2):   1208      Minor Street (Higher Volume App.):      117
:                               -----
: Major Street Total (Both Approaches): 2045      Minor Street Total:                     117
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 3):    450      Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3):      100
-----
    
```

WARRANT 11 SATISFIED? YES

NOTES:

- ```

: 1. Heavier left-turn movement from the major street may be included with minor street volume
: if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
: Traffic Control Devices," March 1986.
=====

```

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
: Major Street: OLD MAMMOTH RD.
: Minor Street: CHATEAU RD.
: Scenario: CUMULATIVE PLUS PROJECT
=====
:
:
: Requested Volumes
: for Satisfy Applicable
: Warrant Number and Name Analysis? Warrant? Time Period
:-----
: 1-Minimum Vehicular Volume YES NO 8th Highest Hour
: 2-Interruption of Cont. Traffic YES NO 8th Highest Hour
: 6-Combination of Warrants 1 & 2 YES NO 8th Highest Hour
:
: 9-Four Hour Volume YES YES 4th Highest Hour
:
: 11-Peak Hour Volume YES YES Peak Hour
:
: Estimated Average Daily Traffic
: Minimum Vehicular Volume NO n/a Daily
: Interruption of Cont. Traffic NO n/a Daily
: Combination of Warrants NO n/a Daily
:-----

```



TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

| Major Street: MINARET RD.                                                                                                                                                                                          |     | Minimum Requirements        |              |                                         |       |                               |       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------|--------------|-----------------------------------------|-------|-------------------------------|-------|
| Minor Street: OLD MAMMOTH RD.                                                                                                                                                                                      |     | # of Lanes on Each Approach |              | Vehicles Per Hour (eighth highest hour) |       |                               |       |
| Scenario: CUMULATIVE PLUS PROJECT                                                                                                                                                                                  |     |                             |              |                                         |       |                               |       |
| Urban/Rural: U (U=urban, R=rural)                                                                                                                                                                                  |     |                             |              |                                         |       |                               |       |
| WARRANT 1-MINIMUM VEHICULAR VOLUME                                                                                                                                                                                 |     |                             |              | Major Street                            |       | Minor Street                  |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              | (Total of Both Approaches)              |       | (Higher Volume Approach Only) |       |
| Major Street:                                                                                                                                                                                                      | 1   | Major Street                | Minor Street | Urban                                   | Rural | Urban                         | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       |                                         |       |                               |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                               |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 433 | 1                           | 1            | 500                                     | 350   | 150                           | 105   |
| Major Street (Approach 2):                                                                                                                                                                                         | 527 | >=2                         | 1            | 600                                     | 420   | 150                           | 105   |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 600                                     | 420   | 200                           | 140   |
| Minor Street (higher Volume App.):                                                                                                                                                                                 | 588 | 1                           | >=2          | 500                                     | 350   | 200                           | 140   |
| WARRANT 1 SATISFIED?                                                                                                                                                                                               | YES | Minimum Req.                |              | 500                                     | NA    | 150                           | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                 |              | 960                                     | NA    | 588                           | NA    |
| WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC                                                                                                                                                                       |     |                             |              | Major Street                            |       | Minor Street                  |       |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              | (Total of Both Approaches)              |       | (Higher Volume Approach Only) |       |
| Major Street:                                                                                                                                                                                                      | 1   | Major Street                | Minor Street | Urban                                   | Rural | Urban                         | Rural |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       |                                         |       |                               |       |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                               |       |
| Major Street (Approach 1):                                                                                                                                                                                         | 433 | 1                           | 1            | 750                                     | 525   | 75                            | 53    |
| Major Street (Approach 2):                                                                                                                                                                                         | 527 | >=2                         | 1            | 900                                     | 630   | 75                            | 53    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 900                                     | 630   | 100                           | 70    |
| Minor Street (higher Volume App.):                                                                                                                                                                                 | 588 | 1                           | >=2          | 750                                     | 525   | 100                           | 70    |
| WARRANT 2 SATISFIED?                                                                                                                                                                                               | YES | Minimum Req.                |              | 750                                     | NA    | 75                            | NA    |
|                                                                                                                                                                                                                    |     | Test Amount                 |              | 960                                     | NA    | 588                           | NA    |
| WARRANT 8-COMBINATION                                                                                                                                                                                              |     |                             |              |                                         |       |                               |       |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |     |                             |              |                                         |       |                               |       |
| Warrant 1 80% Fulfilled?                                                                                                                                                                                           | YES |                             |              |                                         |       |                               |       |
| Warrant 2 80% Fulfilled?                                                                                                                                                                                           | YES |                             |              |                                         |       |                               |       |
| WARRANT 8 SATISFIED?                                                                                                                                                                                               | YES |                             |              | Warrants 1 and 2 Both 80% Fulfilled     |       |                               |       |
| NOTES:                                                                                                                                                                                                             |     |                             |              |                                         |       |                               |       |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |     |                             |              |                                         |       |                               |       |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |     |                             |              |                                         |       |                               |       |

## TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

|                                                                                                |  |                                          |  |
|------------------------------------------------------------------------------------------------|--|------------------------------------------|--|
| =====                                                                                          |  |                                          |  |
| : Major Street: MINARET RD.                                                                    |  |                                          |  |
| : Minor Street: OLD MAMMOTH RD.                                                                |  |                                          |  |
| : Scenario: CUMULATIVE PLUS PROJECT                                                            |  |                                          |  |
| : Urban/Rural: U (U=urban, R=rural)                                                            |  |                                          |  |
| : =====                                                                                        |  |                                          |  |
| : WARRANT 9-FOUR HOUR VOLUME                                                                   |  |                                          |  |
| : -----                                                                                        |  |                                          |  |
| : Number of Lanes on Each Approach                                                             |  |                                          |  |
| : Major Street: 1                                                                              |  |                                          |  |
| : Minor Street: 1                                                                              |  |                                          |  |
| : -----                                                                                        |  |                                          |  |
| : Vehicles Per Hour (4th Highest Hour)                                                         |  |                                          |  |
| : Major Street (Approach 1): 613                                                               |  | : Major Street Left Turn (See Note 1): 0 |  |
| : Major Street (Approach 2): 747                                                               |  | : Minor Street (Higher Volume App.): 833 |  |
| : -----                                                                                        |  | : -----                                  |  |
| : Major Street Total (Both Approaches): 1360                                                   |  | : Minor Street Total: 833                |  |
| : Minimum Volume on Major Street                                                               |  | : Minimum Volume on Minor Street         |  |
| : to Satisfy Warrant (see Note 2): 380                                                         |  | : to Satisfy Warrant (see Note 2): 80    |  |
| : -----                                                                                        |  |                                          |  |
| : WARRANT 9 SATISFIED?                                                                         |  | : YES                                    |  |
| : =====                                                                                        |  |                                          |  |
| : WARRANT 11-PEAK HOUR VOLUME                                                                  |  |                                          |  |
| : -----                                                                                        |  |                                          |  |
| : Number of Lanes on Each Approach                                                             |  |                                          |  |
| : Major Street: 1                                                                              |  |                                          |  |
| : Minor Street: 1                                                                              |  |                                          |  |
| : -----                                                                                        |  |                                          |  |
| : Vehicles Per Hour (Peak Hour)                                                                |  |                                          |  |
| : Major Street (Approach 1): 721                                                               |  | : Major Street Left Turn (See Note 1): 0 |  |
| : Major Street (Approach 2): 879                                                               |  | : Minor Street (Higher Volume App.): 980 |  |
| : -----                                                                                        |  | : -----                                  |  |
| : Major Street Total (Both Approaches): 1600                                                   |  | : Minor Street Total: 980                |  |
| : Minimum Volume on Major Street                                                               |  | : Minimum Volume on Minor Street         |  |
| : to Satisfy Warrant (see Note 3): 450                                                         |  | : to Satisfy Warrant (see Note 3): 100   |  |
| : -----                                                                                        |  |                                          |  |
| : WARRANT 11 SATISFIED?                                                                        |  | : YES                                    |  |
| : =====                                                                                        |  |                                          |  |
| : NOTES:                                                                                       |  |                                          |  |
| : 1. Heavier left-turn movement from the major street may be included with minor street volume |  |                                          |  |
| : if a separate signal phase is proposed for left-turn movements.                              |  |                                          |  |
| : 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.                             |  |                                          |  |
| : 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.                             |  |                                          |  |
| : 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and      |  |                                          |  |
| : U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform        |  |                                          |  |
| : Traffic Control Devices," March 1986.                                                        |  |                                          |  |
| : =====                                                                                        |  |                                          |  |





TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

|                                                                                                                                                                                                                    |  | Minimum Requirements                |              |                                         |       |                                            |       |     |    |    |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-------------------------------------|--------------|-----------------------------------------|-------|--------------------------------------------|-------|-----|----|----|----|
|                                                                                                                                                                                                                    |  | # of Lanes on Each Approach         |              | Vehicles Per Hour (eighth highest hour) |       |                                            |       |     |    |    |    |
| Major Street: MINARET RD.                                                                                                                                                                                          |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Minor Street: LODESTAR ACCESS #1                                                                                                                                                                                   |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Scenario: CUMULATIVE PLUS PROJECT                                                                                                                                                                                  |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Urban/Rural: U (U=urban, R=rural)                                                                                                                                                                                  |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| WARRANT 1-MINIMUM VEHICULAR VOLUME                                                                                                                                                                                 |  |                                     |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |     |    |    |    |
| Number of Lanes on Each Approach:                                                                                                                                                                                  |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Major Street: 2                                                                                                                                                                                                    |  | Major Street                        | Minor Street |                                         |       |                                            |       |     |    |    |    |
| Minor Street: 1                                                                                                                                                                                                    |  | Street                              | Street       | Urban                                   | Rural | Urban                                      | Rural |     |    |    |    |
| Vehicles Per Hour (8th Highest Hour):                                                                                                                                                                              |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Major Street (Approach 1): 554                                                                                                                                                                                     |  | 1                                   | 1            | 500                                     | 350   | 150                                        | 105   |     |    |    |    |
| Major Street (Approach 2): 421                                                                                                                                                                                     |  | >=2                                 | 1            | 600                                     | 420   | 150                                        | 105   |     |    |    |    |
| Major Street Left Turn (See Note 1): 0                                                                                                                                                                             |  | >=2                                 | >=2          | 600                                     | 420   | 200                                        | 140   |     |    |    |    |
| Minor Street (Higher Volume App.): 61                                                                                                                                                                              |  | 1                                   | >=2          | 500                                     | 350   | 200                                        | 140   |     |    |    |    |
| WARRANT 1 SATISFIED? NO                                                                                                                                                                                            |  | Minimum Req. Test Amount            |              | 600                                     | 975   | NA                                         | NA    | 150 | 61 | NA | NA |
| WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC                                                                                                                                                                       |  |                                     |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |     |    |    |    |
| Number of Lanes on Each Approach:                                                                                                                                                                                  |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Major Street: 2                                                                                                                                                                                                    |  | Major Street                        | Minor Street |                                         |       |                                            |       |     |    |    |    |
| Minor Street: 1                                                                                                                                                                                                    |  | Street                              | Street       | Urban                                   | Rural | Urban                                      | Rural |     |    |    |    |
| Vehicles Per Hour (8th Highest Hour):                                                                                                                                                                              |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Major Street (Approach 1): 554                                                                                                                                                                                     |  | 1                                   | 1            | 750                                     | 525   | 75                                         | 53    |     |    |    |    |
| Major Street (Approach 2): 421                                                                                                                                                                                     |  | >=2                                 | 1            | 900                                     | 630   | 75                                         | 53    |     |    |    |    |
| Major Street Left Turn (See Note 1): 0                                                                                                                                                                             |  | >=2                                 | >=2          | 900                                     | 630   | 100                                        | 70    |     |    |    |    |
| Minor Street (Higher Volume App.): 61                                                                                                                                                                              |  | 1                                   | >=2          | 750                                     | 525   | 100                                        | 70    |     |    |    |    |
| WARRANT 2 SATISFIED? NO                                                                                                                                                                                            |  | Minimum Req. Test Amount            |              | 900                                     | 975   | NA                                         | NA    | 75  | 61 | NA | NA |
| WARRANT 8-COMBINATION                                                                                                                                                                                              |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Warrant 1 80% Fulfilled? NO                                                                                                                                                                                        |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| Warrant 2 80% Fulfilled? YES                                                                                                                                                                                       |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| WARRANT 8 SATISFIED? NO                                                                                                                                                                                            |  | Warrants 1 and 2 Both 80% Fulfilled |              |                                         |       |                                            |       |     |    |    |    |
| NOTES:                                                                                                                                                                                                             |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |  |                                     |              |                                         |       |                                            |       |     |    |    |    |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |  |                                     |              |                                         |       |                                            |       |     |    |    |    |

## TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street: MINARET RD.
: Minor Street: LODESTAR ACCESS #1
: Scenario: CUMULATIVE PLUS PROJECT
: Urban/Rural: U (U=urban, R=rural)
=====

```

## WARRANT 9-FOUR HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1
=====

```

```

: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1): 785 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 597 Minor Street (Higher Volume App.): 86
: -----
: Major Street Total (Both Approaches): 1382 Minor Street Total: 86
:
: Minimum Volume on Major Street Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2): 390 to Satisfy Warrant (see Note 2): 80
=====

```

WARRANT 9 SATISFIED? YES

## WARRANT 11-PEAK HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1
=====

```

```

: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1): 923 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 702 Minor Street (Higher Volume App.): 101
: -----
: Major Street Total (Both Approaches): 1625 Minor Street Total: 101
:
: Minimum Volume on Major Street Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3): 510 to Satisfy Warrant (see Note 3): 130
=====

```

WARRANT 11 SATISFIED? NO

## NOTES:

