

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION

FINAL

## DESIGN CONCEPT REPORT

### NORTHERN AVENUE LOOP 101 TO 67TH AVENUE

MARICOPA COUNTY, ARIZONA

Work Order No. 68915  
Contract No. CY 1996-58

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September 1997

Prepared by:

STANLEY CONSULTANTS, INC.  
2929 East Camelback Road, Suite 130  
Phoenix, Arizona 85016

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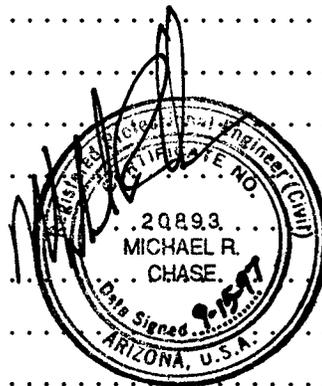
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## EXECUTIVE SUMMARY

This Design Concept Report (DCR) develops and reviews alternatives for alignments to meet the goals of improving operational capacity, controlling drainage and enhancing safety of Northern Avenue between Loop 101 and 67th Avenue while minimizing utility relocations and impacts on adjacent properties. The proposed improvements involve upgrading the roadway section to a four lane Urban Minor Arterial with a continuous left-turn lane in conformance with the Maricopa County Department of Transportation (MCDOT) Roadway Design Manual, November 3, 1993. Sidewalks will not be included in the current project improvements unless they are already in place as part of an existing development.

The Maricopa County Department of Transportation has planned this project to include the entire length of their jurisdiction along Northern Avenue between Loop 101 and 71st Avenue. During early stages of project scoping the City of Glendale has requested that the segment of Northern Avenue between 71st Avenue and 67th Avenue within their corporate limits also be included in the project. The improvements within these limits will be funded by the City of Glendale. The City of Peoria has requested and will be funding the addition of utilities and two bus bays in the project. MCDOT is in the process of executing Intergovernmental Agreements with these Cities to address these funding issues.

Storm Drain improvement construction will include multi-agency participation in design and funding of the facilities. The Flood Control District of Maricopa County is currently preparing design for portions of the Northern/Orangewood Storm Drain System in Northern Avenue between 91st Avenue and 83rd Avenue. The Flood Control District project will address the offsite flows and MCDOT will provide the features needed to drain the roadway between 91st Avenue and 83rd Avenue. MCDOT, Peoria, and FCDMC will share the costs of the Northern/Orangewood storm drain facility. The Northern/Orangewood construction will be included as part of the MCDOT roadway construction project. The MCDOT design will complete additional drainage facilities between 83rd Avenue and 71st Avenue. The funding of these additional facilities will also be shared by MCDOT, FCDMC and the City of Peoria.

This report has evaluated traffic operations, right-of-way, alignments, utilities and drainage associated with this portion of Northern Avenue. The evaluation process has involved agency and public participation. The City of Glendale, City of Peoria and the Flood Control District of Maricopa

County have provided relevant information during the development of the DCR. Public input was solicited through both a mailed informational package with a questionnaire and a public information meeting with displays and survey questionnaires. The results of the public participation process are summarized and included in Appendix C of the DCR.

The projected traffic needs for Northern Avenue were evaluated for the existing and proposed roadway configurations. Auxiliary turning lanes were considered at the 91st Avenue and 83rd Avenue intersections and were found to be unnecessary based on studies of the projected volumes and operational analyses. The Traffic Memorandum is included in Appendix A of this report.

Research of the environmental characteristics did not identify any serious issues that would present an obstacle to the proposed improvements. Archaeology surveys are underway for the alignment of the preferred alternative. The final alignment will be subject to the results of archaeology survey, SHPO requirements, and results of any required archaeological data recovery.

The alignment of the proposed improvements are controlled largely by two existing water well sites located at the 83rd Avenue and 91st Avenue intersections. The well site at 83rd Avenue belongs to the City of Peoria and provides drinking water for the Peoria water system. The well site at 91st Avenue is operated by Salt River Project (SRP) to provide irrigation for the agricultural lands along Northern Avenue.

A total of three alternatives have been identified including an "Enhanced Maintenance" alternative (Alternative 1). The three alternatives that were evaluated are as follows:

- Alternative 1 -- Enhanced Maintenance
- Alternative 2 -- Improved Section
- Alternative 3 -- Improved Section with 83rd Avenue Adjustment

Review of Alternative 1 was limited after completion of the Traffic Memorandum due to recognition that Enhanced Maintenance would not meet the future needs for traffic operations or provide any improvement in safety.

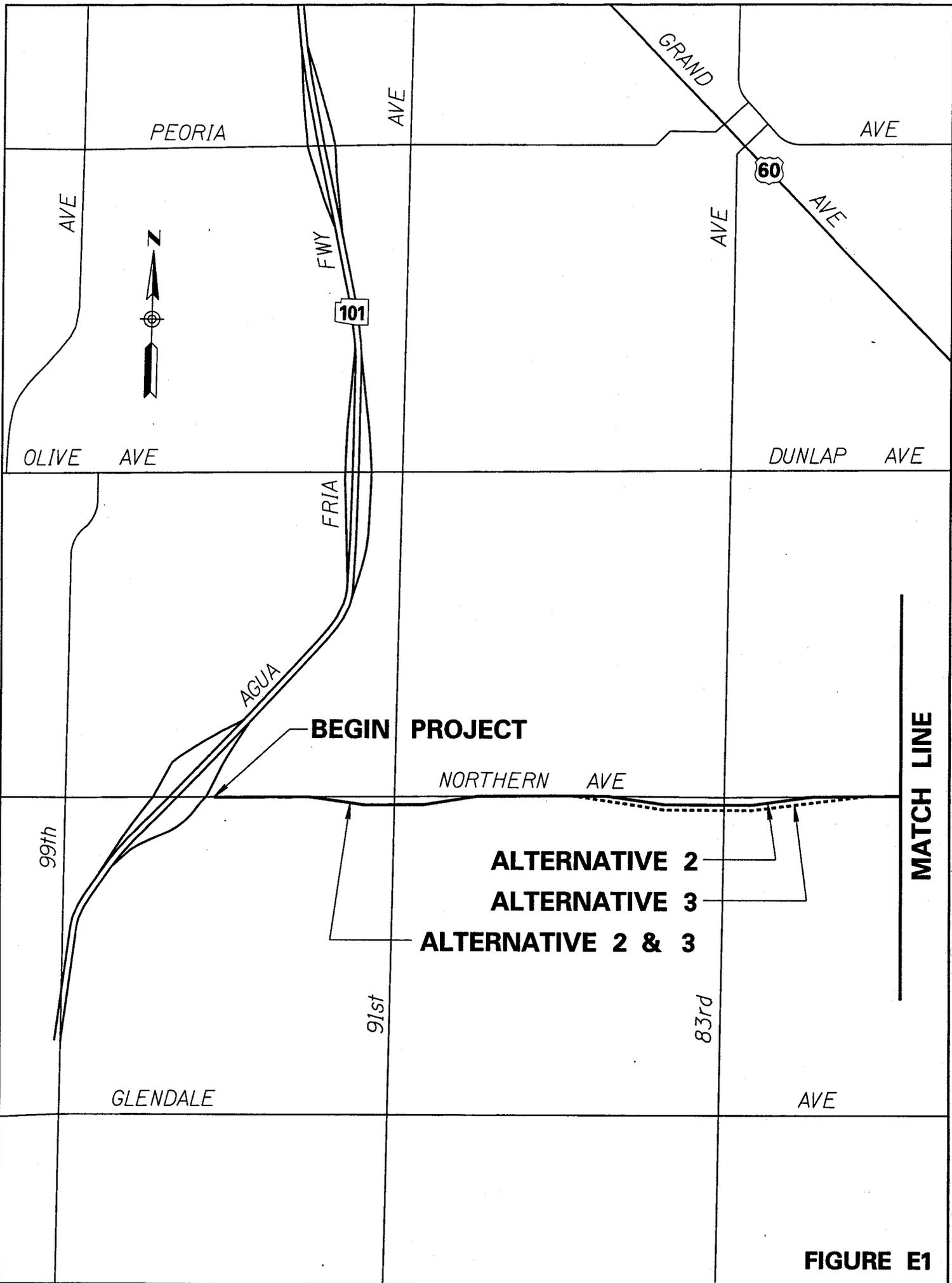
Detailed analysis of the remaining alternatives (Alternative 2 -- Improved Section and Alternative 3 -- Improved Section with 83rd Avenue Adjustment) is presented in the report subsection 4.3 and summarized in the Evaluation Matrix included as Table 4.3. The major difference between Alternative 2 and Alternative 3 is the amount of horizontal shift required to avoid the City of Peoria well site at 83rd Avenue. Alternative 2 requires a shift of Northern Avenue to the south with a similar easterly shift of 83rd Avenue. Alternative 3 requires a much larger southerly shift of Northern Avenue and a lesser easterly shift of 83rd Avenue.

Alternative 2 has been selected as the preferred alternative since it closely balances the shifts required on both Northern Avenue and 83rd Avenue. Alternative 2 also more evenly distributes the right-of-way impacts on the parcels at the 83rd Avenue intersection and provides the least possible impact on existing property owners and utilities.

An Alternatives Cost Comparison (Table 4.2) has been included with the executive summary. Detailed cost estimates are included in Section 6 of the report. The difference in cost between Alternative 2 and Alternative 3 is primarily in construction cost with Alternative 2 being slightly higher due to the length of tapered transitions on 83rd Avenue.

**TABLE 4.2 - ALTERNATIVES COST COMPARISON**  
**NORTHERN AVENUE (LOOP 101 TO 67TH AVENUE)**  
**WORK ORDER NO. 68915**

Project Activity Description	Factors	Enhanced Maintenance of Existing Alignment (Alt. 1)	Improved Section (Alt. 2)	Improved Section with 83 <sup>rd</sup> Ave. Adjustment (Alt. 3)
<b>Construction Costs</b>				
MCDOT	N/A	\$0	\$3,941,310	\$3,930,440
MCFCDD	N/A	\$0	\$423,500	\$423,500
City of Glendale	N/A	\$0	\$430,000	\$430,000
City of Peoria	N/A	\$0	\$790,900	\$790,900
<b>DCR, Right-of-Way &amp; Roadway Design</b>				
MCDOT	N/A	\$0	\$454,450	\$454,450
City of Glendale	N/A	\$0	\$81,050	\$81,050
City of Peoria	N/A	\$0	\$71,000	\$71,000
<b>Construction Management</b>				
MCDOT	15%	\$0	\$591,400	\$589,400
MCFCDD	15%	\$0	\$63,500	\$63,500
City of Glendale	15%	\$0	\$64,500	\$64,500
City of Peoria	15%	\$0	\$118,600	\$118,600
<b>Right-of-Way Acquisition</b>				
MCDOT	N/A	\$0	\$539,000	\$491,000
City of Glendale	N/A	\$0	\$0	\$0
<b>Utility Relocation</b>				
MCDOT	N/A	\$0	\$382,000	\$382,000
City of Glendale	N/A	\$0	\$0	\$0
<b>Salt River Valley Water Users Association</b>				
MCDOT ( Design)	14%	\$0	\$118,000	\$118,000
MCDOT ( Construction)	N/A	\$0	\$774,000	\$774,000
MCDOT ( Construction Management)	15%	\$0	\$116,550	\$116,550
City of Glendale ( Design)	10%	\$0	\$25,000	\$25,000
City of Glendale ( Construction)	N/A	\$0	\$250,000	\$250,000
City of Glendale ( Construction Management)	15%	\$0	\$37,450	\$37,450
<b>Administration</b>				
MCDOT	10%	\$0	\$559,000	\$557,000
<b>TOTAL PROJECT COST</b>				
		\$0	\$9,831,210	\$9,768,340
MCDOT Total Cost		\$0	\$7,475,710	\$7,412,840
MCFCDD Total Cost		\$0	\$487,000	\$487,000
City of Glendale Total Cost		\$0	\$888,000	\$888,000
City of Peoria Total Cost		\$0	\$980,500	\$980,500