```

=====
: 1. Heavier left-turn movement from the major street may be included with minor street volume
: if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
: U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
: Traffic Control Devices," March 1986.
=====

```





TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

| Major Street: MINARET RD.<br>Minor Street: LODESTAR ACCESS #2<br>Scenario: CUMULATIVE PLUS PROJECT<br>Urban/Rural: U (U=urban, R=rural)                                                                            |     | Minimum Requirements        |              |                                         |       |                                            |       |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------|--------------|-----------------------------------------|-------|--------------------------------------------|-------|----|
|                                                                                                                                                                                                                    |     | # of Lanes on Each Approach |              | Vehicles Per Hour (eighth highest hour) |       |                                            |       |    |
| <b>WARRANT 1-MINIMUM VEHICULAR VOLUME</b>                                                                                                                                                                          |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |    |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |    |
| Major Street:                                                                                                                                                                                                      | 2   | Major Street                | Minor Street |                                         |       |                                            |       |    |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       | Urban                                   | Rural | Urban                                      | Rural |    |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |    |
| Major Street (Approach 1):                                                                                                                                                                                         | 419 | 1                           | 1            | 500                                     | 350   | 150                                        | 105   |    |
| Major Street (Approach 2):                                                                                                                                                                                         | 499 | >=2                         | 1            | 600                                     | 420   | 150                                        | 105   |    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 600                                     | 420   | 200                                        | 140   |    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 133 | 1                           | >=2          | 500                                     | 350   | 200                                        | 140   |    |
| <b>WARRANT 1 SATISFIED?</b>                                                                                                                                                                                        |     | NO                          |              | Minimum Req.                            | 600   | NA                                         | 150   | NA |
|                                                                                                                                                                                                                    |     |                             |              | Test Amount                             | 918   | NA                                         | 133   | NA |
| <b>WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC</b>                                                                                                                                                                |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |    |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |    |
| Major Street:                                                                                                                                                                                                      | 2   | Major Street                | Minor Street |                                         |       |                                            |       |    |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       | Urban                                   | Rural | Urban                                      | Rural |    |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |    |
| Major Street (Approach 1):                                                                                                                                                                                         | 419 | 1                           | 1            | 750                                     | 525   | 75                                         | 53    |    |
| Major Street (Approach 2):                                                                                                                                                                                         | 499 | >=2                         | 1            | 900                                     | 630   | 75                                         | 53    |    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 900                                     | 630   | 100                                        | 70    |    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 133 | 1                           | >=2          | 750                                     | 525   | 100                                        | 70    |    |
| <b>WARRANT 2 SATISFIED?</b>                                                                                                                                                                                        |     | YES                         |              | Minimum Req.                            | 900   | NA                                         | 75    | NA |
|                                                                                                                                                                                                                    |     |                             |              | Test Amount                             | 918   | NA                                         | 133   | NA |
| <b>WARRANT 8-COMBINATION</b>                                                                                                                                                                                       |     |                             |              |                                         |       |                                            |       |    |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |     |                             |              |                                         |       |                                            |       |    |
| Warrant 1 80% Fulfilled?                                                                                                                                                                                           | YES |                             |              |                                         |       |                                            |       |    |
| Warrant 2 80% Fulfilled?                                                                                                                                                                                           | YES |                             |              |                                         |       |                                            |       |    |
| <b>WARRANT 8 SATISFIED?</b>                                                                                                                                                                                        |     | YES                         |              | Warrants 1 and 2 Both 80% Fulfilled     |       |                                            |       |    |
| <b>NOTES:</b>                                                                                                                                                                                                      |     |                             |              |                                         |       |                                            |       |    |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |     |                             |              |                                         |       |                                            |       |    |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |     |                             |              |                                         |       |                                            |       |    |

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street: MINARET RD.
: Minor Street: LODESTAR ACCESS #2
: Scenario: CUMULATIVE PLUS PROJECT
: Urban/Rural: U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1
=====

```

```

: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1): 593 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 707 Minor Street (Higher Volume App.): 189
: -----
: Major Street Total (Both Approaches): 1300 Minor Street Total: 189
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 2): 390 Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2): 90
=====

```

WARRANT 9 SATISFIED? YES

WARRANT 11-PEAK HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1
=====

```

```

: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1): 698 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 832 Minor Street (Higher Volume App.): 222
: -----
: Major Street Total (Both Approaches): 1530 Minor Street Total: 222
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 3): 510 Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3): 140
=====

```

WARRANT 11 SATISFIED? YES

NOTES:

- ```

=====
: 1. Heavier left-turn movement from the major street may be included with minor street volume
:    if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
:    U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
:    Traffic Control Devices," March 1986.
=====

```


TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

Major Street: MERIDIAN BLVD.		Minimum Requirements					
Minor Street: LODESTAR ACCESS #3		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
Scenario: CUMULATIVE PLUS PROJECT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
Number of Lanes on Each Approach							
Major Street:	2	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	322	1	1	500	350	150	105
Major Street (Approach 2):	486	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	29	1	>=2	500	350	200	140
WARRANT 1 SATISFIED? NO		Minimum Req.		600	NA	150	NA
		Test Amount		808	NA	29	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC				Major Street (Total of Both Approaches)		Minor Street (Higher Volume Approach Only)	
Number of Lanes on Each Approach							
Major Street:	2	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	322	1	1	750	525	75	53
Major Street (Approach 2):	486	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	25	1	>=2	750	525	100	70
WARRANT 2 SATISFIED? NO		Minimum Req.		900	NA	75	NA
		Test Amount		808	NA	29	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled?	NO						
Warrant 2 80% Fulfilled?	NO						
WARRANT 8 SATISFIED? NO		Warrants 1 and 2 Both 80% Fulfilled					
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
Major Street:  MERIDIAN BLVD.
Minor Street:  LODESTAR ACCESS #3
Scenario:      CUMULATIVE PLUS PROJECT
Urban/Rural:  U (U=urban, R=rural)
=====
    
```

WARRANT 9-FOUR HOUR VOLUME

```

-----
Number of Lanes on Each Approach
Major Street:      2
Minor Street:     1

-----
Vehicles Per Hour (4th Highest Hour)
Major Street (Approach 1):  456      Major Street Left Turn (See Note 1):  0
Major Street (Approach 2):  689      Minor Street (Higher Volume App.):    42
-----
Major Street Total (Both Approaches): 1145      Minor Street Total:                    42

Minimum Volume on Major Street
to Satisfy Warrant (see Note 2):  390      Minimum Volume on Minor Street
to Satisfy Warrant (see Note 2):  110
=====
    
```

WARRANT 9 SATISFIED? NO

WARRANT 11-PEAK HOUR VOLUME

```

-----
Number of Lanes on Each Approach
Major Street:      2
Minor Street:     1

-----
Vehicles Per Hour (Peak Hour)
Major Street (Approach 1):  537      Major Street Left Turn (See Note 1):  0
Major Street (Approach 2):  816      Minor Street (Higher Volume App.):    49
-----
Major Street Total (Both Approaches): 1347      Minor Street Total:                    49

Minimum Volume on Major Street
to Satisfy Warrant (see Note 3):  510      Minimum Volume on Minor Street
to Satisfy Warrant (see Note 3):  180
=====
    
```

WARRANT 11 SATISFIED? NO

NOTES:

1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.
2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
: Major Street:  MERIDIAN BLVD.
: Minor Street:  LODESTAR ACCESS #3
: Scenario:      CUMULATIVE PLUS PROJECT
=====
:
:
: Requested Volumes
: for Satisfy
: Warrant? Warrant?
:
: Warrant Number and Name      Applicable
:                               Time Period
:-----
: 1-Minimum Vehicular Volume   YES      NO      8th Highest Hour
: 2-Interruption of Cont. Traffic YES      NO      8th Highest Hour
: 6-Combination of Warrants 1 & 2 YES      NO      8th Highest Hour
:
: 9-Four Hour Volume           YES      NO      4th Highest Hour
:
: 11-Peak Hour Volume          YES      NO      Peak Hour
:
: Estimated Average Daily Traffic
: Minimum Vehicular Volume     NO      n/a     Daily
: Interruption of Cont. Traffic NO      n/a     Daily
: Combination of Warrants      NO      n/a     Daily
:
=====
    
```


TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

		Minimum Requirements					
		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
				(Total of Both Approaches)		(Higher Volume Approach Only)	
		Major Street	Minor Street	Urban	Rural	Urban	Rural
Major Street: MERIDIAN BLVD.							
Minor Street: LODESTAR ACCESS #4							
Scenario: CUMULATIVE PLUS PROJECT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME							
Number of Lanes on Each Approach							
Major Street:	2	Major Street	Minor Street				
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	344	1	1	500	350	150	105
Major Street (Approach 2):	499	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	45	1	>=2	500	350	200	140
WARRANT 1 SATISFIED	NO	Minimum Req.		600	NA	150	NA
		Test Amount		843	NA	45	NA
WARRANT 2-INTERUPTION OF CONTINUOUS TRAFFIC							
Number of Lanes on Each Approach							
Major Street:	2	Major Street	Minor Street				
Minor Street:	1	Street	Street	Urban	Rural	Urban	Rural
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	344	1	1	750	525	75	53
Major Street (Approach 2):	499	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	45	1	>=2	750	525	100	70
WARRANT 2 SATISFIED	NO	Minimum Req.		900	NA	75	NA
		Test Amount		843	NA	45	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled	NO						
Warrant 2 80% Fulfilled	NO						
WARRANT 8 SATISFIED	NO	Warrants 1 and 2 Both 80% Fulfilled					
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1985.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street:  MERIDIAN BLVD.
: Minor Street:  LODESTAR ACCESS #4
: Scenario:      CUMULATIVE PLUS PROJECT
: Urban/Rural:  U (U=urban, R=rural)
=====
    
```

WARRANT 9-FOUR HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street:          2
: Minor Street:          1
=====
: Vehicles Per Hour (4th highest Hour)
: Major Street (Approach 1):  489      Major Street Left Turn (See Note 1):  0
: Major Street (Approach 2):  706      Minor Street (Higher Volume App.):    64
:                               -----
: Major Street Total (Both Approaches): 1194      Minor Street Total:                    64
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 2):  390      Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2):  110
=====
    
```

WARRANT 9 SATISFIED? NO

WARRANT 11-PEAK HOUR VOLUME

```

=====
: Number of Lanes on Each Approach
: Major Street:          2
: Minor Street:          1
=====
: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1):  574      Major Street Left Turn (See Note 1):  0
: Major Street (Approach 2):  831      Minor Street (Higher Volume App.):    75
:                               -----
: Major Street Total (Both Approaches): 1405      Minor Street Total:                    75
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 3):  510      Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3):  170
=====
    
```

WARRANT 11 SATISFIED? NO

NOTES:

1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.
2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1988.

SUMMARY OF TRAFFIC SIGNAL WARRANT ANALYSIS

```

=====
Major Street:  MERIDIAN BLVD.
Minor Street:  LODESTAR ACCESS #4
Scenario:      CUMULATIVE PLUS PROJECT
=====

```

Warrant Number and Name	Requested for Analysis	Volumes Satisfy Warrant	Applicable Time Period
1-Minimum Vehicular Volume	YES	NO	8th Highest Hour
2-Interruption of Cont. Traffic	YES	NO	8th Highest Hour
8-Combination of Warrants 1 & 2	YES	NO	8th Highest Hour
9-Four hour Volume	YES	NO	4th Highest Hour
11-Peak Hour Volume	YES	NO	Peak Hour
Estimated Average Daily Traffic			
Minimum Vehicular Volume	NO	n/a	Daily
Interruption of Cont. Traffic	NO	n/a	Daily
Combination of Warrants	NO	n/a	Daily

```

=====

```


TRAFFIC SIGNAL WARRANTS 1, 2 AND 8
(Based on Eighth Highest Hour of Traffic)

Major Street: MERIDIAN BLVD.		Minimum Requirements					
Minor Street: LODESTAR ACCESS #5		# of Lanes on Each Approach		Vehicles Per Hour (eighth highest hour)			
Scenario: CUMULATIVE PLUS PROJECT							
Urban/Rural: U (U=urban, R=rural)							
WARRANT 1-MINIMUM VEHICULAR VOLUME				Major Street		Minor Street	
Number of Lanes on Each Approach				(Total of Both Approaches)		(Higher Volume Approach Only)	
Major Street:	2	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street				
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	294	1	1	500	350	150	105
Major Street (Approach 2):	378	>=2	1	600	420	150	105
Major Street Left Turn (See Note 1):	0	>=2	>=2	600	420	200	140
Minor Street (Higher Volume App.):	24	1	>=2	500	350	200	140
WARRANT 1 SATISFIED?	NO	Minimum Req.		600	NA	150	NA
		Test Amount		672	NA	24	NA
WARRANT 2-INTERRUPTION OF CONTINUOUS TRAFFIC				Major Street		Minor Street	
Number of Lanes on Each Approach				(Total of Both Approaches)		(Higher Volume Approach Only)	
Major Street:	2	Major Street	Minor Street	Urban	Rural	Urban	Rural
Minor Street:	1	Street	Street				
Vehicles Per Hour (8th Highest Hour)							
Major Street (Approach 1):	294	1	1	750	525	75	53
Major Street (Approach 2):	378	>=2	1	900	630	75	53
Major Street Left Turn (See Note 1):	0	>=2	>=2	900	630	100	70
Minor Street (Higher Volume App.):	24	1	>=2	750	525	100	70
WARRANT 2 SATISFIED?	NO	Minimum Req.		900	NA	75	NA
		Test Amount		672	NA	24	NA
WARRANT 8-COMBINATION							
No one warrant satisfied but following warrants fulfilled 80% or more:							
Warrant 1 80% Fulfilled?	NO						
Warrant 2 80% Fulfilled?	NO						
WARRANT 8 SATISFIED?	NO			Warrants 1 and 2 Both 80% Fulfilled			
NOTES:							
1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.							
2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986.							

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
|| Major Street:  MERIDIAN BLVD.
|| Minor Street:  LODESTAR ACCESS #5
|| Scenario:      CUMULATIVE PLUS PROJECT
|| Urban/Rural:  U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

=====
|| Number of Lanes on Each Approach
|| Major Street:      2
|| Minor Street:     1
=====

```

```

|| Vehicles Per Hour (4th Highest hour)
|| Major Street (Approach 1):  417      Major Street Left Turn (See Note 1):  0
|| Major Street (Approach 2):  536      Minor Street (Higher Volume App.):  34
||                               -----
|| Major Street Total (Both Approaches):  952      Minor Street Total:  34
||
|| Minimum Volume on Major Street
|| to Satisfy Warrant (see Note 2):  390      Minimum Volume on Minor Street
|| to Satisfy Warrant (see Note 2):  160
=====

```

WARRANT 9 SATISFIED NO

WARRANT 11-PEAK HOUR VOLUME

```

=====
|| Number of Lanes on Each Approach
|| Major Street:      2
|| Minor Street:     1
=====

```

```

|| Vehicles Per Hour (Peak Hour)
|| Major Street (Approach 1):  490      Major Street Left Turn (See Note 1):  0
|| Major Street (Approach 2):  630      Minor Street (Higher Volume App.):  40
||                               -----
|| Major Street Total (Both Approaches):  1120      Minor Street Total:  40
||
|| Minimum Volume on Major Street
|| to Satisfy Warrant (see Note 3):  510      Minimum Volume on Minor Street
|| to Satisfy Warrant (see Note 3):  240
=====

```

WARRANT 11 SATISFIED NO

NOTES:

- ```

|| 1. Heavier left-turn movement from the major street may be included with minor street volume
|| if a separate signal phase is proposed for left-turn movements.
|| 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
|| 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
|| 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
|| U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
|| Traffic Control Devices," March 1986.
=====

```





TRAFFIC SIGNAL WARRANTS 1, 2 AND 8  
(Based on Eighth Highest Hour of Traffic)

| Major Street: MERIDIAN BLVD.<br>Minor Street: LODESTAR ACCESS #6<br>Scenario: CUMULATIVE PLUS PROJECT<br>Urban/Rural: U (U=urban, R=rural)                                                                         |     | Minimum Requirements        |              |                                         |       |                                            |       |    |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----|-----------------------------|--------------|-----------------------------------------|-------|--------------------------------------------|-------|----|
|                                                                                                                                                                                                                    |     | # of Lanes on Each Approach |              | Vehicles Per Hour (eighth highest hour) |       |                                            |       |    |
| <b>WARRANT 1-MINIMUM VEHICULAR VOLUME</b>                                                                                                                                                                          |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |    |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |    |
| Major Street:                                                                                                                                                                                                      | 2   | Major Street                | Minor Street |                                         |       |                                            |       |    |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       | Urban                                   | Rural | Urban                                      | Rural |    |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |    |
| Major Street (Approach 1):                                                                                                                                                                                         | 373 | 1                           | 1            | 500                                     | 350   | 150                                        | 105   |    |
| Major Street (Approach 2):                                                                                                                                                                                         | 316 | >=2                         | 1            | 600                                     | 420   | 150                                        | 105   |    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 600                                     | 420   | 200                                        | 140   |    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 22  | 1                           | >=2          | 500                                     | 350   | 200                                        | 140   |    |
| <b>WARRANT 1 SATISFIED?</b>                                                                                                                                                                                        |     | NO                          |              | Minimum Req.                            | 600   | NA                                         | 150   | NA |
|                                                                                                                                                                                                                    |     |                             |              | Test Amount                             | 689   | NA                                         | 22    | NA |
| <b>WARRANT 2-INTERUPTION OF CONTINUOUS TRAFFIC</b>                                                                                                                                                                 |     |                             |              | Major Street (Total of Both Approaches) |       | Minor Street (Higher Volume Approach Only) |       |    |
| Number of Lanes on Each Approach                                                                                                                                                                                   |     |                             |              |                                         |       |                                            |       |    |
| Major Street:                                                                                                                                                                                                      | 2   | Major Street                | Minor Street |                                         |       |                                            |       |    |
| Minor Street:                                                                                                                                                                                                      | 1   | Street                      | Street       | Urban                                   | Rural | Urban                                      | Rural |    |
| Vehicles Per Hour (8th Highest Hour)                                                                                                                                                                               |     |                             |              |                                         |       |                                            |       |    |
| Major Street (Approach 1):                                                                                                                                                                                         | 373 | 1                           | 1            | 750                                     | 525   | 75                                         | 53    |    |
| Major Street (Approach 2):                                                                                                                                                                                         | 316 | >=2                         | 1            | 900                                     | 630   | 75                                         | 53    |    |
| Major Street Left Turn (See Note 1):                                                                                                                                                                               | 0   | >=2                         | >=2          | 900                                     | 630   | 100                                        | 70    |    |
| Minor Street (Higher Volume App.):                                                                                                                                                                                 | 22  | 1                           | >=2          | 750                                     | 525   | 100                                        | 70    |    |
| <b>WARRANT 2 SATISFIED?</b>                                                                                                                                                                                        |     | NO                          |              | Minimum Req.                            | 900   | NA                                         | 75    | NA |
|                                                                                                                                                                                                                    |     |                             |              | Test Amount                             | 689   | NA                                         | 22    | NA |
| <b>WARRANT 8-COMBINATION</b>                                                                                                                                                                                       |     |                             |              |                                         |       |                                            |       |    |
| No one warrant satisfied but following warrants fulfilled 80% or more:                                                                                                                                             |     |                             |              |                                         |       |                                            |       |    |
| Warrant 1 80% Fulfilled?                                                                                                                                                                                           | NO  |                             |              |                                         |       |                                            |       |    |
| Warrant 2 80% Fulfilled?                                                                                                                                                                                           | NO  |                             |              |                                         |       |                                            |       |    |
| <b>WARRANT 8 SATISFIED?</b>                                                                                                                                                                                        |     | NO                          |              | Warrants 1 and 2 Both 80% Fulfilled     |       |                                            |       |    |
| <b>NOTES:</b>                                                                                                                                                                                                      |     |                             |              |                                         |       |                                            |       |    |
| 1. Heavier left-turn movement from the major street may be included with minor street volume if a separate signal phase is proposed for left-turn movements.                                                       |     |                             |              |                                         |       |                                            |       |    |
| 2. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-7; and U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform Traffic Control Devices," March 1986. |     |                             |              |                                         |       |                                            |       |    |

TRAFFIC SIGNAL WARRANTS 9 AND 11

(Warrant 9 Based on Fourth Highest Hour of Traffic; Warrant 11 Based on Peak Hour of Traffic)

```

=====
: Major Street: MERIDIAN BLVD.
: Minor Street: LODESTAR ACCESS #6
: Scenario: CUMULATIVE PLUS PROJECT
: Urban/Rural: U (U=urban, R=rural)
=====

```

WARRANT 9-FOUR HOUR VOLUME

```

: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1

```

```

: Vehicles Per Hour (4th Highest Hour)
: Major Street (Approach 1): 528 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 448 Minor Street (Higher Volume App.): 31
: -----
: Major Street Total (Both Approaches): 976 Minor Street Total: 31
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 2): 390 Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 2): 150

```

WARRANT 9 SATISFIED?                    NO

WARRANT 11-PEAK HOUR VOLUME

```

: Number of Lanes on Each Approach
: Major Street: 2
: Minor Street: 1

```

```

: Vehicles Per Hour (Peak Hour)
: Major Street (Approach 1): 621 Major Street Left Turn (See Note 1): 0
: Major Street (Approach 2): 527 Minor Street (Higher Volume App.): 37
: -----
: Major Street Total (Both Approaches): 1148 Minor Street Total: 37
:
: Minimum Volume on Major Street
: to Satisfy Warrant (see Note 3): 510 Minimum Volume on Minor Street
: to Satisfy Warrant (see Note 3): 230

```

WARRANT 11 SATISFIED?                    NO

NOTES:

- ```

=====
: 1. Heavier left-turn movement from the major street may be included with minor street volume
:    if a separate signal phase is proposed for left-turn movements.
: 2. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2A.
: 3. From: Caltrans, "Traffic Manual," December 1986, Figure 9-2C.
: 4. Adopted from: Caltrans, "Traffic Manual," December 1986, pages 9-1 through 9-13; and
:    U.S. Department of Transportation, Federal Highway Administration, "Manual on Uniform
:    Traffic Control Devices," March 1986.
=====
    
```

APPENDIX F.
Archaeological Survey Report

AN ARCHAEOLOGICAL SURVEY
OF THE LODESTAR PROPERTY
MAMMOTH LAKES, CALIFORNIA



JEFFERY F. BURTON

Trans-Sierran Archaeological Research
Contributions to Trans-sierran Archaeology No. 20
February 1990

AN ARCHAEOLOGICAL SURVEY
OF THE LODESTAR PROPERTY
MAMMOTH LAKES, CALIFORNIA

Prepared by:
Jeffery F. Burton

Trans-Sierran Archaeological Research
332 East Mabel Street
Tucson, Arizona 85705

Prepared for:
Lodestar Company
P.O. Box 2127
Mammoth Lakes, California 93546

TSAR Project No. 26
Contributions to Trans-sierran Archaeology No. 20
February 1990

Management Summary

Trans-Sierran Archaeological Research has conducted an archaeological survey of the Lodestar property, within the town of Mammoth Lakes, California. Six archaeological sites and 13 isolates were located and recorded during survey of the approximately 200-acre parcel. One of the sites, Lodestar #6, appears significant based on surface evidence for its information potential. Additional fieldwork and analysis is recommended to assess the significance of the other five sites. To comply with the *California Environmental Quality Act*, data recovery is recommended at significant sites that cannot be avoided by the proposed project. This would include Lodestar #6 and possibly the other five sites if they are determined significant through additional fieldwork and analysis. No further archaeological work is recommended for the isolates.

Table of Contents

Management Summary	i
INTRODUCTION	1
ENVIRONMENTAL BACKGROUND	1
ARCHAEOLOGICAL BACKGROUND	3
Chronology	4
ETHNOGRAPHY	5
HISTORY BACKGROUND	8
METHODS	9
RESULTS	9
Lodestar #1	11
Lodestar #2	11
Lodestar #3	11
Lodestar #4	11
Lodestar #5	13
Lodestar #6	13
Isolates	13
DISCUSSION	15
Evaluation of significance	15
Recommendations	17
REFERENCES CITED	21
APPENDIX A - Archaeological Site Records	27

INTRODUCTION

Trans-Sierran Archaeological Research (TSAR) conducted an archaeological survey for the Lodestar property under contract with the Lodestar Company. The project area is located within the town of Mammoth Lakes, north and south of Meridian Blvd. The legal location is within section 34, T3S, R27E, MDB&M (Figure 1). A total of 200 acres was surveyed, including all of the area considered in the Lodestar Master Plan. The master plan outlines new developments, such as a new hotel, commercial developments, housing developments, ponds, and a golf course. The archaeological survey was designed to identify any archaeological resources within the project area as a first step to fulfill *California Environmental Quality Act* (CEQA) requirements for mitigating the effects of the proposed project on archaeological resources.

There are a total of six archaeological sites and 13 isolates within the project area. Five sites and three isolates were recorded during this survey, the remainder had been previously recorded of the Minaret Road Extension project (Burton 1989). This report discusses the background, methods and results of the present work, followed by an evaluation of significance and management recommendations.

ENVIRONMENTAL BACKGROUND

The project area lies at the base of the Sierra Nevada range, on a broad terrace north of Mammoth Creek. The elevation is 2410-2460 m (7900-8070 feet) amsl. Soils are derived from Pleistocene glacial deposits and alluvium and Holocene volcanic debris. The soils consist of sands, gravels, cobbles and loam. Medium to large glacial erratics are also found in the area. The area receives between 15 and 20 inches of precipitation annually, mostly in the form of snow. Water can be found year-round in Mammoth Creek 0.5 to 1.5 km (1 mile) south of the project area.

Vegetation of the area is a mixture of forest types. The overstory is predominately Jeffrey Pine (*Pinus jeffreyi*) and lodgepole pine (*P. murrayana*), with lesser amounts of red fir (*Abies magnifica*), white fir (*A. concolor*), western white pine (*P. monticola*), and quaking aspen (*Populus tremuloides*). The understory consists of shrubs such as basin sagebrush (*Atemesia tridentata*), greenleaf manzanita (*Arctostaphylos patula*), pinemat manzanita (*A. nevadensis*), snowberry (*Symphoricarpos vaccinoides*), currant (*Ribes*

lasianthum), tobacco brush (*Ceanothus velutinus*), and bitter cherry (*Prunus emarginata*), forbs such as buckwheat (*Eriogonum* spp.), goldenrod (*Solidage canadensis*), mules ears (*Wyethia mollis*), clover (*Trifolium* sp.), lupine (*Lupinus* sp.), cinquefoil (*Potentilla glandulosa*), and yarrow (*Achillea lanulosa*), and grasses, such as bluegrass (*Poa* sp.), blue wildrye (*Elymus glaucus*), timothy (*Alopecurus aequalis*), wheatgrass (*Agropyron* sp.), squirreltail (*Sitanion hystrix*), and cheatgrass (*Bromus* sp.).

Fauna present in the vicinity today include: mule deer (*Odocoileus hemionus*), black bear (*Ursus americanus*), mountain lion (*Felis concolor*), coyote (*Canis laterns*), red fox (*Vulpes fulva*), pine martin (*Martes americana*), and porcupine (*Erethizon dorsatum*). Grizzly bear (*U. horribilis*), antelope (*Antilocapra americana*), and possibly bighorn sheep (*Ovis canadensis*) may have been present in prehistoric times.