**FIGURE E1**

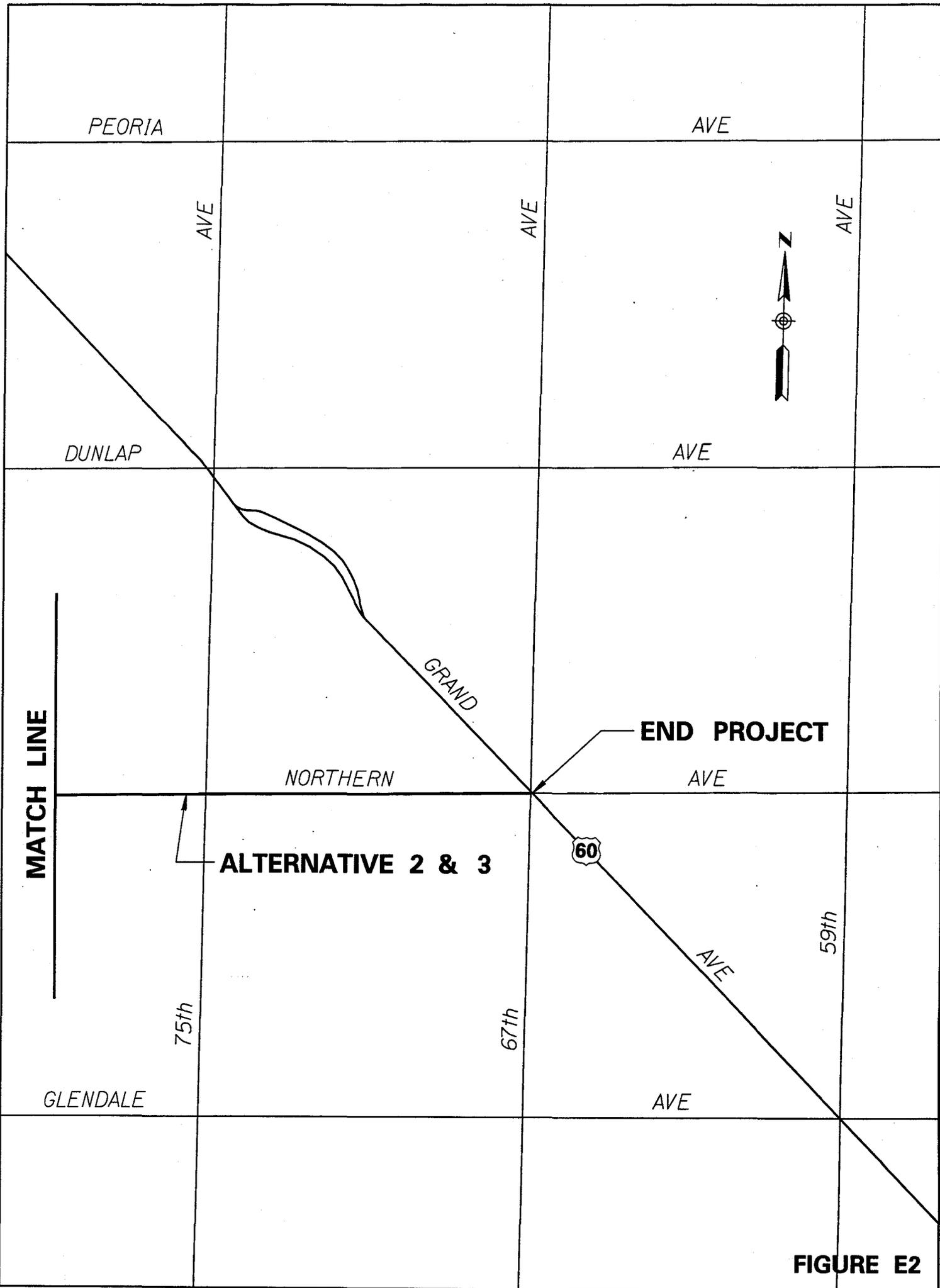


FIGURE E2

## **1.0 INTRODUCTION**

### **1.1 Project Description**

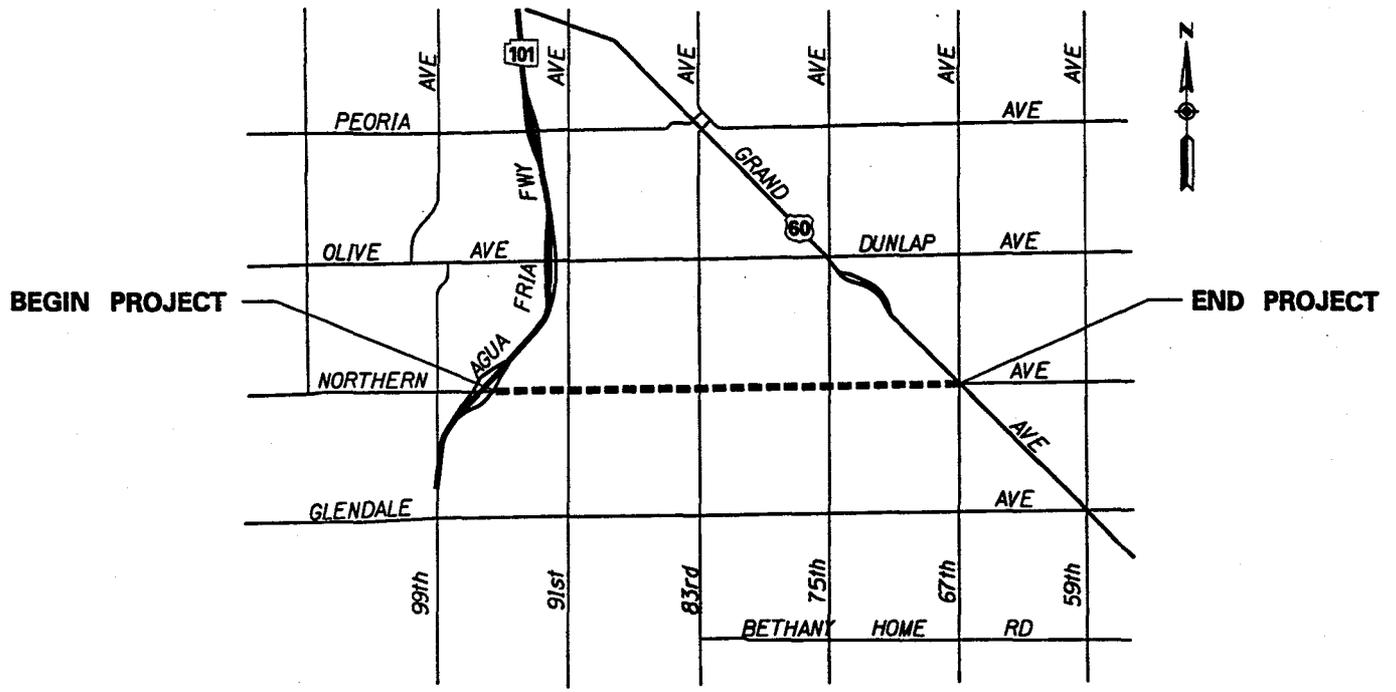
The proposed project will reconstruct and upgrade Northern Avenue to a four-lane arterial roadway with a continuous left-turn lane from the Loop 101 improvements east to 67<sup>th</sup> Avenue. The length of project is approximately 5.7 kilometers (3.54 miles). The project is partially located within jurisdictions of Maricopa County, the City of Glendale and the City of Peoria. Intergovernmental Agreements are in the process of being executed by Maricopa County Department of Transportation (MCDOT) with both cities.

The Maricopa County Department of Transportation originally intended this project to include the entire length of their jurisdiction along Northern Avenue between Loop 101 and 71st Avenue. The City of Glendale has requested that the portion of Northern Avenue between 71st Avenue and 67th Avenue be included in the project to complete the connection to US60 (Grand Avenue). The improvements within the Glendale jurisdictional limit of the project will be funded by the City of Glendale. The City of Peoria is funding the addition of utilities and bus bays in Northern Avenue along their corporate limits. The City of Peoria will annex the county portion of roadway at the completion of construction.

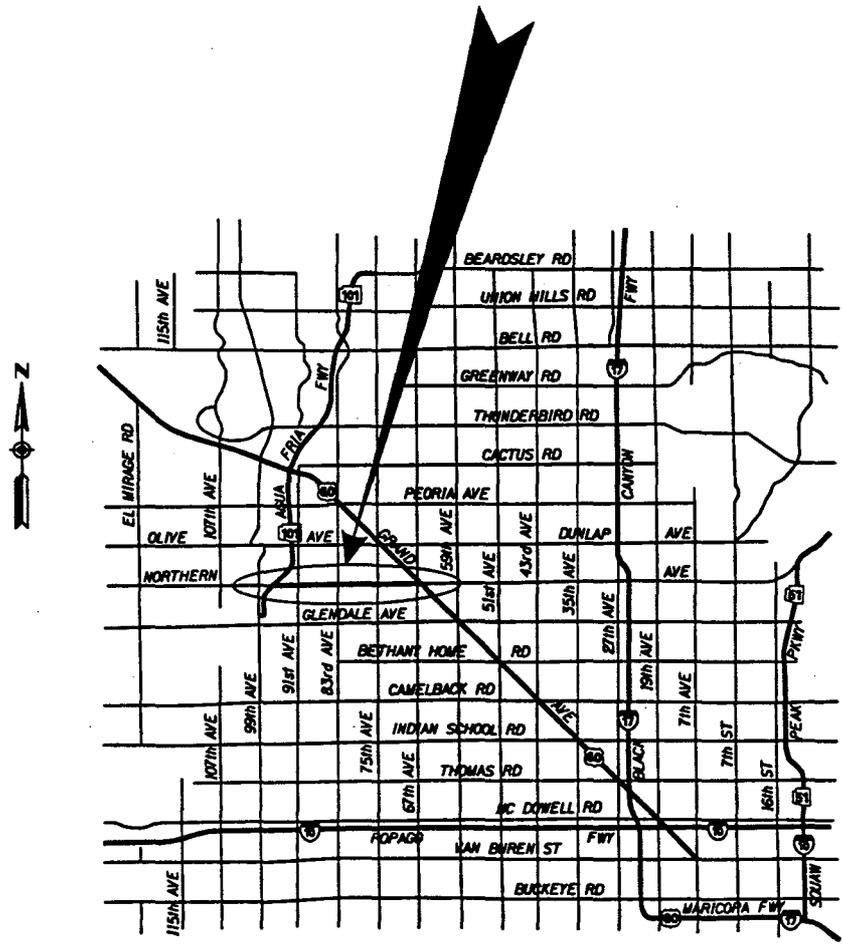
This project is currently scheduled for construction in the 5 year CIP for fiscal year 2000, and is a potential early construction project.

### **1.2 Purpose of the Project**

The purpose of this roadway project is to improve operational capacity, control drainage, and enhance safety of Northern Avenue. Alternatives have been developed and reviewed to provide an alignment which meets the goals of the project which will minimize utility relocations and minimize impacts to adjacent properties.



**PROJECT MAP**



**VICINITY MAP**

**FIGURE 1.1**

## **2.0 ENVIRONMENTAL OVERVIEW**

### **2.1 Purpose**

The purpose of this environmental overview is to describe the existing environment of the Northern Avenue Corridor based on available data, and to identify the potential environmental concerns within the corridor area. The overview is not intended to meet the requirements of the National Environmental Policy Act (NEPA) for the proposed improvements. An appropriate environmental document will be prepared during the design phase(s) of the project, if needed to comply with NEPA.