ARCHAEOLOGICAL BACKGROUND

Archaeological work in the region has been summarized in several major overviews, especially those of Bettinger (1982a), prepared for the Forest Service, and Busby *et al.* (1979), prepared for the Bureau of Land Management. Jackson (1985) included a discussion of current archaeological work in the area in his survey report. Several surveys have been undertaken within and near the project area. E. L. Davis conducted an extensive survey in the region, recorded numerous sites, and developed a site typology (Davis 1964). In 1975, Kuhn and Jersey surveyed a sample of the Long Valley "Known Geothermal Resource Area" (KGRA) for the Inyo National Forest. Bettinger conducted a systematic stratified random sample of the KGRA in 1977. His survey encompassed lands administered by the Inyo National Forest adjacent to the project area. Through his work, Bettinger was able to develop a model to predict site density and site taxonomy based on the presence of nine types of cultural material. In addition, Bettinger discussed subsistence and settlement patterns and apparent changes through time. Most apparent from survey data from Long Valley is the ubiquity of archaeological sites near the Casa Diablo obsidian quarries.

Most of the archaeological work conducted in Long Valley has concentrated on the Mammoth Lakes area. Excavation at sites in the Mammoth Lakes area has revealed a variety of subsistence, residence, and exchange activities through time. Notable among these excavations are those conducted at rockshelters such as CA-Mno-455 and -472 (Davis

Information compiled from the various excavations and surveys provides a glimpse of lifeways during these periods. The pre-Newberry occupation of Long Valley may have been sporadic. During the Newberry period, obsidian quarrying and biface production, apparently for trade, appears to have become intensive. During the Haiwee and Marana periods, biface production diminished, and there is evidence of increasing direct subsistence activity. Long Valley has lacked evidence of the shifts in direct subsistence that appear to have occurred in Owens Valley, to the south. For example, occupation sites are almost always associated with riparian settings and were utilized throughout the Medithermal (Bettinger 1982a:112-114). However, there is some evidence that pinyon exploitation did not begin on any intensive scale in Long Valley until the Haiwee period (after A.D. 600), and there may have been a partial abandonment or reduction in the use of upland and desert scrub areas after ca. A.D. 1000 (Bettinger 1977).

ETHNOGRAPHY

Ethnographic information on the inhabitants of Long Valley is limited, with most of the available data contained in works by Steward (1930, 1933, 1934, 1938), Davis (1964), and Stewart (1939, 1941). There are several excellent reviews of what is known about the ethnography of Long Valley, extracted from these and other works (*e.g.* Bettinger 1982a; Busby *et al.* 1979; Basgall 1983; Hall 1983; and Jackson 1985). No attempt is made here to recapitulate all known ethnographic information, but rather follows an outline of a few ideas that seem especially pertinent.

Not ascribed to any one particular group's territory, Long Valley is near the intersection of several ethnic groups: the Mono Lake Paiute to the north, the Owens Valley Paiute to the south, Benton and Round Valley Paiute to the east, Monache to the west, and Southern Sierra Miwok to the northwest. The Paiute and Monache are Numic speakers, of the Uto-Aztecan language family, while the Southern Sierra Miwok are a branch of the Utian language family.

Hall (1983:49) cites evidence that Northern Paiute generally regarded their borders as fluid, which may have precluded exclusive use of Long Valley by a single group (*cf.* evidence of territoriality among Paiute in Owens Valley, Bettinger 1982b). Territories of the Monache and Southern Sierra Miwok were centered on the west slope of the Sierra

Paiute, with at least some hereditary rulers and semi-permanent villages (Levy 1978; Spier 1978; Theodoratus Cultural Research 1984: 32-39). Some researchers have postulated that any autochthonous Long Valley group that may have existed would have followed a pattern closer to that of the Mono Lake Paiute (and other Great Basin groups) than that of Owens Valley Paiute, due to similarities in environmental constraints (Jackson 1985:21; Basgall 1983:10). However, Long Valley residents may have been closely tied to the Owens Valley Paiute (see Bettinger and King 1971).

In the spring, Tui chub, specked dace, and Owens sucker may have been fished from creeks, while roots and greens along creeks and meadows might have replenished dwindling winter stores. Small game, deer, and antelope may have been hunted nearby. In the summer, grass seeds may have been collected from meadows and drier upland areas. Fall subsistence activities of both the Mono Lake and Owens Valley Paiute revolved around the collection of pinyon.

In addition, much of the trade and travel likely occurred during the summer months, when the high Sierran passes were free of deep snow. Inter- and intra-regional trade may have had extensive ramifications for subsistence and settlement systems of the Owens Valley and Long Valley areas. Bettinger and King (1971) proposed that an elaborate redistributive exchange system might account for the relatively complex sociopolitical organization of Owens Valley.

There is ethnographic evidence of many items traded: Owens Valley Paiute traded salt, pinyon pine nuts, seeds, obsidian, sinew-backed bows, rabbitskin blankets, deerskins, moccasins, mountain sheepskins, foxskin leggings, balls of tobacco, baskets, basketry water bottles waterproofed with pitch, wooden hot rock lifters, and red and white pigments, in exchange for shell money (e.g. disc beads, tubular clam beads, and more recently white glass beads), acorns and acorn meal, finely-constructed Yokuts baskets, cane for arrows, manzanita berries, squaw berries, and elderberries from the Monache (Hall 1983:56-57). The Mono Lake Paiute traded salt, pinyon pine nuts, piuga, brine fly larvae, rabbitskin blankets, baskets, pumice stones, and red and white pigments to the Sierra Miwok, in exchange for shell money, acorns, baskets, arrows, a fungus used in paints, manzanita berries, elderberries, and squaw berries (Hall 1983:57-58).

enterprise, although small scale mining still continued. In 1895 major work was again started at the Mammoth mines. In 1898 a ten stamp mill was constructed at Mammoth City, using the old water wheel from Mill City. Again the mine did not pay off, and was closed the same year.

In the early 1900s "Old" Mammoth was promoted as a resort community and recreation and tourism became a dominant industry in the region. The Los Angeles Department of Power and Water (LADWP) began acquiring water rights in Inyo County, to the south, early in the twentieth century. By the 1930s LADWP began buying water rights on streams north of Owens Valley.

METHODS

Archival research was conducted at the Eastern Information Center of the California Archaeological Inventory (CAI), located at the University of California, Riverside. During work undertaken for a variety of projects (*e.g.* Basgall 1983, 1984b; Bettinger 1980; Burton 1980, 1989, 1990; Hall 1983; Jackson 1986; Leonard 1974), one site had been previously recorded within the project area and numerous others have been recorded in the immediate vicinity. These sites are characterized by lithic scatters, some with associated bedrock milling features or midden.

Fieldwork was conducted on October 21-24, 1989, by the author and one other archaeologist. The project area was traversed by walking parallel zig-zag transects at 15-meter intervals. In areas of existing buildings and pavement, planters, bare soil, cut banks and other areas where the ground was exposed were sought out and checked for cultural material. A total of 200 acres was examined (Figure 1). Thirteen isolates (three of them previously recorded) and six sites (one previously recorded) are present within the project area. No subsurface testing or surface collection was conducted for this project.

RESULTS

Site and isolate locations are depicted in Figure 2. Archaeological site records are included as Appendix A; the sites and isolates are summarized below.

Lodestar #1

This site, previously recorded by Burton (1989), is located on the south side of an ephemeral drainage in a small clearing within a heavily forested area (Figure 3). The site includes less than 100 flakes in an area of approximately 3200 square meters. Maximum density of surface artifacts is seven per square meter. The subsurface extent of the site is unknown. Soil development at the site is good, suggesting the potential for subsurface deposits.

Lodestar #2

This site is located in the old Starwood subdivision, south of Meridian Boulevard. The site is located on a gentle north-facing slope in a forested area (Figure 4). Cultural material at the site consists of a biface fragment and less than 100 obsidian flakes in an area of 4000 square meters. Artifacts appear to be centered around granite boulders. Maximum surface density of artifacts is four per square meter. Soil development at the site is good, suggesting the potential for subsurface deposits.

Lodestar #3

This site is also located in the old Starwood subdivision, south of Meridian Boulevard. The site is located on a south-facing slope of a forested ridge. Cultural material at the site consists of approximately 100 obsidian flakes in an area of 1225 square meters. Artifacts at the site are centered between granite boulders (Figure 5). Maximum surface density of artifacts is 15 per square meter. Soil development at the site is good, suggesting the potential for subsurface deposits.

Lodestar #4

This site is located just north of Meridian Boulevard in the southwest portion of the project area. The site is located on a south-facing slope north of a grassy ephemeral drainage (Figure 6). Cultural material at the site consists of a projectile point fragment and approximately 25 obsidian flakes in an area of 5400 square meters. Soil development at the site is good, suggesting the potential for subsurface deposits.

Lodestar #5

This site is located in the intersection of two dirt roads in the southwest portion of the project area (Figure 7). The site includes approximately 100 obsidian flakes in an area of 75 square meters. Maximum surface density of artifacts is 15 per square meter. The extent of the site is unknown. The undisturbed site vicinity is heavily forested; cultural material is only apparent in the shallow road cut, possibly indicating a buried site.

Lodestar #6

This site is located in the center of the project area along an ephemeral drainage. Cultural material at the site consists of biface fragments, biface retouch flakes, and 1,000s of obsidian flakes in an area of 14,400 square meters. Maximum surface density of artifacts is 20 per square meter. Soil development at the site is good, suggesting the potential for subsurface deposits. Indeed, flakes were noted in disturbed areas, indicating that subsurface deposits are likely. There is a recent tent camp, with a cement and rock fireplace, at the northern end of the site (Figure 8).

Isolates

Isolate #1: consists of a single unmodified obsidian flake (Burton 1989).

Isolate #2: consists of a single unmodified obsidian flake (Burton 1989).

Isolate #3: consists of less than 20 obsidian flakes at the north end of the project area at the current end of Minaret Road. These are most likely from a site (North Village #2) 100 m north of the project area bisected by Minaret Road (Burton 1990). Fill dirt from a road cut through that site was apparently deposited in this location (Burton 1989).

Isolate #4: consists of an obsidian retouched flake fragment.

Isolate #5: consists of a basal fragment of an obsidian roughout.

Isolate #6: consists of two loose rock check dams across an ephemeral drainage.

Isolate #7: consists of an edge-retouched obsidian flake.

Isolate #8: consists of a single unmodified obsidian flake.

Isolate #9: consists of a single unmodified obsidian flake.

Isolate #10: consists of a single unmodified obsidian flake.

Isolate #11: consists of two unmodified obsidian flakes.

Isolate #12: consists of three unmodified obsidian flakes.

Isolate #13: consists of two unmodified obsidian flakes.

DISCUSSION

Evaluation of significance

The legal guidelines for evaluation and management of archaeological sites on private land are contained in the *California Environmental Quality Act (CEQA)*, Appendix K. Parts II and III of Appendix K state:

II. If the lead agency determines that a project may affect archeological resources, the agency shall, as part of the determination made pursuant to Section 21080.1 determine whether the effect may be a significant effect on the environment. If the project may cause damage to an important archeological resource, the project may have a significant effect on the environment. For the purposes of CEQA, an "important archeological resource" is one which:

A. Is associated with a theme, event, person, or group of recognized significance in California or American history;

B. Is considered by a discrete social or ethnic group to be of important traditional cultural significance;

C. Is valuable as a means of interpreting a significant aspect of California or American history or prehistory to the public;

D. Can provide information useful in addressing scientifically consequential and reasonable research questions; or

E. Has special or particular qualities such as oldest, best example, largest or last surviving example of its kind.

III. If an archaeological resource is not an important archeological resource, the effect on the resource shall be noted and recorded but need not be considered further in the CEQA process.

Criterion B of CEQA would have to be determined through consultation with local Native American groups, which is beyond the scope of this report. However, none of the Native American concerns identified for the Inyo-Mono region by Kobori *et al.* (1980; *e.g.*

pinyon and brine fly resources, and burial sites) appear applicable. In order to interpret criteria A, C, D, and E of CEQA, properties are often evaluated within the context of regional historical themes. Archaeological sites are usually evaluated against criterion D, and to some extent E. Although subject to much debate, the evaluation of archaeological sites would ideally consider (1) the relative abundance of the resources to be affected, (2) the degree to which specific kinds of data are confined to the study area, (3) the range of research topics to which the resources may contribute, and (4) recognized deficiencies in current knowledge of cultural history in and near the project area (Scovill *et al.* 1972:21). The first two factors are often difficult to apply, given our incomplete knowledge of the resources in the region. Developments in archaeological methodology, in general, and past research in the region provide information for the last two factors.

Currently identified research topics in the region include questions about the nature and timing of trade and regional subsistence and settlement patterns, including degree of territoriality (see Bettinger 1982a). The presence of obsidian flakes at all of the sites indicates potential for chronometric and technologic data; obsidian sourcing could also provide information on patterns of travel or trade. Site Lodestar #6 meets CEQA criteria: the quantity and apparent depth of cultural material is sufficient to address regional research questions. Subsurface testing is necessary to determine if the remaining five sites contain sufficient intact deposits to meet CEQA criteria. The 13 isolates do not meet the CEQA criteria for significant resources. These resources lack the diversity and quantity of cultural material necessary to provide further significant information pertaining to regional research questions.

Recommendations

The following section summarizes the California requirements for treatment of archaeological resources, outlines the potential impacts of the project on the archaeological resources within the project area, and recommends mitigation measures to avoid significant effects on the environment. The State requirements for dealing with prehistoric and historic archaeological resources are outlined in Appendix K of the *California Environmental Quality Act* (CEQA). The main points are:

Public agencies should seek to avoid damaging effects on

Sites Lodestar #1-5 may meet the CEQA criteria for important sites, for their ability to address scientifically consequential research questions. Although avoidance might be considered the preferred treatment for these sites, the adoption of any mitigation measures would be premature before the significance of each site is determined. Further archaeological work is recommended to determine if indeed these sites are significant. This would include at each site the excavation of up to five 25 by 25 cm shovel test units, surface collection of all surface artifacts, lithic and obsidian hydration analyses and possibly soil chemistry and obsidian source analysis. If no substantial subsurface deposit is encountered at the sites, this work would also suffice for data recovery.

Lodestar #6 appears significant. Although currently protected by its relatively remote location, the high visibility of the site would make it susceptible to casual collection and indirect impacts even if it were avoided during construction. In accordance with CEQA, any construction in the site vicinity should be preceded by data recovery. Minimally this would include a sample surface collection, excavation of at least eight 1 by 1 m excavation units, analyses, curation of collected materials, and a report.

REFERENCES CITED

Adams, Cynthia J.

- 1986 CA-Mno-833, an Obsidian Stoneworking Camp in Long Valley, Mono County, California. MS. on file, California Department of Transportation, Environmental Studies Branch, Sacramento, and CAI, Riverside, California.

Basgall, Mark E.

- 1983 Archaeology of the Forest Service Forty Site (CA-Mno-529), Mono County, California. MS. on file, Inyo National Forest, Bishop, California, and CAI, Riverside, California, and CAI, Riverside, California.

- 1984a Paleoindian Lithic Procurement in the Long Valley Caldera, Mono County, California. Paper presented at the 19th Biennial Meeting of the Great Basin Anthropological Conference, Boise, Idaho.

- 1984b The Archaeology of Mno-1529: A Secondary Reduction Site in Mammoth Lakes, Mono County, California. MS. on file, Inyo National Forest, Bishop, California, and CAI, Riverside, California.

Bettinger, Robert L.

- 1977 The Surface Archaeology of the Long Valley Caldera, Mono County, California. *Archaeological Research Unit Monograph 1*. Riverside, California.

- 1978 Archaeology of the Blue Flag Site (FS-05-04-53-37) (CA-Mno-34), Mono County, California. MS. on file, Inyo National Forest, Bishop, California, and CAI, Riverside, California.

- 1980 Archaeology of the Triple R Site, FS-05-04-52-10 (CA-Mno-714), Mono County, California. MS. on file, Inyo National Forest, Bishop, California, and CAI, Riverside, California.

- 1982a Archaeology East of the Range of Light: Aboriginal Human Ecology of the Inyo-Mono Region of Central-Eastern California. *Monographs in California and Great Basin Anthropology 1*. Davis, California.

- 1982b Aboriginal Exchange and Territoriality in Owens Valley, California. In *Contexts for Prehistoric Exchange*. J. Ericson and T. Earle, eds. Academic Press, New York.

Bettinger, Robert L., and Baumhoff

- 1982 The Numic Spread: Great Basin Cultures in Competition. *American Antiquity 47(3):485-503*.

- Busby, Colin I., John M. Findlay, and James C. Bard
1979 A Cultural Resource Overview of the Bureau of Land Management Coleville, Bodie, Benton, and Owens Valley Planning Units, California. MS. on file, Bureau of Land Management, Bakersfield, California, and CAI, Riverside, California.

- Cain, Ella M.
1961 *The Story of Early Mono County*. San Francisco: Fearon Publishers, Inc.

- Davis, Emma Lou
1964 An Archaeological Survey of the Mono Basin and Excavations of Two Rockshelters, Mono County, California. *University of California Archaeological Survey Annual Report 1963-1964*: 251-392. Los Angeles, California.

- Doyle, Helen M.
1934 *A Child Went Forth*. Gotham House, New York.

- Enfield, Rolin and Grace Enfield
1964 Mammoth Creek Cave, Mono County, California. *University of California Archaeological Survey Annual Report 1963-1964*: 393-242. Los Angeles, California.

- Gifford, E.W.
1932 The Northfork Mono. *University of California Publications in American Archaeology and Ethnology* 31(2):15-65. Berkeley, California.

- Goldberg, Susan K., Elizabeth Skinner, and Jeffery F. Burton
n.d. Archaeological Excavations at Sites CA-Mno-574, -577, -578, and -833: Stoneworking in Mono County, California. Draft MS. on file, California Department of Transportation, Environmental Studies Branch, Sacramento.

- Hall, Matthew C.
1983 Late Holocene Hunter-Gatherers and Volcanism in the Long Valley- Mono Basin Region: Prehistoric Culture Change in the Eastern Sierra Nevada. Ph.D. dissertation, University of California, Riverside.

- Jackson, Robert J.
1985 An Archaeological Survey of the Wet, Antelope, Railroad, and Ford Timber Sale Compartments in the Inyo National Forest. Report on file Inyo National Forest, Bishop, California, and CAI, Riverside, California.

1986 Archaeological Investigations at the Triple R Site (CA-Mno-714). MS. on file, Inyo National Forest, Bishop, California, and CAI, Riverside, California.

Scovill, Douglas H., Garland J. Gordon, and Keith M. Anderson

- 1972 Guidelines for the Preparation of Statements of Environmental Impacts on Archaeological Resources. MS. on file, Arizona Archaeological Center, National Park Service, Tucson, Arizona.

Spier, Robert F.G.

- 1978 Monache. In Handbook of North American Indians, Vol. 8: California, R.F. Heizer, editor. Smithsonian Institution, Washington, D.C.

Sterud, Gene L.

- 1965 Preliminary Report of Archaeological Investigations at the Mammoth Junction Site: A Second Season (1964). MS. on file, California Department of Transportation, Environmental Studies Branch, Sacramento, and CAI, Riverside, California.

Steward, Julian H.

- 1930 Irrigation without Agriculture. *Papers of the Michigan Academy of Science, Arts, and Letters* 12:149-156.

- 1933 Ethnography of the Owens Valley Paiute. *University of California Publications in American Archaeology and Ethnology* 34(5):355-440. Berkeley, California.

- 1934 Two Paiute Autobiographies. *University of California Publications in American Archaeology and Ethnology* 33:428-438. Berkeley, California.

- 1938 Basin-Plateau Aboriginal Sociopolitical Groups. *Bureau of American Ethnology Bulletin* 120. Smithsonian Institution, Washington, D.C.

Stewart, Omer C.

- 1939 The Northern Paiute Bands. *University of California Anthropological Records* 2(3). Berkeley, California.

- 1941 Culture Element Distributions XIV: Northern Paiute. *University of California Anthropological Records* 4(3):361-446. Berkeley, California.

Tadlock, W. Lewis, and Jean Tadlock

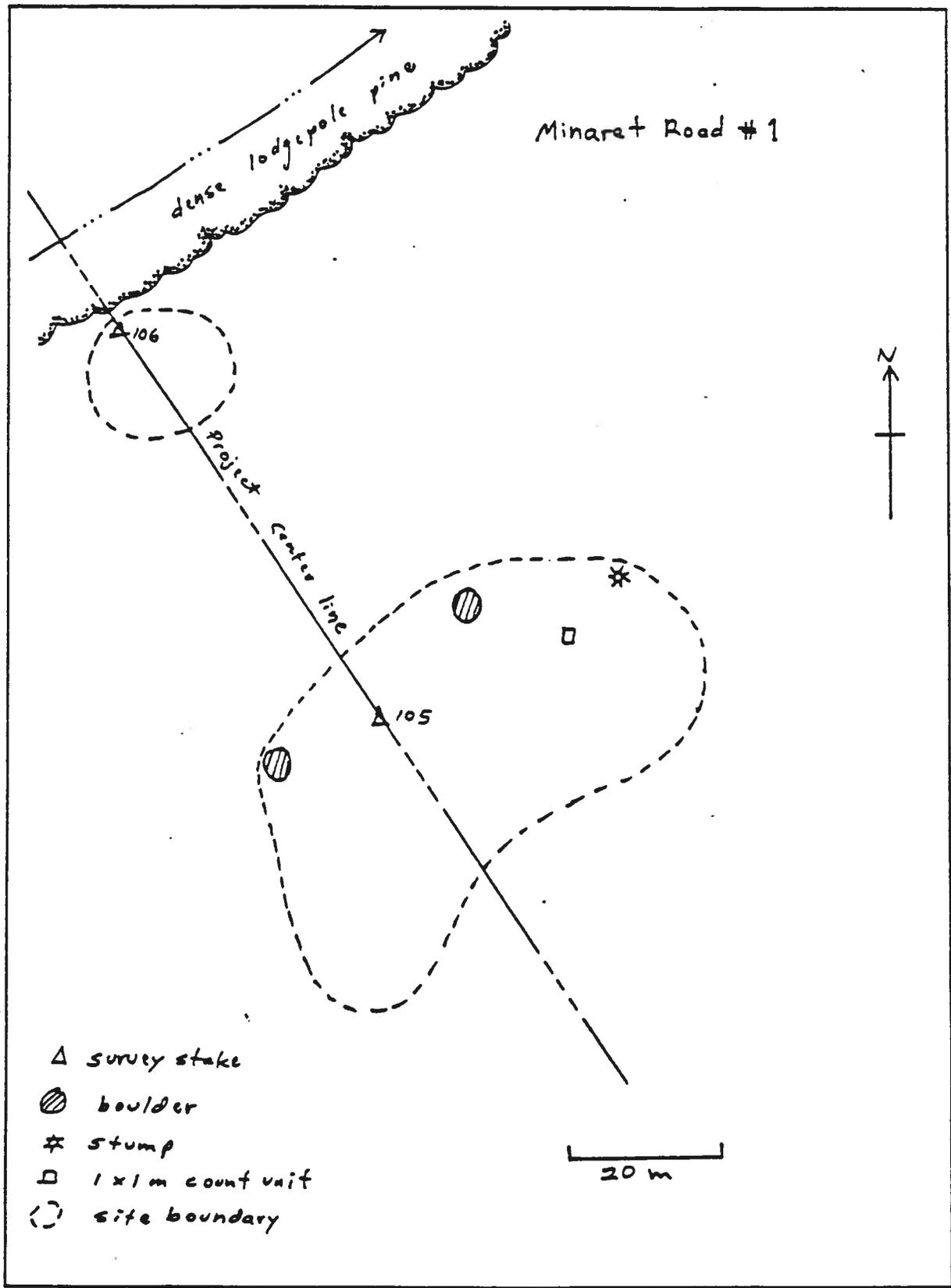
- 1972 Preliminary Report of Archaeological Investigations at the Hot Creek Hatchery Site, Mono County, California, Mno-611. MS. on file, Department of Anthropology, California State University, Long Beach.

Theodoratus Cultural Research

- 1984 Cultural Resource Overview of the Southern Sierra Nevada. MS. on file, Sierra National Forest, Fresno, California.

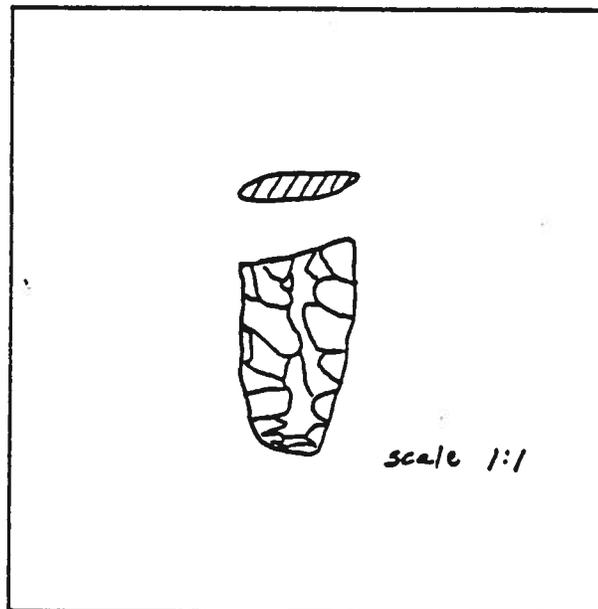
APPENDIX A
Archaeological Site Record

22. Landform: Slope along drainage.
23. Slope: 0-20°
24. Aspect: Northeast.
25. Exposure: Open.
26. Landowner and Address: Lodestar Company, c/o Richard W. Liebersbach, P.O. Box 2127, Mammoth Lakes, CA 93546.
27. References: Burton, Jeffery F., 1989, An Archaeological Survey of the Minaret Road Extension, Mammoth Lakes, California. On file with the Town of Mammoth Lakes.
28. Date Recorded: 10/21/89
29. Recorded by: J. Burton
30. Affiliation: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
31. Name of Project: Archaeological survey of the Minaret Road extension, Mammoth Lakes, California.
32. Type of Investigation: Archaeological survey.
33. Artifacts Curated at: None collected.
Accession No: n/a
34. Photos: 3 color slides
Taken by: J. Burton
Negatives at: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
37. Remarks: A 1 by 1 meter count unit in the densest portion of Locus 1 contained 1 retouched flake fragment, 1 complete flake and 5 flake fragments, all of Casa Diablo obsidian.