The environmental overview describes the project area in terms of its socio-economic, physical and natural, and cultural resource context. The information provided is based on existing data sources from various municipal, County, and Federal agencies, and a visual field survey of the project area. For this overview, the project area is generally defined as a 5.7 kilometers (km) (3.54 miles) by 800 meter (m) (2,625 foot) wide corridor on the center line of Northern Avenue from Loop 101 to 67<sup>th</sup> Avenue in Maricopa County.

### **2.2 Socio-Economic Environment**

The socio-economic environment description consists of a summary of the social and economic elements of the project area including its jurisdictional boundaries and property ownership, land use, zoning, socio-economics, and publicly owned lands. Environmental Justice and Title VI considerations are also described herein. This summary identifies the socio-economic resources within the project area using adopted planning documents and maps prepared by the City of Glendale, City of Peoria, and Maricopa County.

#### Jurisdictional Boundaries and Property Ownership

Jurisdictional boundaries within the corridor consist of three jurisdictional entities. These include Maricopa County, the City of Glendale and the City of Peoria. Maricopa County jurisdictional limits are generally located between 75<sup>th</sup> Avenue and 85<sup>th</sup> Avenue on north side of Northern Avenue; and between 75<sup>th</sup> Avenue and 99<sup>th</sup> Avenue on the south side of Northern Avenue.

The City of Glendale corporate limits are generally located south of the right-of-way of Northern Avenue from Loop 101 to 67<sup>th</sup> Avenue and surround the unincorporated County lands. The City of Glendale jurisdictional boundary also includes the area north of Northern Avenue east of 71<sup>st</sup>

Avenue. The City of Peoria corporate limits are located north of the Northern Avenue right-of-way between 71<sup>st</sup> Avenue and 75<sup>th</sup> Avenue and 86<sup>th</sup> Avenue to Loop 101.

The corridor consists primarily of numerous privately-owned properties and the Salt River Project (SRP) Agua Fria Power Generating Station, located at the northeast corner of 75<sup>th</sup> Avenue and Northern Avenue. Privately held parcels immediately adjacent to Northern Avenue include the Rovey Farms agricultural land holdings in the central portion of the corridor from 75<sup>th</sup> to 83<sup>rd</sup> Avenues. Properties are located between 89<sup>th</sup> and 90<sup>th</sup> Avenues in Peoria and between 79<sup>th</sup> Avenue and Loop 101 in the County lands south of Northern Avenue.

#### Land Use

Existing land uses within the project area generally consist of agriculture, commercial, industrial, and residential uses.

Agriculture is the predominant land use in the project corridor between 75<sup>th</sup> Avenue and Loop 101 consisting of many crop farms and dairies. Major agricultural crops include cotton, corn, alfalfa, and vegetables.

Residential use within the corridor is limited to a small multi-family residential neighborhood located at the northwest corner of 89<sup>th</sup> Avenue in Peoria and scattered rural single family residences between 79<sup>th</sup> Avenue and Loop 101 on the south side of Northern Avenue in the County. Other rural residences are scattered throughout the agricultural areas in the corridor.

Commercial/retail and industrial land uses are primarily located in the City of Glendale at the eastern portion of the corridor between 67<sup>th</sup> Avenue and 75<sup>th</sup> Avenue. Major commercial/industrial uses include the SRP Agua Fria Power Generating Station, Stone Container Corporation, Alliance Lumber Wholesale, and numerous industrial and commercial wholesale uses located on 68<sup>th</sup> Avenue south of Northern Avenue. The City of Glendale General Plan (1996) identifies this light industry and heavy commercial/retail use area as the North Grand Employment Center.

One public or quasi public use is located in the corridor study area. A small community church building (Church of Christ) is located on the south side of Northern approximately 500 meters (1640 feet) east of 83<sup>rd</sup> Avenue. No other public or quasi public uses are located in the corridor.

### Zoning

Zoning classifications within the corridor include various agricultural, residential, commercial, and industrial designations. Zoning classifications for the Maricopa County portion are Rural-43 (one dwelling per acre) and AG (agriculture) located between 75<sup>th</sup> Avenue and 85<sup>th</sup> Avenue on north side of Northern Avenue, and between 75<sup>th</sup> Avenue and 99<sup>th</sup> Avenue on the south side of Northern Avenue.

Zoning within the City of Peoria includes several residential zones including SR-43 (Suburban Ranch), R1-6 (Single Family), R1-8 (Single Family), and RM-1 (Multi-Family). Nonresidential zones include AG (General Agriculture), C-1 (Convenience Commercial), C-2 (Intermediate Commercial), and I-1 (Light Industrial), and I-2 (General Industrial) zoning districts. Zoning within the City of Glendale includes one residential R1-6 (Single Family) zone. Nonresidential zones in Glendale include C-3 (Heavy Commercial), and M-1 (Light Industrial), and M-2 (Heavy Industrial) zoning districts.

### Socio-Economics

The most recent population census indicated the population of Glendale was 164,890 (1994) and Peoria 65,500 (1994) per the Arizona Department of Economic Security (ADES). Current population projections suggest that both Glendale and Peoria are poised for continued growth similar to trends currently experienced throughout the Phoenix Metropolitan Area.

Within the project study area the local economy has long been based on agriculture. The area is now experiencing economic and employment growth from nearby Luke Air Force Base, Honeywell Flight Systems, American Express and Bull Information Systems. The combined labor force for Glendale and Peoria was 109,842 (1994) per the ADES. Current economic conditions indicate continued growth in employment opportunities for future residents in the Glendale/Peoria area.

### Section 4(f) of the US Department of Transportation Act

With the possibility that federal funding might be used to construct this project, Section 4(f) of the Department of Transportation Act restricts the use of any publicly-owned land in a park, recreation area, wildlife or waterfowl refuge, or land from historical sites for highway purposes. This act requires consultation with various resource agencies, a specific finding that there are no feasible and prudent alternatives to the use of such land, and a determination that the proposed action includes all possible planning to minimize harm to such lands before Federal funds can be used for highway

purposes on these lands. The Act is binding to programs administered by agencies under the US Department of Transportation.

There are no wildlife or waterfowl refuges designated within the project area. There are no public parks or potential historic properties located within the corridor.

#### Title VI/Environmental Justice

The basic provisions of Title VI of the Civil Rights Act of 1964 require federal agencies to ensure that their actions do not exclude persons and populations from participation, deny persons and populations of the benefits of the proposed action/activities or subject persons and populations to discrimination because of race, color or national origin. Executive Order 12898, "Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations," reaffirms the principles of Title VI and related statutes. The Executive Order adds the consideration of low income populations to minority populations when a Federal agency is examining effects from proposed actions. Minority means a person who is African American, Hispanic, Asian American, American Indian, or Alaskan Native. Low income means a person whose median household income is below the poverty guideline estimated from the 1996 Census to be \$15,600 per year for a family of four.

Within the project corridor, minority and low income households are present. According to Title VI/Environmental Justice, these groups represent protected populations. Therefore, any alternative alignments passing through this area must address concerns related to disproportionate impacts to minority and low income populations according to Title VI/Environmental Justice. Special consideration should be given to involve these protected populations in the planning and public input phases of the project.

#### Summary of Socio-Economic Considerations

Overall, the primary concerns associated with the socio-economic environment will deal with the potential relocation of residences and disruption of access, for those few affected. Special consideration should be given to protected populations.

## 2.3 Physical and Natural Environment

This section describes the existing physical and natural environment within the project area. The physical and natural environment is described in terms of topography/physiology, vegetation, wetlands, wildlife, sensitive species, noise and air quality, visual character, and hazardous materials.

### Topography/Physiology

The entire corridor area is nearly flat with slopes of less than 2 percent. The topography of the entire corridor varies little from the east, 348 m (1140 feet) above mean sea level at 67<sup>th</sup> Avenue and Northern to the west, 331 m (1085 feet) above mean sea level at Loop 101 and Northern Avenue. Drainage patterns in the corridor are generally from the east to the west. The major drainage way, New River crosses Northern Avenue at approximately 99<sup>th</sup> Avenue, west of the project corridor.

### Vegetation

Most of the lands in the corridor are either developed or graded for agricultural fields. No undeveloped natural desert areas exist in the project area. No known protected Arizona native plants exist within the corridor.

### Wetlands/Section 404 of the Clean Water Act

Natural washes and drainages are considered jurisdictional "waters of the U.S." and activities within these areas are regulated by the US Army Corps of Engineers (COE) as promulgated by the Clean Water Act of 1977. Any activity that discharges dredged or fill material into the designated jurisdictional areas will require a Section 404 permit. Correspondence with the COE indicates that several unnamed crossings that traverse the corridor may require 404 permits.

Wash areas determined to contain significant riparian plant communities may be designated as wetlands and will require review by the COE. The COE has jurisdiction of any wetland resources within the corridor area.

Currently no designated wetlands or visible COE jurisdictional waters are located within the corridor.

### Wildlife

Wildlife habitats and populations are limited in agricultural areas and consist mostly of birds and small animals. Species include doves, woodpeckers, field mice, snakes, and rabbits.

### Sensitive Species

Communications with the U.S. Fish and Wildlife Service (USFWS) suggest that there are no endangered, threatened, or candidate species potentially occurring in the corridor. Discussions with the USFWS indicate there are no critical habitat areas located within the project limits.

The Arizona Game and Fish Department's (AGFD) Heritage Data Management System records show there is one Arizona special status species documented as occurring within the project area. The black-bellied whistling-duck (*Dendrocygna autumnalis*) occurs in the vicinity of the corridor. This species is classified as "Wildlife of Special Concern in Arizona" by the AGFD. The construction of this project will not impact any sensitive species.

### Air Quality

The entire corridor lies within the Maricopa County Nonattainment Area. A nonattainment area is an area that exceeds any National Ambient Air Quality Standard (NAAQS) for any pollutant based upon the data collected through air quality monitoring. The pollutants that exceed the prescribed air quality standards in the nonattainment area are particulate matter (PM<sub>10</sub>), carbon monoxide (CO), and ozone (O<sub>3</sub>) as identified by the Arizona Department of Environmental Quality, Air Quality Division.

Levels of air pollutants for PM<sub>10</sub>, CO, and O<sub>3</sub> within the corridor exceed the Federal standards identified by ADEQ. Significant sources of PM<sub>10</sub> within Maricopa County are from vehicle exhaust, road dust and agriculture. Both agricultural activities and the dust from dirt roads contribute to the levels of PM<sub>10</sub> within the corridor.

Carbon monoxide is the pollutant of main concern on a project level basis because of its potential hazard to public health at excessive concentrations. Ozone, hydrocarbons, and nitrogen oxide air quality concerns are regional in nature (complex atmospheric chemistry) and as such, meaningful evaluation on a project-by-project (microscale) basis is not possible.

During preparation of the environmental documentation for the project, the future ambient air quality for the corridor project area may need to be evaluated in terms of State and NAAQS Compliance.

### Noise Quality

With the possibility that federal funding could be used to construct this project, FHWA noise procedures may need to be followed. According to FHWA procedures, noise abatement must be considered when implementation of a roadway project results in a substantial increase over the existing noise level (most State Highway agencies define a substantial increase as 15 decibels greater than the existing noise level). Abatement must also be considered when noise levels are expected to approach or exceed the criteria levels.

FHWA has adopted Noise Abatement Criteria (NAC) that establish acceptable hourly, A-weighted noise levels for various land use activity categories (A-weighting emphasizes certain frequencies to approximate how sound is perceived by human hearing). The FHWA's NAC emphasizes traffic generated noise and are intended to serve as guidelines for determining traffic noise impacts and the need for mitigation. FHWA Noise Abatement Criteria are shown in Table 1 below.

Activity Category	Description	Leq(h)
A	Lands on which serenity and quiet are of extraordinary significance and serve an important public need and where the preservation of those qualities are essential if the area is to continue to serve it's intended purpose.	57 dBA
B	Residences, schools, parks, churches, libraries, hospitals, motels and hotels.	67 dBA
C	Developed lands not included in Categories A or B above.	72 dBA

*Source.- Code of Federal Regulations, Title 23, Part 772*

There are two noise category types found within the project area. Category B includes residential type land uses such as single family homes and churches within the Glendale, Peoria, and the County. Category C activities relate to commercial businesses and other less noise sensitive areas with land uses such as commercial and light industrial such as the Stone Container Corporation Plant and the SRP Agua Fria Power Generating Station.

According to FHWA procedures, noise impacts occur if the anticipated sound levels for the project meets or exceeds the thresholds for each of the land use categories or approaches 67 dBA Leq for Category B type land uses. "Approaches" is considered to be 66 dBA Leq. These levels are typically applied to exterior areas where lowered noise levels would be of benefit. Traffic noise impacts also occur when the predicted traffic noise levels substantially exceed the existing noise level (15 dBA Leq or more).

Existing noise quality data is not currently available for the corridor. During subsequent environmental documentation activities, ambient noise levels will be monitored at specific locations along the corridor. Future noise impacts for the project area will need to be evaluated against the existing noise data in terms of Federal Regulations for Noise Abatement.

Noise abatement measures (mitigation) may be included in the project as required to meet the noise requirements.

#### Prime/Unique Farmland

Prime farmlands are those whose values derive from their general advantage as cropland resulting from climatic, soil, and water conditions. Prime farmlands, as defined by the U.S. Natural Resource Conservation Service (NRCS), are lands that have the best combination of physical and chemical characteristics to produce food, feed, forage, fiber, and oilseed crops and are also available for these uses.

Unique farmlands are lands whose values derive from their particular advantage for specialty crops due to climate, soil, and water conditions. Unique farmland has a special combination of soil quality, location, growing season, and moisture supply needed to produce sustained high quality and/or high yields of specific crops when treated and managed according to modern farming methods.

Prime/Unique farmland does exist in the corridor in the 4.0 kilometer (2.5 mile) segment between 75<sup>th</sup> and 95<sup>th</sup> Avenues according to the NRCS. Determination of exemption from requirements of the Farmland Protection Policy Act (FPPA), as revised in 1994, will be made by the NRCS. Exemption from the FPPA is allowed for lands which are already in or committed to urban development. The Northern Avenue corridor is currently planned for urban development in both the Glendale and Peoria adopted General Plans.

### Visual Quality

The visual character of the project area is typified by urban/agricultural area visual character type. Due to the low topographic relief, views from the project area are expansive to distant mountain ranges and landforms. At the eastern end of the corridor, the urban structures of the steam turbine superstructures and transmission towers of the SRP Agua Fria Power Generating Station in Glendale and Peoria dominate the view. The western portion of the corridor has expansive views of natural landforms and native vegetation interspersed with built facilities and improvements, such as Loop 101, the developed areas of west Glendale, Estrella Mountains to the south, and the White Tank Mountains to the west. In the central portion of the corridor, the relatively flat landscape is covered with agricultural fields with a varied rotation of crops and dairies. The contrast of the urban/agriculture areas and the mountains to the west provides a change in form, color and texture within the immediate view area of the corridor. The green hues of the agricultural lands contrasts with the grey-green/purple of the surrounding mountains to the south and west.

### Hazardous Materials

Hazardous materials are regulated by the Resource Conservation and Recovery Act (RCRA) and the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). The Arizona Department of Environmental Quality implements CERCLA, commonly known as Superfund, and its amendment, the Superfund Amendments and Reauthorization Act of 1986 (SARA). The inherent environmental concerns associated with hazardous materials and solid waste landfills require a preliminary investigation into the location of permitted and non-regulated hazardous material sites and solid waste facilities within the project area.

Readily available regulatory agency information was reviewed to locate areas of environmental concern, compliance enforcement actions, or investigations involving hazardous materials and/or waste within the project area. The most recent list of Arizona CERCLA Information Data System (ACIDS) was reviewed (December 1996). Information on the location of solid waste landfills was

provided by ADEQ. Records from the RCRA database, Leaking Underground Storage Tank (LUST) file listing, and Hazardous Material Incident Logbook 1984-1996 were also reviewed.

No National Priority List (NPL) Superfund Sites or Water Quality Assurance Revolving Fund (WARF) sites were identified in the corridor area. No active, inactive or closed solid waste landfills are located in the corridor. Two LUST sites were identified from existing ADEQ records. Both sites are located on the Stone Container Corporation Plant. Specific case files were not reviewed as part of this preliminary assessment.

#### Summary of Natural and Physical Considerations

Primary concerns associated with the project area's natural and physical environment include leaking underground storage tanks and future potential noise impacts. Based on existing information, no determination of the existence of or magnitude of potential impacts to these resources can be made. Project-specific analyses will be made during the environmental documentation phase of the project to evaluate project impacts.

#### **2.4 Cultural Resource Context**

The National Historic Preservation Act of 1966 is a national policy to coordinate and support public and private efforts to identify, evaluate, and protect our cultural and natural resources. The National Register of Historic Places (NRHP) is part of this national policy and is the official list of historic properties considered worthy of preservation for their national, state or local significance in American history, architecture, archeology, engineering and culture. Any Federally funded action requires the identification and evaluation of historic properties in accordance with the requirements of Title 36, Code of Federal Regulations (CFR) Part 800 Section 106 - the review process established in the National Historic Preservation Act. This and other Federal regulations apply to any properties listed or considered eligible for the National Register of Historic Places. For these reasons, listed or eligible historic properties or areas anticipated having high densities of historic properties have been identified as important cultural resource considerations associated with the project area.

#### Cultural History

For the purposes of this environmental overview, the cultural history of the project area is briefly summarized. The prehistoric era is commonly divided into three periods, including Paleo-Indian, Archaic and Hohokam. The Paleo-Indian period refers to the time when big game hunters occupied North America after the end of the Pleistocene ice age. These sites date from *ca.* 12,000 B.P. to

8,000 B.P. Archaic sites also represent hunter gatherer populations, but the types of features associated with Archaic sites are vastly different than those associated with the Paleo-Indian period. The site file search did not identify any previously recorded Paleo-Indian or Archaic sites in the study area. However, Paleo-Indian and Archaic sites are typically represented as buried components in archaeological sites, and therefore may be present as subsurface cultural materials.

The Hohokam were sedentary agriculturalists who practiced extensive irrigation agriculture and dry farming in the Phoenix Basin of south-central Arizona. The Hohokam lived in the Phoenix Basin for 900 to 1100 years, establishing an array of complex and ephemeral sites throughout much of the region. Although there has been much controversy over the timing of the Hohokam's arrival in south-central Arizona, the timing of their dispersal from the Basin is fairly widely accepted, ca. AD 1400.

The proto-historic period (AD 1450 to 1700) represents an interval when Pima and Papago lived in the Salt River Valley. Most researchers generally accept that the Pima and Papago are the descendants of the Hohokam. However, at present the settlement and subsistence practices, and social structure of these proto-historic culture groups are poorly understood.

A previous Class III inventory paralleling Northern Avenue along its north side did not reveal any prehistoric or historic cultural materials (1993). This 1993 inventory indicated that much of the right-of-way north of Northern Avenue has been disturbed by urban development. The right-of-way south of Northern Avenue has not been previously surveyed in the project area. Correspondingly, the density of surface cultural resources in this area is presently unknown. There is a low to moderate probability that Pima, Papago, and/or Hohokam cultural materials are present in the agricultural fields south of Northern Avenue.

#### Historic Character

During the mid to late 1800's Hispanics and Anglos settled in the Phoenix Basin. Agricultural activities dominated land use during this period, with industrious farmers often constructing their canals along segments of the earlier Hohokam canals. In the vicinity of the Northern Road project area, Glendale and Peoria were each settled in the early 1890's. Glendale was a thriving agricultural community supporting 72 families as early as 1892 (Trimble, 1987). Peoria also was an agricultural community, with citrus, cotton and melon farming comprising the main base of the economy.

### Summary of Cultural Resource Considerations

Cultural resource considerations within the project area were identified from information gathered the SHPO and existing environmental studies relevant to the area. No known historic districts, places or sites listed on, or eligible for listing on the National Register of Historic Places (NRHP) are located within the project area. During the environmental evaluation phase of this project, a cultural resources survey will be completed for the entire corridor.

If archaeological sites are identified within the corridor, the State Historic Preservation Officer (SHPO) must be consulted to determine whether the sites are eligible for listing on the National Register of Historic Places (NRHP). To determine the eligibility of sites with moderately dense to dense concentrations of surface cultural materials, testing and data recovery may be required. If the sites are eligible for listing on the NRHP, avoidance will be recommended. If a site(s) are eligible for listing on the NRHP under criterion "d, " the adverse effects of future development may be mitigated through the excavation and recording of the site(s).

## 2.5 REFERENCES and RESOURCES

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### **3.0 MAJOR DESIGN FEATURES**

#### **3.1 Design Features**

**Roadway Design** - The planned Northern Avenue roadway typical section conforms to the Urban Minor Arterial Road section presented in Section 5 of the MCDOT Roadway Design Manual, adopted November 3, 1993. The English dimensions have been soft converted to Metric SI units and are presented on Figure 3.1. The total roadway width is 20.6 meters between curb faces divided into four travel lanes and a two-way left turn lane. The two-way left turn lane is 4.2 meters wide centered on the roadway construction centerline. The inside traffic lanes will be 3.6 meters wide and the outside traffic lanes will be 4.6 meters wide to the face of curb. Minor width transitions of the outside traffic lanes will be required at the east and west ends of the project to match existing improvements.

The roadway section will consist of Superpave asphalt with 0.6 meter wide curb and gutter on both sides. The curb and gutter will be either MAG Std. Detail 220, Type A. A future 1.5 meter wide detached sidewalk will be located within this shoulder area 2.1 meters behind the face of curb. This typical section (see Figure 3.1) is used along the entire length of the project with minor modifications at some locations to accommodate existing improvements. The 75<sup>th</sup> Avenue and Northern Avenue intersection will be improved as part of an upcoming MCDOT construction project on 75<sup>th</sup> Avenue. The Northern Avenue project will match those project improvements.

Signing, marking and signalization will be in conformance with MCDOT Traffic Engineering Division manuals, MCDOT Design Guidelines, and the Manual on Uniform Traffic Control Devices (MUTCD).

Traffic control features during construction will be in accordance with the requirements of the Manual on Uniform Traffic Control Devices (MUTCD).