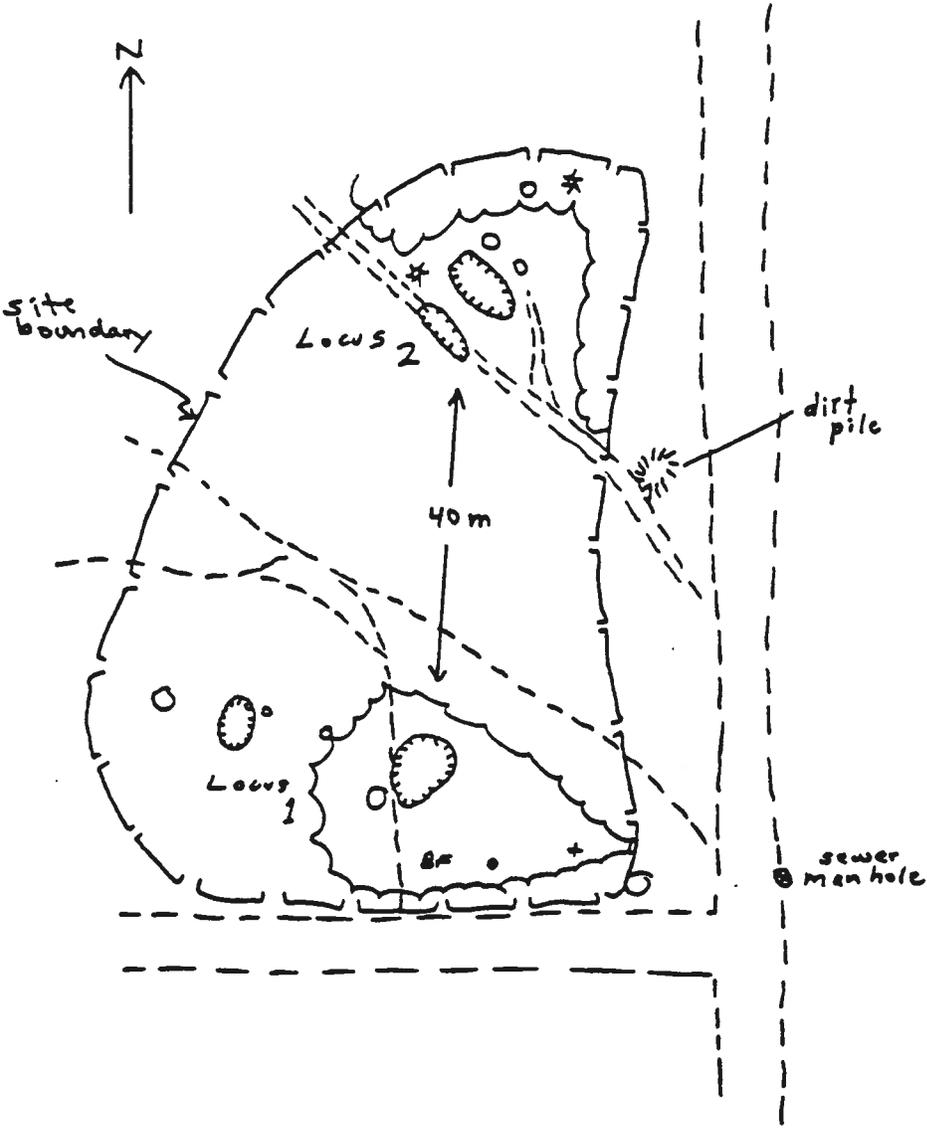


ARCHAEOLOGICAL SITE MAP

24. Aspect: Northeast.
25. Exposure: Open.
26. Landowner and Address: Lodestar Company, c/o Richard W. Liebersbach, P.O. Box 2127, Mammoth Lakes, CA 93546.
27. References: None known beyond present study.
28. Date Recorded: 10/21/89
29. Recorded by: J. Burton
30. Affiliation: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
31. Name of Project: Archaeological survey of the Lodestar property, Mammoth Lakes, California.
32. Type of Investigation: Archaeological survey.
33. Artifacts Curated at: None collected.
- Accession No: n/a
34. Photos: 3 color slides.
- Taken by: J. Burton
- Negatives at: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
37. Remarks: A grab sample of ten artifacts from Locus 1 contained a biface fragment, 1 multi-edge retouched flake fragment, 1 complete flake and 6 flake fragments, of Casa Diablo obsidian and a piece of debris of Mono Glass Mountain obsidian. A grab sample of 11 artifacts from Locus 2 contained 4 complete flakes (1 with cortex) and 7 flake fragments, all of Casa Diablo obsidian.

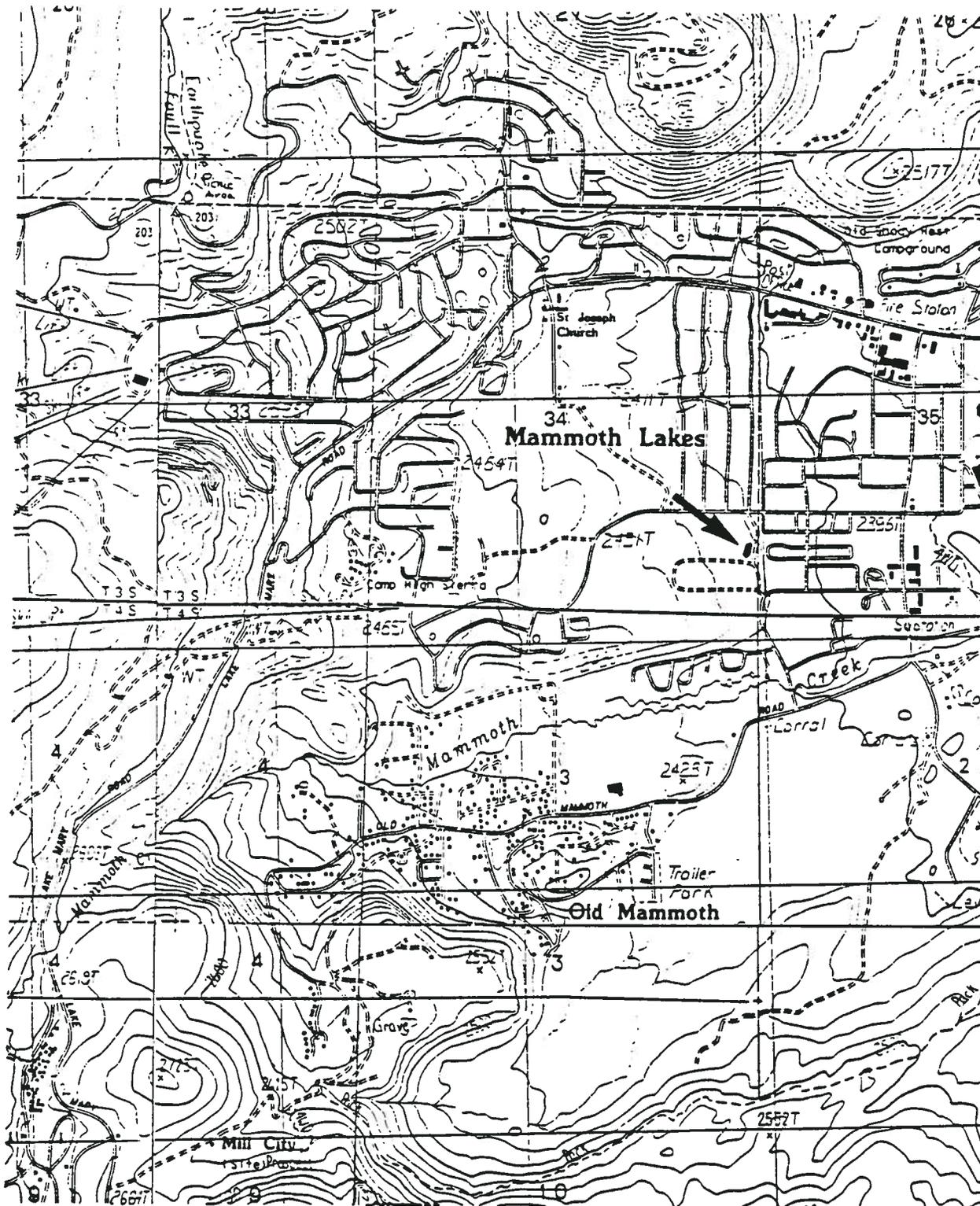


ARTIFACT ILLUSTRATION



- ⊙ flake concentration
- x flake
- BF biface fragment
- boulder
- trails

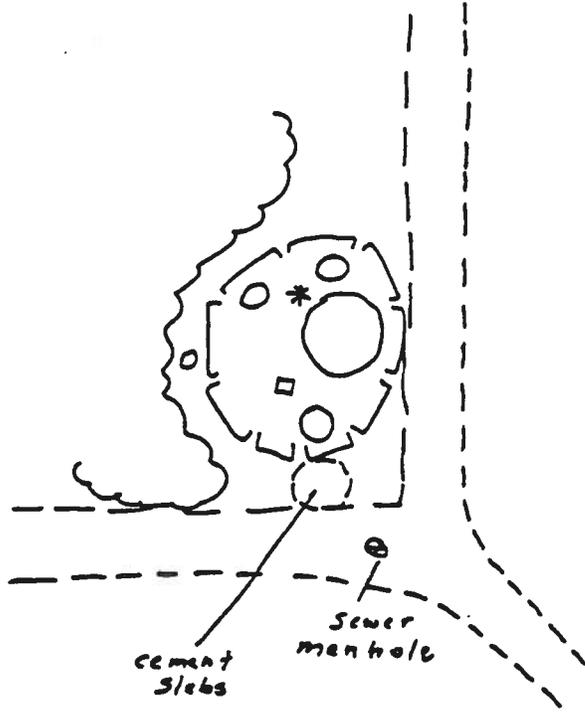
ARCHAEOLOGICAL SITE MAP



ARCHAEOLOGICAL SITE LOCATION MAP (adapted from USGS 7.5' maps Bloody Mtn., Calif. 1983, Crystal Crag, Calif. 1984, Mammoth Mtn, Calif. 1984, and Old Mammoth, Calif. 1983; provisional editions [metric]).

25. Exposure: Open.
26. Landowner and Address: Lodestar Company, c/o Richard W. Liebersbach, P.O. Box 2127, Mammoth Lakes, CA 93546.
27. References: None known beyond present study.
28. Date Recorded: 10/24/89
29. Recorded by: J. Burton
30. Affiliation: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
31. Name of Project: Archaeological survey of the Lodestar property, Mammoth Lakes, California.
32. Type of Investigation: Archaeological survey.
33. Artifacts Curated at: None collected.
Accession No: n/a
34. Photos: 1 color slide.
Taken by: J. Burton
Negatives at: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
37. Remarks: A 1 by 1 meter count unit in the densest portion of the site contained 5 complete flakes (2 with cortex) and 8 flake fragments of Casa Diablo obsidian.

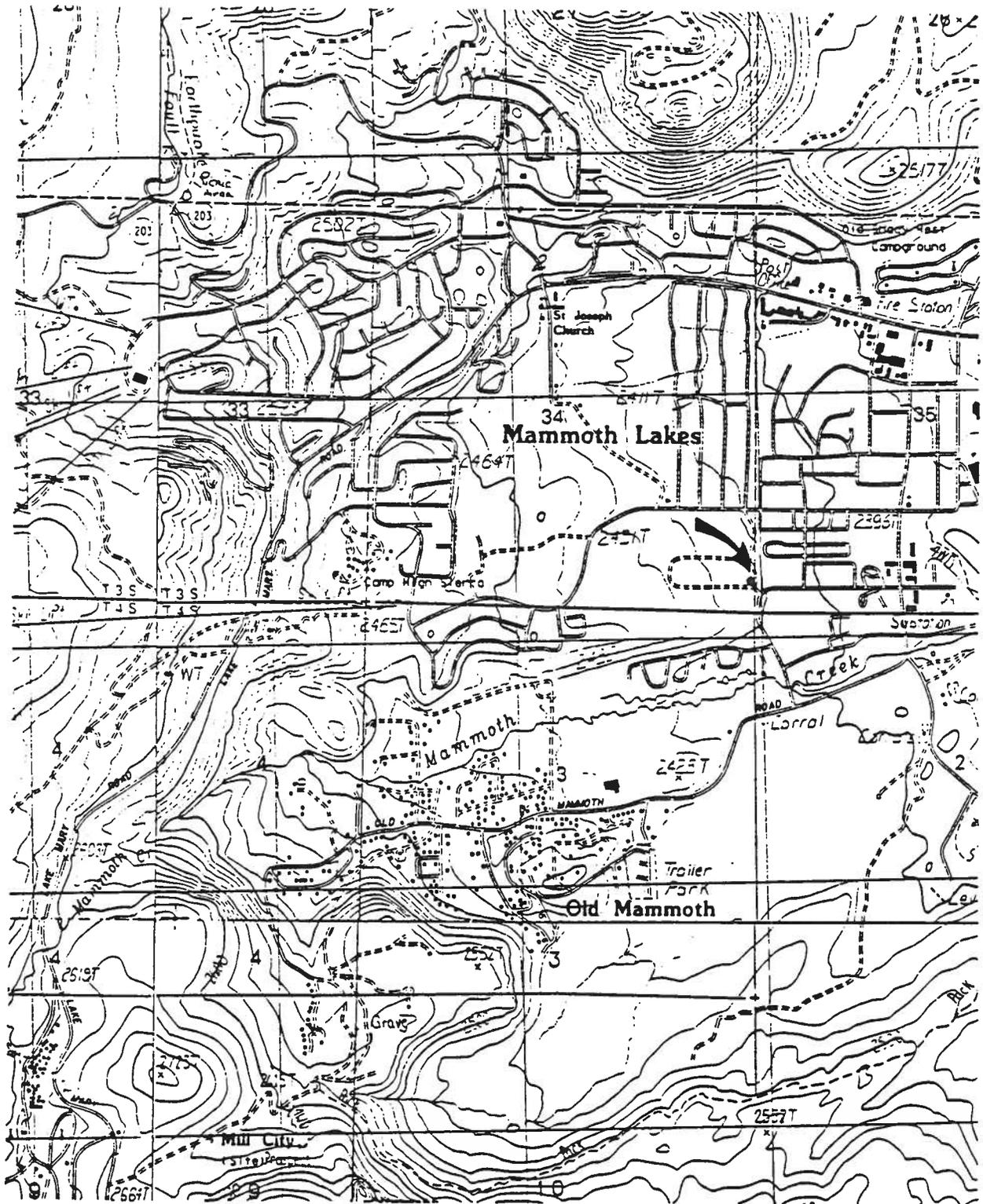
Lodestar #3



30m

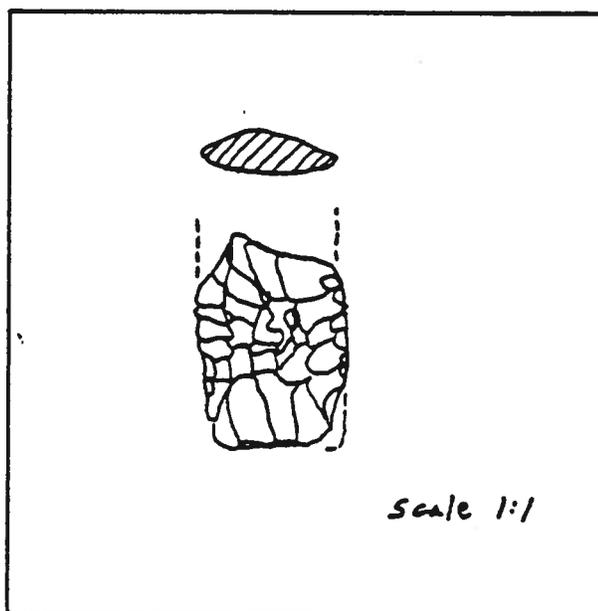
- * tree
- boulder
- ⬡ site boundary
- count unit