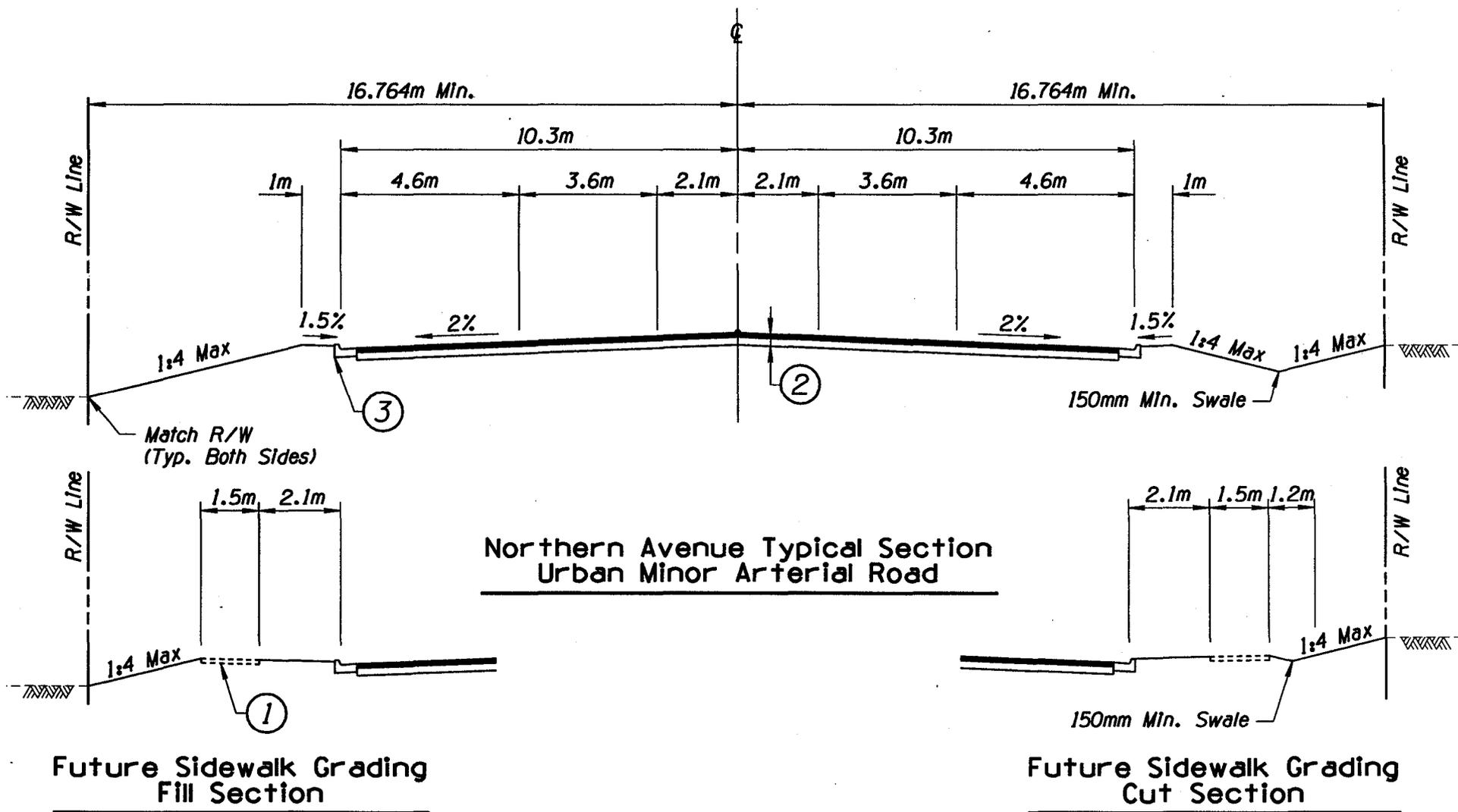


FIGURE 3.1

- ① Typical Location of Future Sidewalk. Except at Street Intersections (Typ. Both Sides).
- ② 100mm Min. A.C. Over 250mm Min. A.B. or Approved Equivalent.
- ③ MAG Std. Detail 220, Type A Curb & Gutter (Typ. Both Sides)

**TABLE 3.1 - DESIGN CRITERIA**

Functional Classification	Urban Minor Arterial	
Design Year	2020	
2020 ADT	24,000	
Design Vehicle	WB-15 (Large Semitrailer)	
Design Speed	90km/h (Level Terrain)	
Pavement Design Life	20 years	
Pavement Structure For DCR	100 mm Min. AC (Superpave Mix) on 250 mm Min. Aggregate Base Pavement structural section is for budgeting purposes only. Final pavement structural section will be determined by soils investigation.	
Horizontal Alignment	V=90 km/h	
Vertical Alignment	Vertical curve is required for algebraic grade difference equal or greater than 0.3%.  At major street/major street urban intersections the maximum intersection ride through breakover at signalized intersections shall not exceed 2.5%.	
Clear Zone	0.91 m desirable, 0.61 m Minimum (AASHTO Roadside Design Guide 1994) for curbed roadways.  Uncurbed roadways shall be evaluated per 1994 AASHTO Roadside Design Guide.	
Traffic Lanes	four; 2 - lanes eastbound; 2 - lanes westbound	
Median	Two-Way Left Turn Lane	
Lane Widths	Two-Way Left Turn Lane = 4.2 m Travel Lanes = 3.6 m	
Shoulder Widths	N/A	
Longitudinal Profile Grades	MCDOT * 5% Max. 0.25% Min. 0.15% Absolute Min.	GLENDALE 12% Max. 0.20% Min. 0.20% Absolute Min.
	* (MCDOT Roadway Design Manual, November 3, 1993; Section 5)	

Roadway Cross-slope	MCDOT 2%	GLENDALE 2% Min. - 3% Max.
Shoulder Cross-slope	N/A	
Embankment Cut/Fill Slopes	Match Existing, 4:1 Maximum	
Curb and Gutter Types	MAG Std. Detail 220, Type A	
Curb Return Radii (face of curb)	10.7 m Urban Minor Arterial with Urban Minor Arterial 9.1 m Urban Minor Arterial with Urban Minor Arterial	
Sidewalks	Use at curb returns with sidewalk ramps modified to ADA requirements, longitudinal sidewalks (1.5 m) are future and will be offset from back of curb 1.925 m.	
Access Control, Driveway Design	Single Residential - MAG 250 or MAG 251 Small Commercial - MAG 251 Large Commercial - MAG 251	
Tapers	55:1 Minimum	
Flares	15:1 Minimum	
Intersection and Crossroad Geometry	<ul style="list-style-type: none"> <li>• 71st Avenue and Northern Avenue T-intersection; Match existing improvements and provide width for single lane in each direction and single left-turn lane. The existing driveway on the north side of Northern Avenue located near the 71st Avenue T intersection will be adjusted and maintained for this project. This driveway will be removed and replaced with the northerly extension of 71st Avenue in the future.</li> </ul> <p>City of Glendale Standards Govern.</p> <ul style="list-style-type: none"> <li>• Match Existing Conditions; Match Proposed MCDOT Design at 75th Ave. and Northern Avenue.</li> </ul> <ul style="list-style-type: none"> <li>• 83rd Avenue and Northern Avenue - Single left-turn lanes and 2 through lanes in all directions. Realign Northern Avenue centerline, and 83rd Avenue centerline to avoid Peoria well site on northwest corner. Alignment shall return to sectional alignment as quickly as possible. City of Peoria Standards Govern.</li> </ul> <ul style="list-style-type: none"> <li>• 91st Avenue and Northern Avenue, single left-turn lanes and 2 through lanes in all directions. Match existing curb returns if possible. City of Peoria Standards Govern.</li> </ul> <ul style="list-style-type: none"> <li>• Consider mid-block type bus bays on Northern Avenue at 83rd Avenue and 91st Avenue intersections.</li> </ul>	

Drainage	Roadway -- 10-year event contained within curbs. Pavement spread--maintain one dry through traffic lane in each direction. Catch basins will be sized to accommodate drainage from the right-of-way. City of Phoenix Standard P-1569 type M catch basins will be used. Storm Drain will be oversized per City of Peoria Request.
Right-of-Way	33.528 m (110 ft)
Structural	None
Utilities	MCDOT guidelines for relocation and AUCC Guide.
Lighting	None, intersection lighting with signals only.
Traffic Signals	67th Avenue - Existing Signals to Remain. 71st Avenue - None, Stop Controlled. 75th Avenue - None, Constructed with 75th Avenue Project. 83rd Avenue - New Signals. 91st Avenue - Existing Signals to Remain.

**Drainage Design** - Regional drainage for the area surrounding the Maricopa County Department of Transportation (MCDOT) Northern Avenue project limits has been analyzed by consultant Wood/Patel Associates for the Flood Control District of Maricopa County (MCFCD). This analysis is part of the Northern/Orangewood Storm Drain Project which includes portions of the Cities of Glendale and Peoria as well as Unincorporated Maricopa County. The purpose of the Northern/Orangewood Storm Drain Study is to establish hydrology, preliminary hydraulics, concept routing and pipe sizing for a regional storm drainage system. The Wood/Patel Associates study is a refinement and finalization of the MCFCD Glendale - Peoria Area Drainage Master Plan done by Camp Dresser & McKee, Inc. and James M. Montgomery Consulting Engineers, Inc. in 1987. More detailed description of the proposed regional drainage system including the Northern Avenue storm drain can be found in Appendix B.

The Northern Avenue storm drain system is necessary to provide pavement drainage for Northern Avenue, reduce impacts of local drainage, and to provide an outfall for the 75<sup>th</sup> Avenue storm drain system so that temporary retention basins along 75<sup>th</sup> Avenue north of Northern Avenue can be removed.

The costs of constructing the Northern Avenue storm drain system will be shared by MCDOT, FCDMC and the City of Peoria. IGA's for sharing these costs are in the final stages of development.

**Right-of-Way** - The minimum width of right-of-way required for an Urban Minor Arterial is 33.528 meters. Intersection sight triangles are included in the required right-of-way at each existing intersections.

**Level of Service** - The roadway concepts have been developed to provide reasonable level of service. Level of service is a measure of the quality of traffic flow. Levels of service are graded A through F and are defined in the Highway Capacity Manual, Special Report 209, published by the Transportation Research Board, Washington, D.C., updated in October 1994. Northern Avenue currently serves average daily traffic (ADT) of 6000 vpd between Loop 101 and 91<sup>st</sup> Avenue; 5000 vpd between 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue; 8000 vpd between 83<sup>rd</sup> Avenue and 75<sup>th</sup> Avenue; 13,000 vpd between 75<sup>th</sup> Avenue and Grand Avenue. These volumes indicate Northern Avenue is currently functioning as an urban minor arterial in a developing area. The existing roadway typical section

would be classified as a rural major collector. The volume for a rural major collector should not exceed 8000 ADT with a desired level of service of B.

The proposed upgrade of Northern Avenue to an urban minor arterial will accommodate future projected volumes and should maintain a level of service of C which meets or exceeds the desired level of service C.

**Utilities** - Numerous public and private utilities are contained in the Northern Avenue corridor. Many of these utilities will be impacted by the proposed project. A series of figures are presented herein (See Figures 3.2, 3.3, 3.4, 3.5, 3.6, 3.7, 3.8) which indicate the approximate locations of underground and overhead facilities. A tabular listing of utilities has been included in Table 3.2.

FIGURE 3.2

Northern Avenue Typical Section  
Existing Utilities  
Loop 101 to 91st Avenue

UT & UE 16.2m Lt (at 95th Ave)
UT 8.8m Lt
UT 7.6m Lt
UT 6.7m Lt
14" PS 6.4m Lt (Abandoned)
16" G 4.0m Lt
60" SD on Monument Line
12" W 3.0m Rt
36" S 5.5m Rt
6" W 7.0m Rt
Irrlg 10.7m Rt (Conc Ditch)
UE 14.6m Rt (at 95th Ave)
UT 16.2m Rt (at 95th Ave)
Irrlg 18.6m to 15.8m Rt (Conc Ditch)

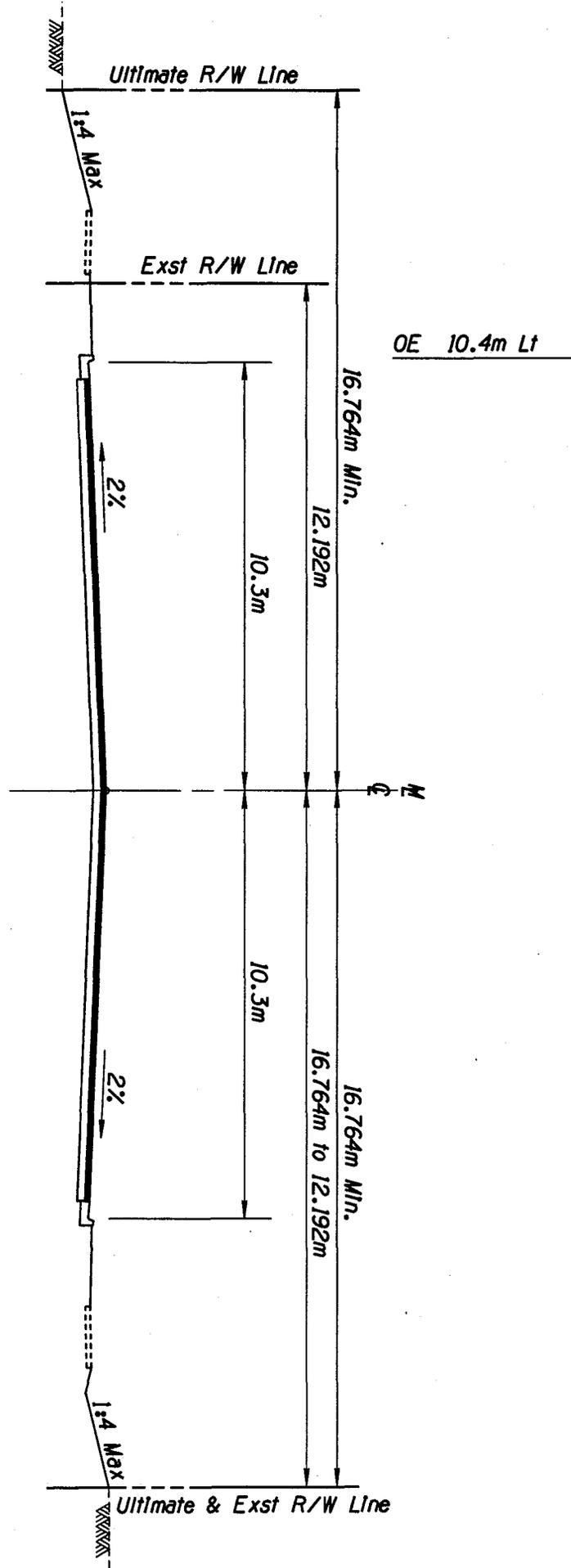


FIGURE 3.3

UT & UE 18.3m Lt  
 (89th Dr to 89th Ave)

TW 12.8m Lt  
 (Earthen)

UE 11.0m Lt  
 (at 91st Ave)

UT 9.9m Lt  
 (91st Ave to 89th Ave)

12" W 8.5m Lt  
 (91st Ave to 89th Ave)

14" PS 7.6m Lt  
 (Abandoned)

16" G 4.9m Lt

60" SD 4.6m Rt  
 (at 91st Ave)

14" PS 5.5m Rt  
 (Abandoned)

24" S 7.9m Rt

6" W 9.4m Rt

12" W 12.9m to 3.0m Rt  
 Irrlg 13.7m Rt  
 (Conc Ditch)

Northern Avenue Typical Section  
 Existing Utilities  
 91st Avenue to 87th Avenue

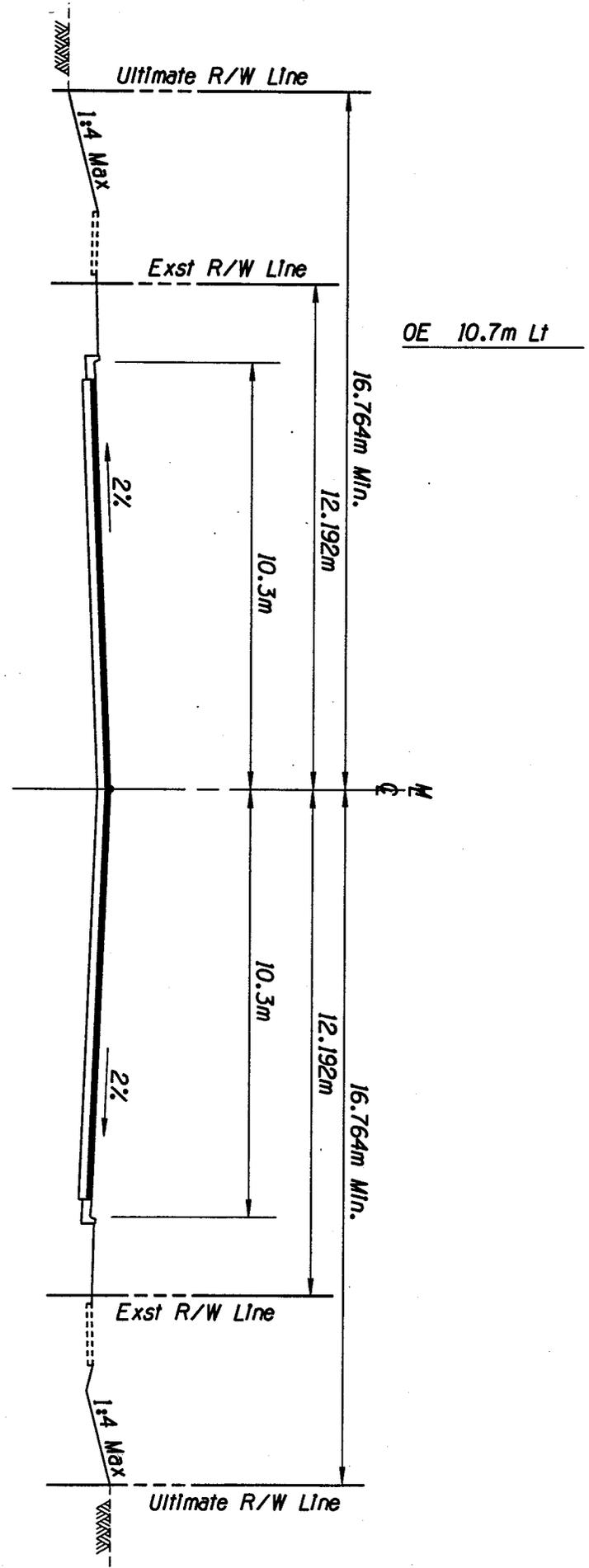


FIGURE 3.4

Northern Avenue Typical Section  
Existing Utilities  
87th Avenue to 83rd Avenue

- Irrig 7.9m Lt  
(Earthen)
- 16" G 4.9m Lt
- 12" W 3.0m Rt
- 14" PS 4.9m Rt  
(Abandoned)
- 2" G 6.1m Rt
- 2" W 6.7m Rt
- 24" S 7.6m Rt
- 14" PS 9.1m Rt  
(Abandoned)
- UT 10.1m Rt
- 6" W 13.4m to 11.0m Rt

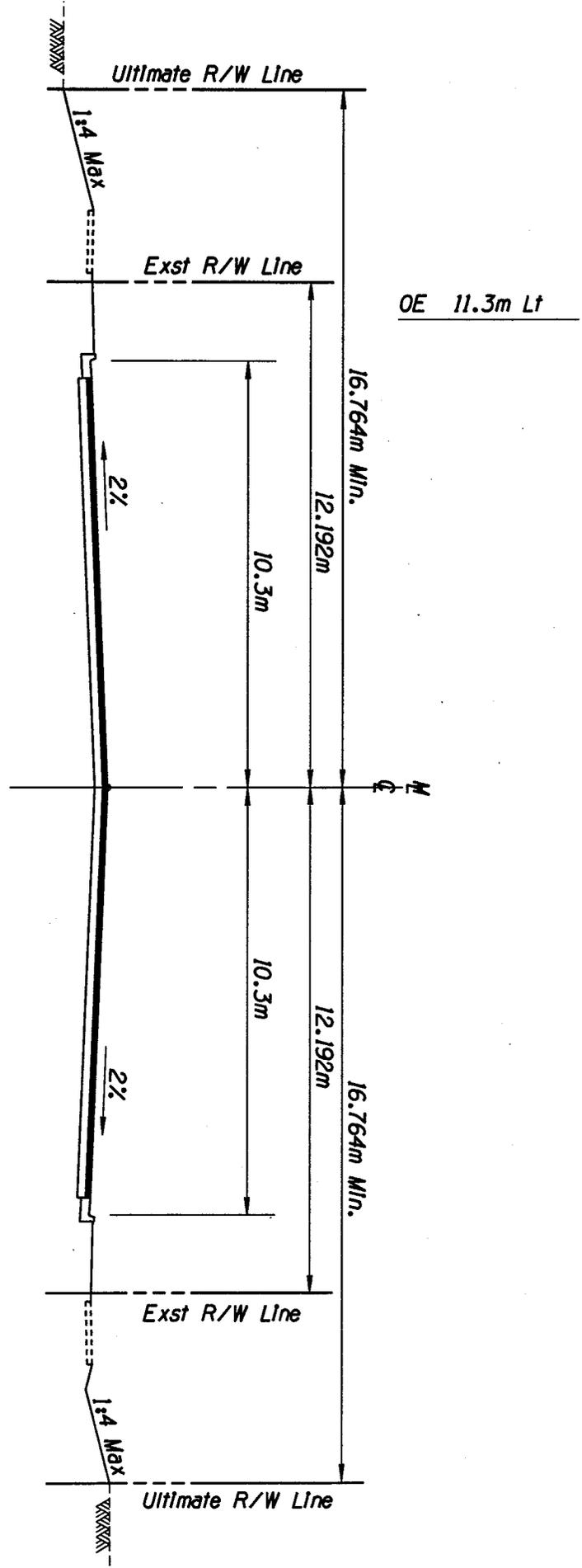


FIGURE 3.5

Northern Avenue Typical Section  
Existing Utilities  
83rd Avenue to 79th Avenue

- Irrig 7.9m Lt  
(Earthen)
- 2" G 4.3m Lt
- 2" W 3.7m Lt
- 12" W 1.8m Lt
- 24" S 0.9m Rt
- 14" PS 3.7m Rt  
(Abandoned)
- 6" W 4.9m Rt
- UT 6.4m Rt
- 16" G 7.3m Rt
- UT 8.8m Rt
- UE 10.7m Rt

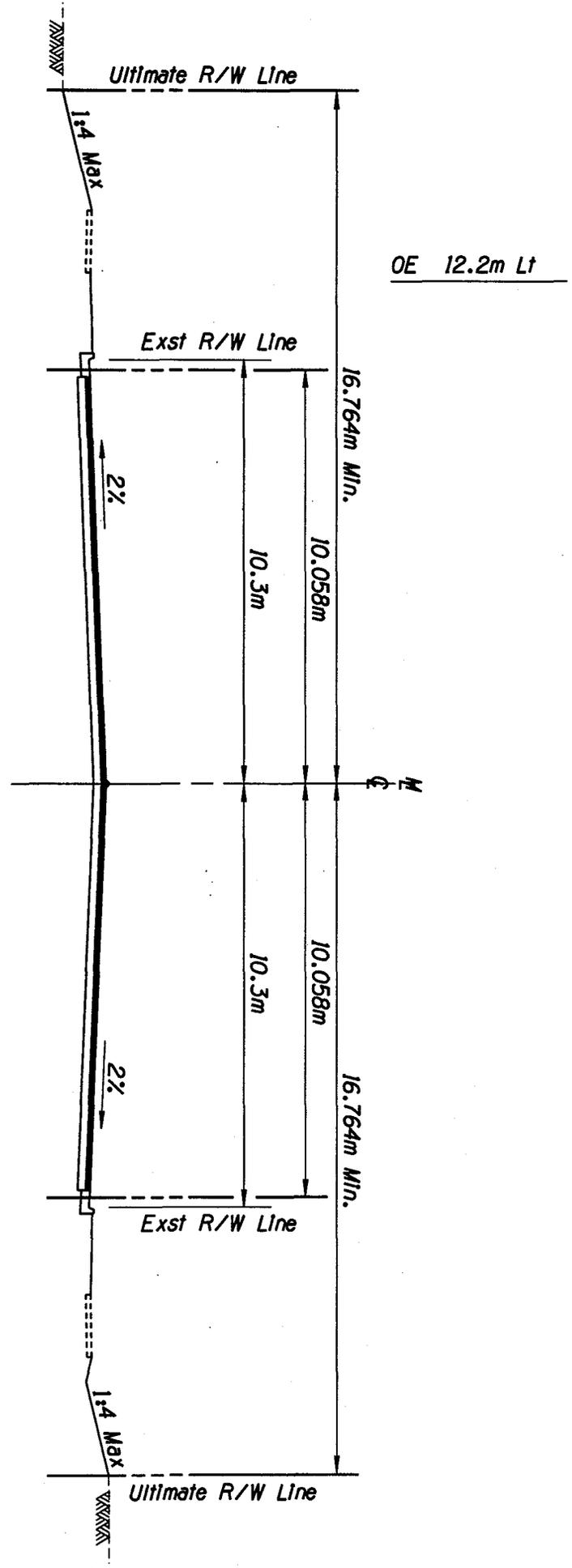


FIGURE 3.6

Northern Avenue Typical Section  
Existing Utilities  
79th Avenue to 75th Avenue