ARCHAEOLOGICAL SITE MAP



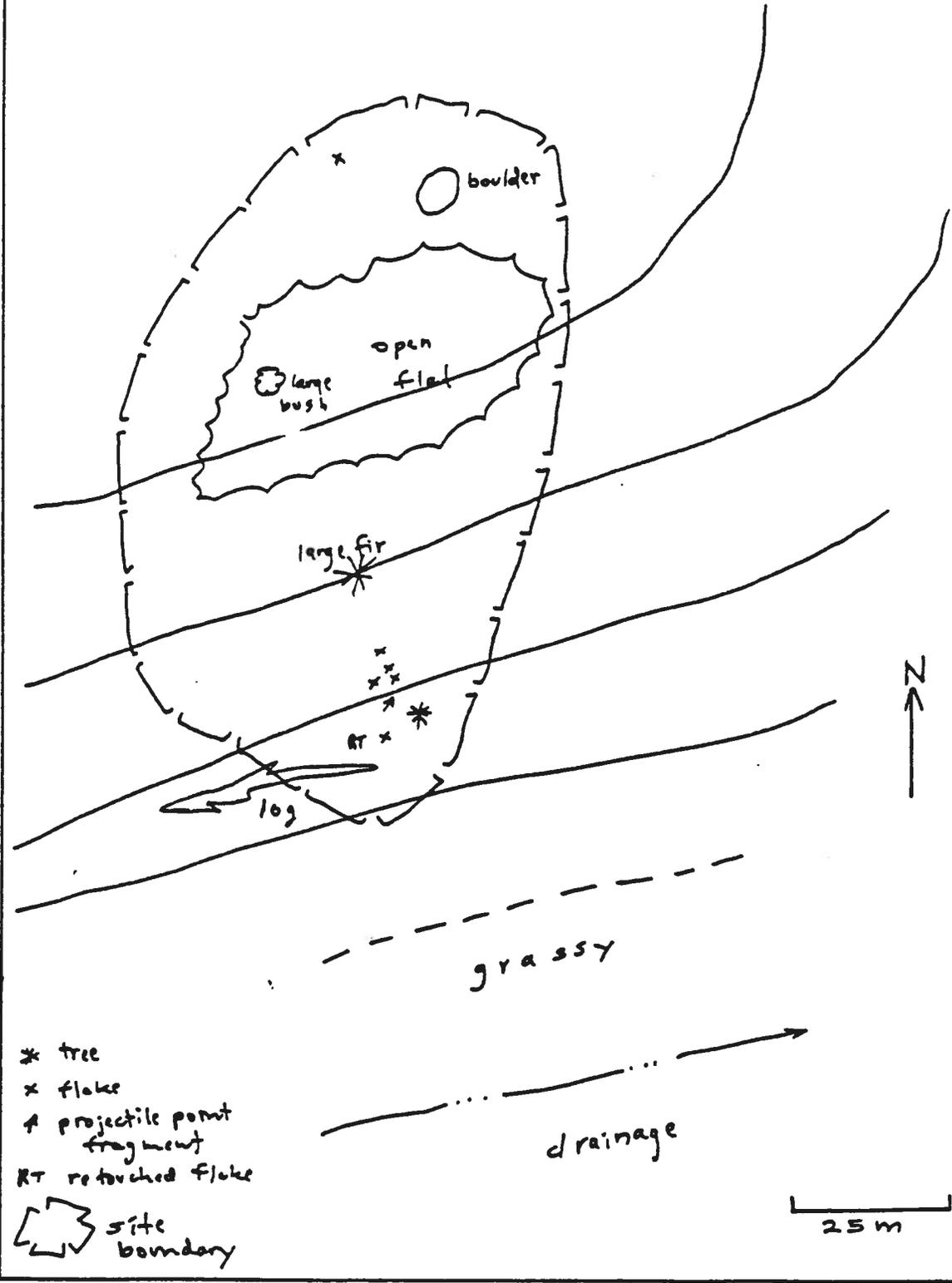
ARCHAEOLOGICAL SITE LOCATION MAP (adapted from USGS 7.5' maps Bloody Mtn., Calif. 1983, Crystal Crag, Calif. 1984, Mammoth Mtn, Calif. 1984, and Old Mammoth, Calif. 1983; provisional editions [metric]).

24. Aspect: South.
25. Exposure: Open.
26. Landowner and Address: Lodestar Company, c/o Richard W. Liebersbach, P.O. Box 2127, Mammoth Lakes, CA 93546.
27. References: None known beyond present study.
28. Date Recorded: 10/24/89
29. Recorded by: J. Burton
30. Affiliation: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
31. Name of Project: Archaeological survey of the Lodestar property, Mammoth Lakes, California.
32. Type of Investigation: Archaeological survey.
33. Artifacts Curated at: None collected.
- Accession No: n/a
34. Photos: 1 color slide.
- Taken by: J. Burton
- Negatives at: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
37. Remarks: A grab sample of 10 artifacts at the site consisted of 1 multi-edge retouched flake fragment, 5 utilized flakes, and 4 flake fragments, all of Casa Diablo obsidian.