TW 15.2m Lt  
(Earthen)

UT 8.5m Lt  
2" G 7.6m Lt  
16" G 7.0m Lt

12" W 1.8m Lt

24" S 0.9m Rt

14" PS 4.3m Rt  
(Abandoned)

6" W 5.5m Rt to 6.7m Lt

UT 6.4m Rt

24" Irrlg 8.5m Rt

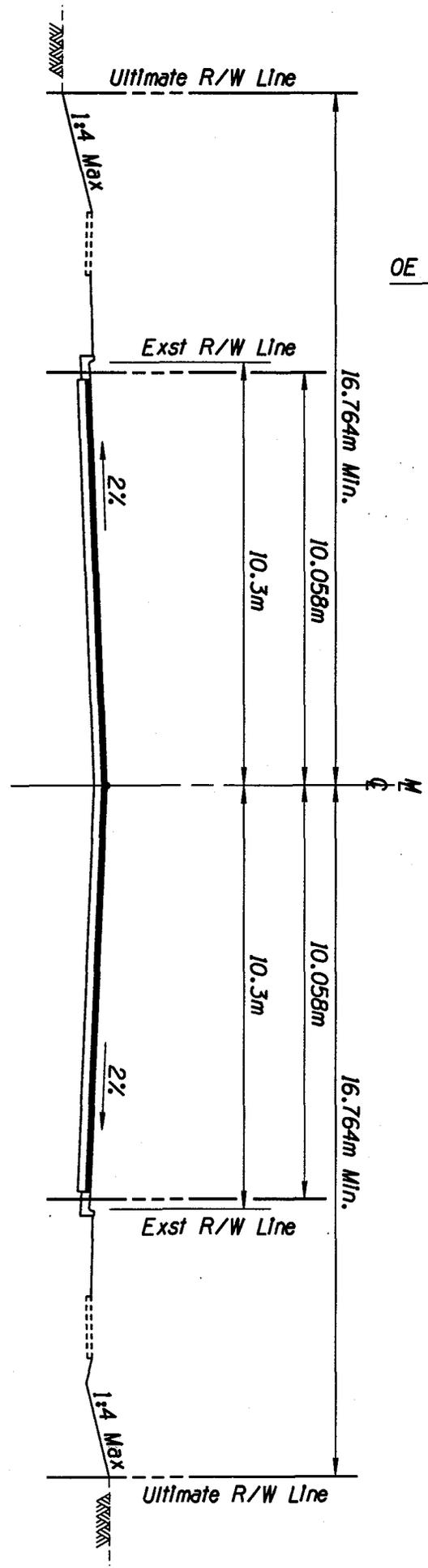


FIGURE 3.7

Northern Avenue Typical Section  
Existing Utilities  
75th Avenue to 71st Avenue

Irrig 17.8m Lt  
(Earthen)

4" G 7.3m Lt  
UT 6.4m Lt  
UT 6.1m Lt

12" W 1.2m Lt

15" S 2.7m Rt

12" G 4.6m Rt

12" G 5.5m Rt

Irrig 7.2m Rt  
(Conc Ditch)

Irrig 12.1m Rt  
(Conc Ditch)

30" Irrig 14.3m Rt  
(at 75th Ave)

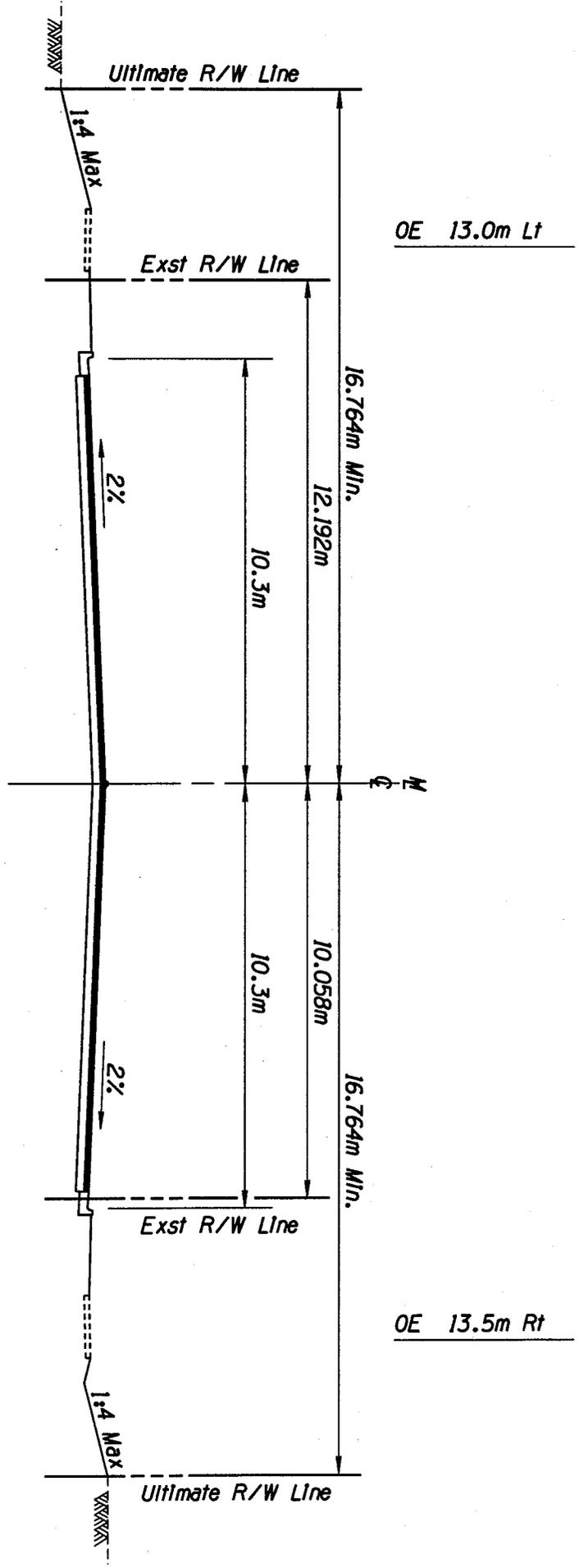


FIGURE 3.8

Northern Avenue Typical Section  
Existing Utilities  
71st Avenue to 67th Avenue

Irrlg 11.3m Lt

4° G 7.3m Lt

UT 6.4m Lt

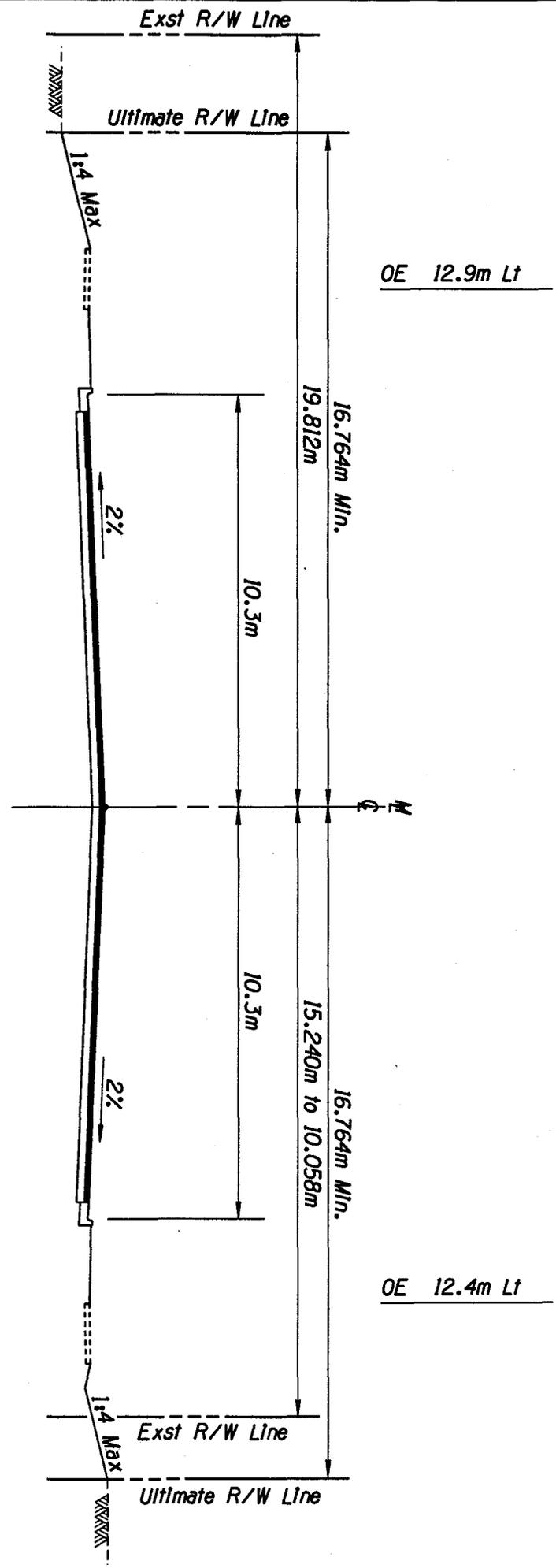
12° W 1.8m Rt

12° G 3.7m Rt

21° S 6.7m Rt

8° S 9.2m Rt

(71st Ave to 69th Ave)



**TABLE 3.2 Northern Ave. Existing Utilities**

DESCRIPTION	LOCATION	OWNERSHIP	DATE	COVER	COMMENTS
12" Waterline	68th Ave. to 75th Ave.	City of Glendale	1983	4' Min.	4' Lt. to 6' Rt.
12" Waterline	75th Ave. to 99th Ave.	City of Glendale	6/1/1996, As-Builts		From 99th to 95th 29' Rt. +/-, Next 2000' - 10' Rt. +/- then 29' Rt. to 91st Ave., Next 400' is 42.36' Rt. (As-Built) then next 2000' - 10.68' Rt., Next 500' @ 18' Rt., Then to 83rd Ave. 10' Rt., From 83rd to 75th offset 7.32' Lt. (As-Built, plan shows 6')
12" Waterline	Freeway to 91st Ave.	City of Peoria	1994 As-Builts (Kaminski-Hubbard)		38.5' to 40' Lt.
12" Waterline	91st to 89th Ave.	City of Peoria	1986 Burgess & Niple		28' Lt. (As-Built)
12" Waterline	83rd Ave. South	City of Glendale	1970	3.5' Min.	26' Rt.
8"/12" Waterline	1700' +/- West to 83rd Ave.	City of Glendale	1977 Hook-Rockwell		8.6' and 31' Lt.
6" Waterline	Freeway to 91st Ave.	City of Glendale			Offset 23' Rt.
6" Waterline	91st Ave. to 3600' East	City of Glendale	1969	3.5' Min.	Offset 31' Rt. and 44' Rt.
6" Waterline	83rd Ave. to 2625' East	City of Glendale	1972 As-Builts	3.5' Min.	Offset 16' Rt.
36" CIPP	91st Ave. to 560' West	SRP	1988		41' Rt.
36" CIPP/48" CIPP (RGRCP ?)	91st Ave.	SRP	1988		40' Lt. & 48' Lt.
36"/42" RGRCP	95th Ave. to 1450' West	SRP	1986		47' & 50' Rt.
24" RGRCP	83rd Ave.	SRP	1986		Cross culverts under north leg of 83rd Ave. and east leg of Northern Ave.
20"/21"/24" IRR	79th Ave. to 75th Ave.	SRP/ SRVWUA	1970/1986	1.5' to 2'	Offset 28' +/- Rt. with cross culverts at 79th Ave., 75th Ave. and 1340' east of 79th Ave.
30" IRR (CIPP)	75th Ave. to 600' east	SRP	1986		Offset 50' Rt.