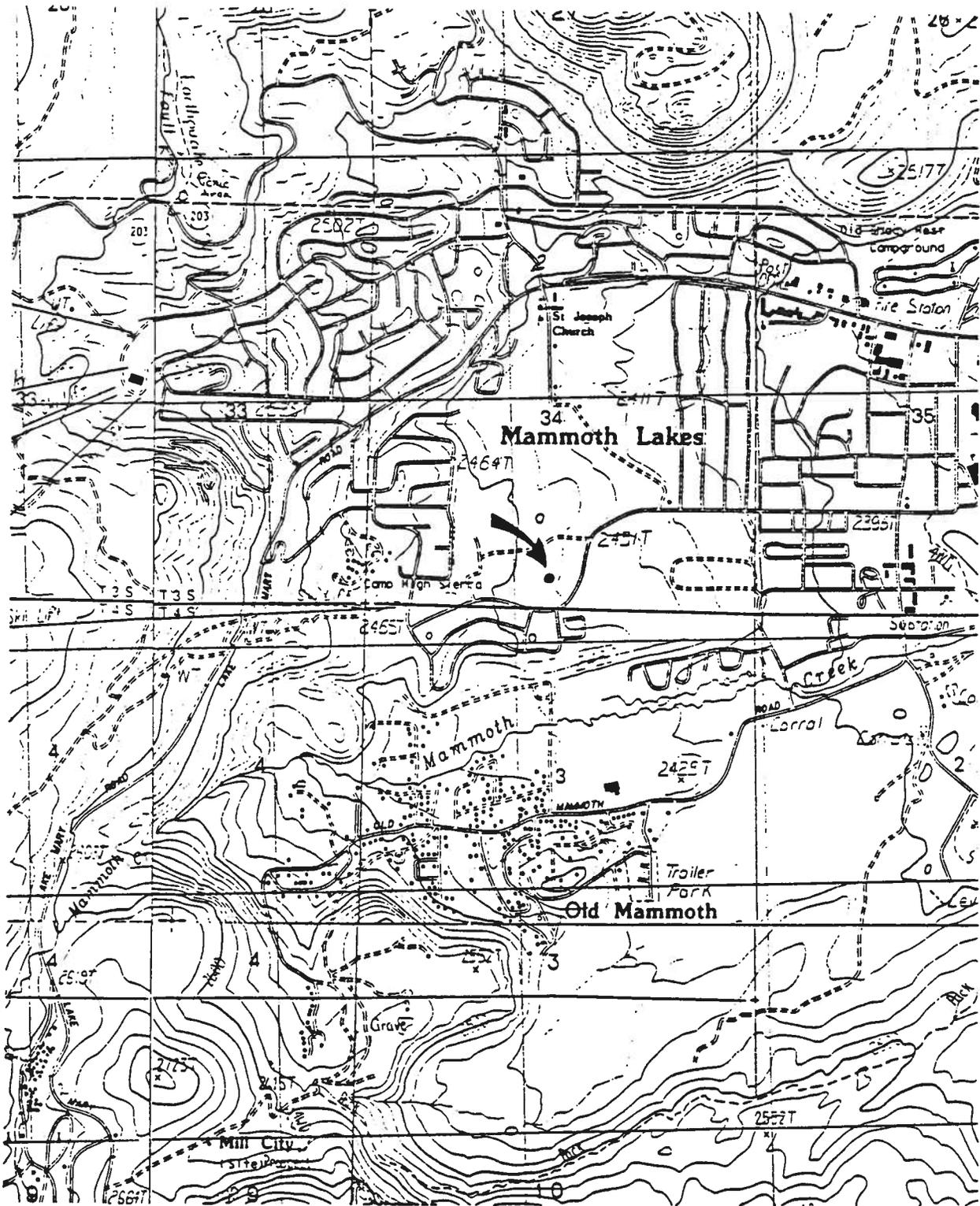


ARTIFACT ILLUSTRATION

Lodestar # 4



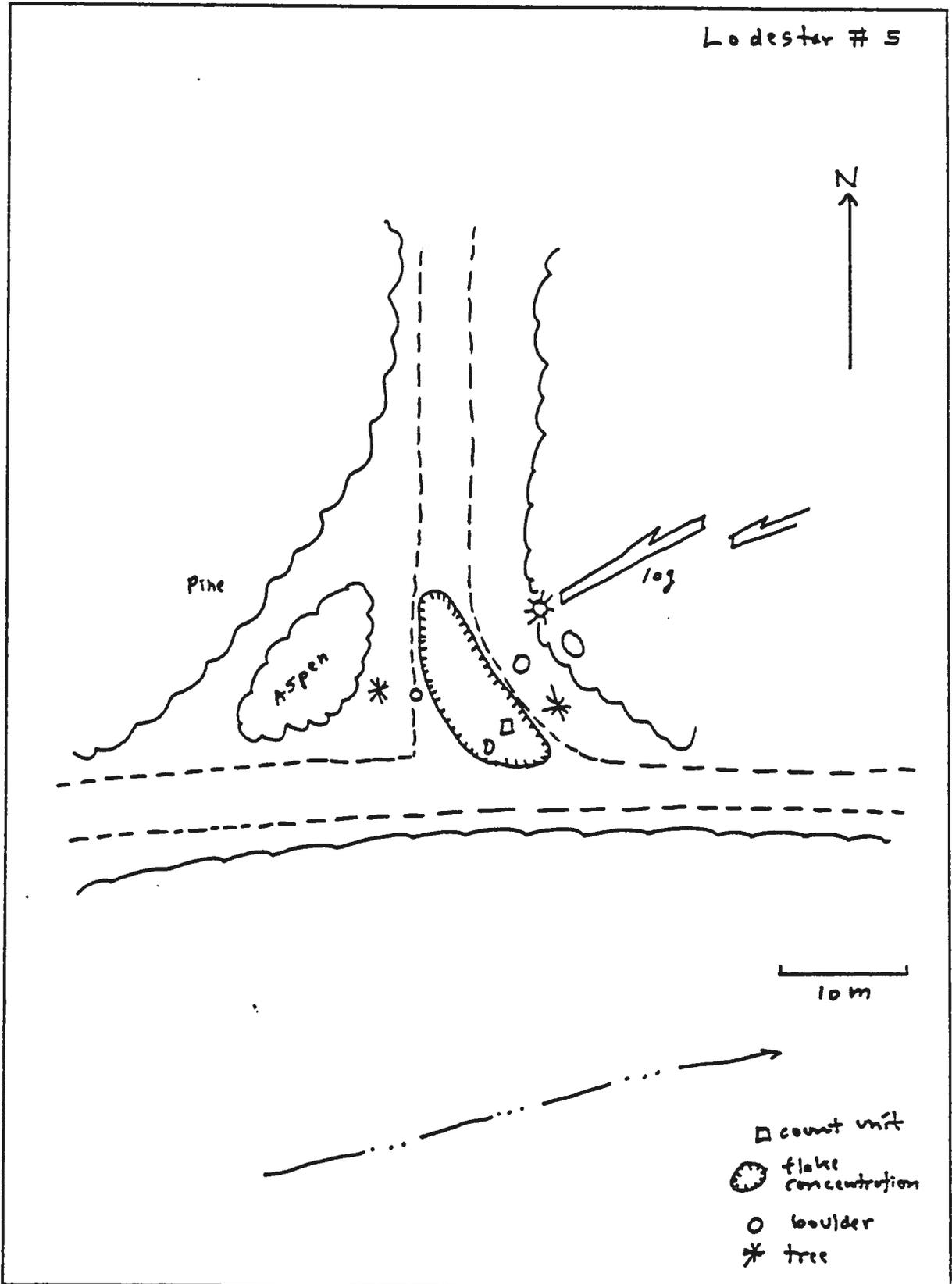
ARCHAEOLOGICAL SITE MAP



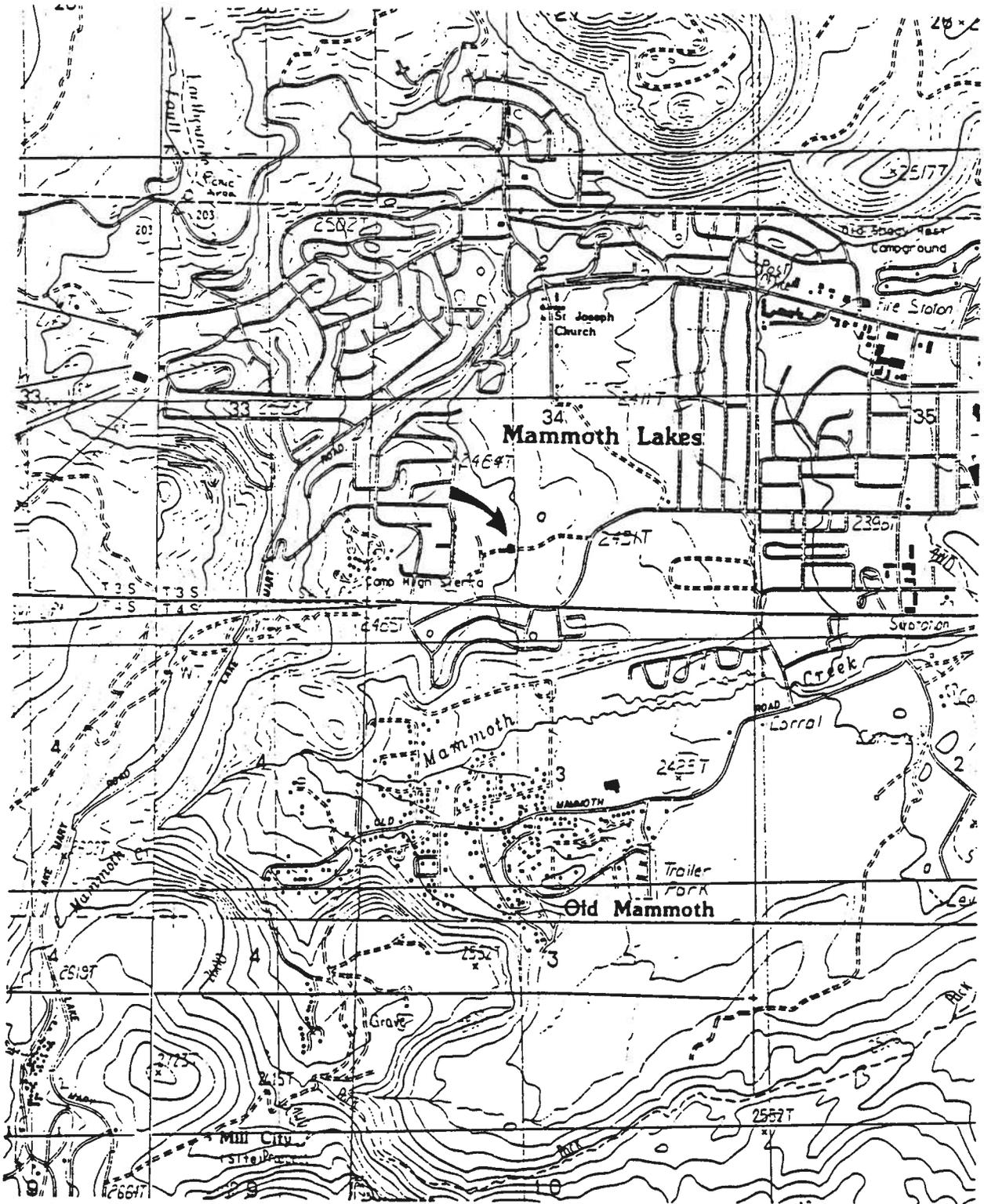
ARCHAEOLOGICAL SITE LOCATION MAP (adapted from USGS 7.5' maps Bloody Mtn., Calif. 1983, Crystal Crag, Calif. 1984, Mammoth Mtn, Calif. 1984, and Old Mammoth, Calif. 1983; provisional editions [metric]).

24. Aspect: South.
25. Exposure: Open.
26. Landowner and Address: Lodestar Company, c/o Richard W. Liebersbach, P.O. Box 2127, Mammoth Lakes, CA 93546.
27. References: None known beyond present study.
28. Date Recorded: 10/24/89
29. Recorded by: J. Burton
30. Affiliation: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
31. Name of Project: Archaeological survey of the Lodestar property, Mammoth Lakes, California.
32. Type of Investigation: Archaeological survey.
33. Artifacts Curated at: None collected.
- Accession No: n/a
34. Photos: 1 color slide.
- Taken by: J. Burton
- Negatives at: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
37. Remarks: A 1 by 1 meter count unit in the densest portion of the site contained 1 biface retouch flake, 1 utilized flake, 1 complete flake, 11 flake fragments, and 1 piece of debris, all of black Casa Diablo obsidian.

Lodestar # 5

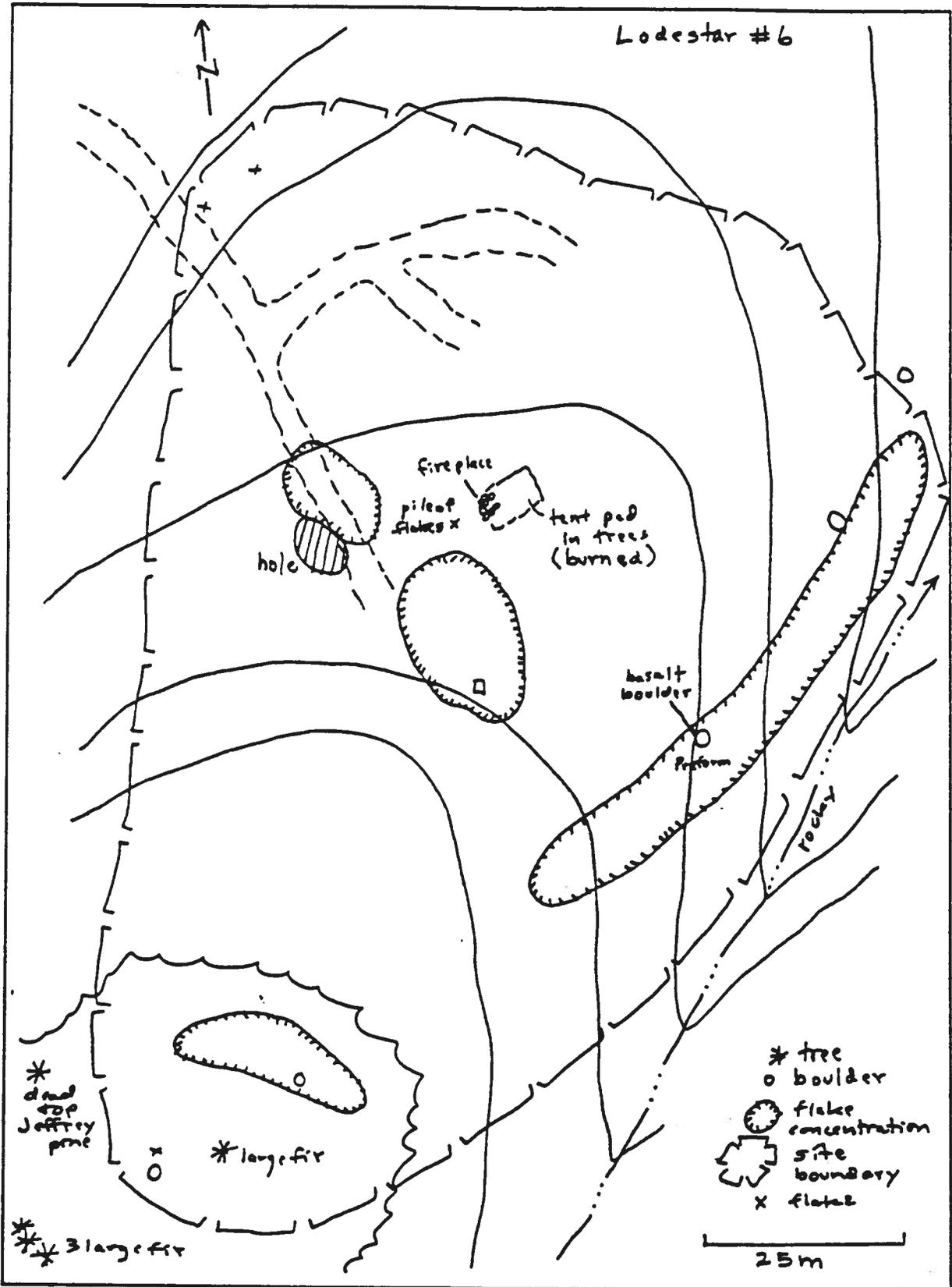


ARCHAEOLOGICAL SITE MAP

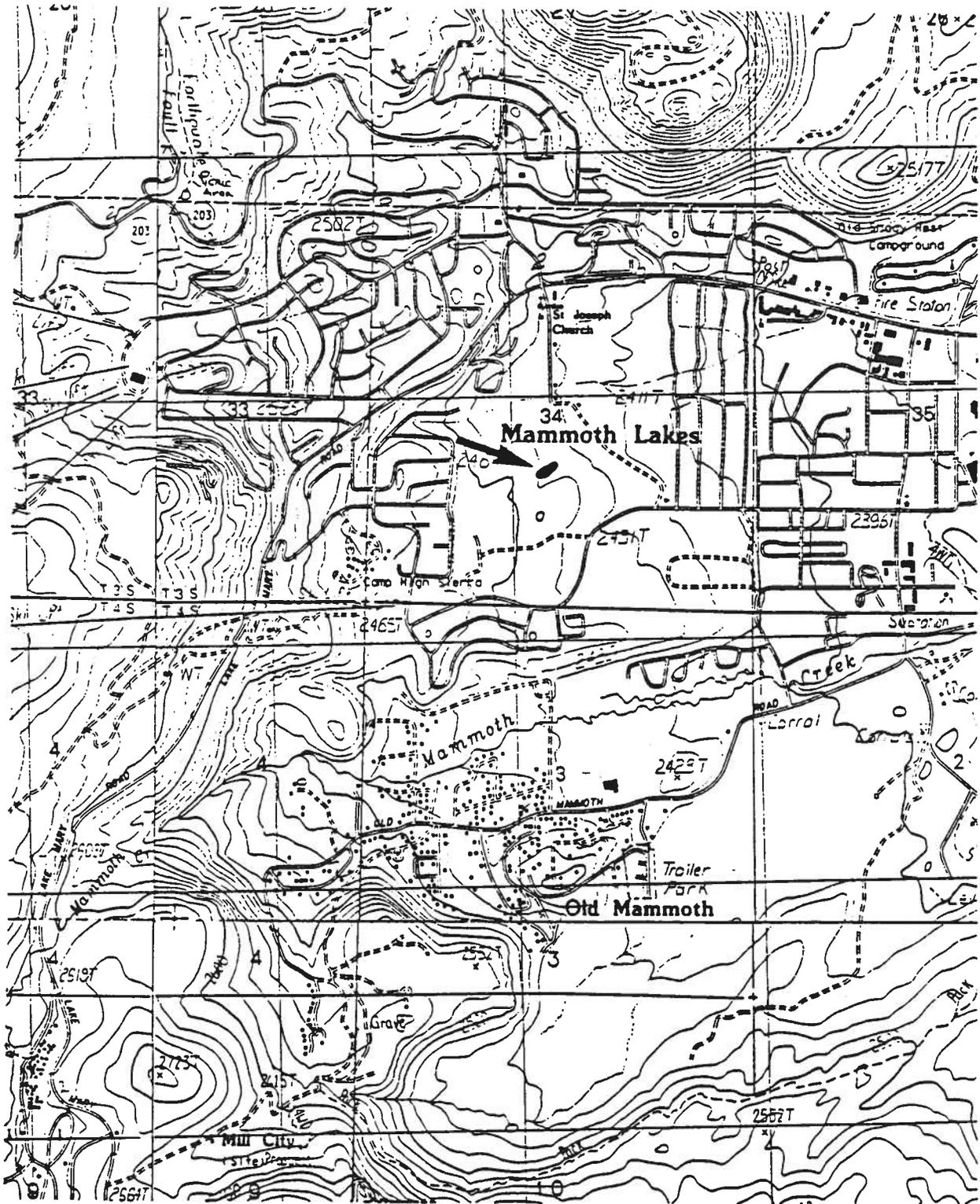


ARCHAEOLOGICAL SITE LOCATION MAP (adapted from USGS 7.5' maps Bloody Mtn., Calif. 1983, Crystal Crag, Calif. 1984, Mammoth Mtn, Calif. 1984, and Old Mammoth, Calif. 1983; provisional editions [metric]).

23. Slope: 0-20°
24. Aspect: Northeast.
25. Exposure: Open.
26. Landowner and Address: Lodestar Company, c/o Richard W. Liebersbach, P.O. Box 2127, Mammoth Lakes, CA 93546.
27. References: None known beyond present study.
28. Date Recorded: 10/24/89
29. Recorded by: J. Burton
30. Affiliation: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
31. Name of Project: Archaeological survey of the Lodestar property, Mammoth Lakes, California.
32. Type of Investigation: Archaeological survey.
33. Artifacts Curated at: None collected.
Accession No: n/a
34. Photos: 3 color slides
Taken by: J. Burton
Negatives at: Trans-Sierran Archaeological Research, 332 E. Mabel St., Tucson, AZ 85705.
37. Remarks: A 1 by 1 meter count unit in the densest portion of the site contained 1 biface retouch flake, 2 utilized flakes, 3 complete flakes, 12 flake fragments, and 1 debris, all of black Casa Diablo obsidian and one flake fragment of red/black Casa Diablo obsidian.



ARCHAEOLOGICAL SITE MAP



ARCHAEOLOGICAL SITE LOCATION MAP (adapted from USGS 7.5' maps Bloody Mtn., Calif. 1983, Crystal Crag, Calif. 1984, Mammoth Mtn, Calif. 1984, and Old Mammoth, Calif. 1983; provisional editions [metric]).