**TABLE 3.2 Northern Ave. Existing Utilities**

DESCRIPTION	LOCATION	OWNERSHIP	DATE	COVER	COMMENTS
18"/24"/30"/54" IRR	75th Ave.	SRP	1986	Varies	Cross culverts at 75th Ave.
24" RGRCP	71st Ave.	SRP	1986	1'-2'	Cross culverts at 71th Ave.
24"/30" CIPP	1444' West to 67th Ave.	SRP	1986		Offset 37'/40' Rt.
18"/42"/54"	67th Ave.	SRVWUA	1965	Various	Cross culverts at intersection of Grand Ave. & 67th Ave.
60" CIPP	95th Ave. to 91st Ave.	Maricopa Co.	1989 Morrison- Knudsen As- Builts	3'-7'	Trunk line in Northern Ave. & intersection with 91st Ave.
Traffic Signals	75th Ave.	Maricopa Co.	Maricopa Co. Traffic Engineering	N/A	Showing signal pole locations only (no pedestrian signals).
Traffic Signals	83rd Ave.	Maricopa Co.	Maricopa Co. Traffic Engineering 1991	N/A	Showing signal and pedestrian pole locations.
Traffic Signals	91st Ave.	Maricopa Co.	Maricopa Co. Traffic Engineering 1988	N/A	Showing signal and pedestrian pole locations.
Traffic Signals	99th Ave.	Maricopa Co.	Maricopa Co. Traffic Engineering 1993	N/A	Pull Box locations only.
24" RGRCP	68th Ave.	American Builders	1979 Coe & Van Loo	2'-3'	Storm Drain replaces concrete lined ditch, 35' Rt.
GAS (ALL)	83rd Ave. to Grand Ave.	Southwest Gas	Various Dates		Various sizes and locations. Gas facilities shown west of 83 rd Ave. have been located from the City of Glendale 12" Waterline plans (75th Ave. to 83rd Ave. only).
MCI DUCT BANK	67th Ave.	MCI	1995 OSP Engineering	4'-10'	31' Lt. +/- of ATCHISON TOPEKA & SANTA FE RR
69 KV Transmission	75th Ave.	APS			Runs N-S along west side of 75th Ave. Exact location unclear from information received.
230 KV Transmission	Grand Ave.	APS			Runs N-S along west side of Grand Ave. Exact location unclear from information received.
Fiber Optic Cable	Grand Ave.	Electric Lightwave		N/A	Attached to power poles in ATS&F R/W.
Cable TV		Times Mirror Cable Television		N/A	Attached to power poles along north side of Northern Ave. between 89th Lane and 89th Ave.

Significant relocation of overhead power, telephone and cable television will be required to allow construction of the new roadway. Surface features of underground facilities such as gas, underground electric feeders and telephone, such as regulators, vents, pull boxes, terminal connectors, transformers and junction boxes will be relocated. Sewer manholes, water valve boxes, gas valve boxes and water meters will either be adjusted to grade or relocated.

Utility features which influenced the alignment alternatives included:

- Salt River Project irrigation well site on the northwest corner of 91<sup>st</sup> Avenue and Northern Avenue.
- City of Peoria drinking water well site on the northwest corner of 83<sup>rd</sup> Avenue and Northern Avenue.

**Traffic Signals** - This project will address improvements to the traffic signals at 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue. Modifications to the traffic signal features at 91<sup>st</sup> Avenue will be limited to replacement of loop detectors and installation of signal interconnect conduits and pull boxes. The traffic signals at 83<sup>rd</sup> Avenue will require complete reconstruction for the new relocated intersection including new poles, foundations, mast arms, conduits, pull boxes, signal interconnect conduits and loop detectors.

Traffic Signals at 75<sup>th</sup> Avenue will be upgraded during construction of the MCDOT 75<sup>th</sup> Avenue Project from Glendale Avenue to Olive Avenue (Project No. 68843).

Provisions for a future traffic signals will be installed at the 87<sup>th</sup> Avenue, 79<sup>th</sup> Avenue and 71<sup>st</sup> Avenue intersections. This installation is limited to signal conduits and pull boxes.

**Lighting** - Full roadway lighting is currently not included in the planned construction. Lighting installations will be limited to lighting associated with the signals at the intersections of 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue. Lighting associated with the traffic signals at 75<sup>th</sup> Avenue and Northern Avenue will be included with the MCDOT 75<sup>th</sup> Avenue project from Glendale Avenue to Olive Avenue (Project No. 68843).

**Public Transit** - The City of Peoria has requested provisions for bus-bays be included along Northern Avenue for future transit service.

### 3.2 Design Exceptions

The design of Northern Avenue will conform with published MCDOT design criteria, the MCDOT Roadway Design Manual, and the Project Scope of Services. The criteria outlined above is in compliance with the AASHTO Green Book, 1994 (metric) version, "A Policy on Geometric Design of Highways and Streets". Dimensions have been converted from English to System International (Metric) units.

Evaluation of the various alternative layouts has not identified any required Design Exceptions.

## 4.0 ALTERNATIVES DEVELOPMENT AND ANALYSIS

### 4.1 Alternatives

**Alternative 1 - Enhanced Maintenance** - This alternative is limited to maintenance of the existing roadway surface with an overlay, shoulder grading and minor drainage/safety improvements. This alternative would not improve the current level of service and would lead to deterioration of future operational characteristics along this stretch of Northern Avenue.

**Alternative 2 - Improved Section** - The Improved Section alternative involves construction of a five-lane roadway section which will provide two traffic lanes in each direction with a continuous two-way left turn lane. Construction of this roadway section will require minor adjustments to the existing roadway centerline to avoid existing major public utility improvements and existing water well sites at 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue. The majority of the proposed alignment follows the existing roadway centerline and /or section line, with slight alignment shifts in the southerly direction at 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue.

Northern Avenue will match the Loop 101 improvements at the west end of the project. At this location the alignment of Northern Avenue will follow the section line. The Northern Avenue alignment at the 91<sup>st</sup> Avenue intersection will shift southerly by 3.200 meters (10.49 feet) to avoid a Salt River Project well site. This alignment will match the existing curb returns at this intersection. East of the 91<sup>st</sup> Avenue intersection, the Northern Avenue centerline will shift back to the section line. As the alignment approaches 83<sup>rd</sup> Avenue, the roadway will be shifted southerly by 4.312 meters (14.15 feet) to avoid the City of Peoria well site at the northwest corner of that intersection. This shift in Northern Avenue, in conjunction with an easterly shift of the 83<sup>rd</sup> Avenue alignment by 6.500 meters (21.32 feet), is necessary to avoid impacting the well site. East of the 83<sup>rd</sup> Avenue intersection, the alignment will shift back to the existing section line. The Northern Avenue alignment will remain on the section line through the 75<sup>th</sup> Avenue and 71<sup>st</sup> Avenue intersections. Between 71<sup>st</sup> Avenue and 67<sup>th</sup> Avenue, the alignment will remain on the section line to allow the new roadway section match the existing curb and gutter along the north side of Northern Avenue. See Figures 4.1 through 4.8.

Provisions to maintain access to existing driveways including use of the continuous two-way left turn lane will be included in the proposed design.



**Peoria**

**Northern Avenue**

**SR101L**

City of Peoria Boundary

City of Glendale Strip Annex

Exst R/W

**Maricopa County**

**Alternative 2**

**FIGURE 4.1**  
**SHEET 1 OF 8**

Peoria



Avenue

SRP Well Site

Northern Avenue

Ultimate R/W

Exst R/W

3.200 meters

Exst R/W

Ultimate R/W

91st

Maricopa County

Alternative 2

FIGURE 4.2  
SHEET 2 OF 8

Peoria



Northern Avenue

89th Lane

89th Ave

City of Peoria Boundary

Ultimate R/W

Exst R/W

City of Glendale Strip Annex

Exst R/W

Ultimate R/W

Maricopa County

Alternative 2

FIGURE 4.3  
SHEET 3 OF 8

Peoria

Maricopa County



Avenue

6.500 meters

Peoria Well Site

Northern Avenue

Exst R/W

Ultimate R/W

City of Peoria Boundary

City of Peoria Strip Annex

City of Glendale Strip Annex

Exst R/W

Ultimate R/W

4.312 meters

83rd

City of Glendale Boundary

Glendale

Maricopa County

Alternative 2

FIGURE 4.4

SHEET 4 OF 8

Maricopa County



Northern Avenue

Ultimate R/W

Exst R/W

City of Peoria Strip Annex

City of Glendale Strip Annex

Exst R/W

Ultimate R/W

Glendale

City of Glendale Boundary

Maricopa County

Alternative 2

FIGURE 4.5  
SHEET 5 OF 8

Maricopa County



Northern Avenue

Ultimate R/W

Exst R/W

City of Peoria Strip Annex

City of Glendale Strip Annex

Exst R/W

Ultimate R/W

Avenue

CITY OF GLENDALE BOUNDARY

Peoria

CITY OF GLENDALE BOUNDARY

Glendale

75th

Maricopa County

Alternative 2

FIGURE 4.6  
SHEET 6 OF 8

Peoria



City of Peoria Boundary

City of Glendale Boundary

Glendale

Ultimate R/W

Exst R/W

Northern Avenue

City of Peoria Boundary

City of Glendale Boundary

Exst R/W

Ultimate R/W

71st Avenue

Glendale

Alternative 2

FIGURE 4.7  
SHEET 7 OF 8

Glendale



Grand Avenue

Avenue

Ultimate R/W

Northern Avenue

Exst R/W

Exst R/W

Ultimate R/W

70th Ave

67th

Glendale

Alternative 2

FIGURE 4.8  
SHEET 8 OF 8

713459/ALT2-08.DGN

**Alternative 3 - Improved Section with 83rd Avenue Adjustment** - This alternative is a combination of Alternative 2 - Improved Section, with slight modification at the 83rd Avenue intersection. The offset of Northern Avenue at the 83<sup>rd</sup> Avenue intersection is modified from 4.312 meters (14.15 feet) for Alternative 2 to 8.68 meters (28.48 feet). This additional offset of Northern Avenue will allow the slight shift at 83<sup>rd</sup> Avenue to be reduced from 6.500 meters (21.32 feet) to 2.600 meters (8.53 feet). This option will provide adequate clearance from the existing City of Peoria well site, yet minimize the impacts to existing residential properties along the east side of 83<sup>rd</sup> Avenue. See Figures 4.9 and 4.10.

Provisions to maintain access to existing driveways including use of the continuous two-way left turn lane will be included in the proposed design.

Maricopa County



Avenue

2.600 meters

Peoria Well Site

Northern Avenue

Ultimate R/W

Exst R/W

City of Peoria Strip Annex

City of Glendale Strip Annex

Exst R/W

Ultimate R/W

8.680 meters

83rd

Glendale

Maricopa County

Alternative 3

FIGURE 4.9  
SHEET 1 OF 2

7/13/99/AL T3-04.DGN

Maricopa County



Northern Avenue

City of Peoria Strip Annex

Ultimate R/W

Exst R/W

City of Glendale Strip Annex

Exst R/W

Ultimate R/W

Glendale

City of Glendale Boundary

Maricopa County

Alternative 3

FIGURE 4.10  
SHEET 2 OF 2

## 4.2 Impact of Alternatives

### a) Natural Environment-

All of the land along the project corridor has been disturbed by either agricultural or development activity. The majority of the land along the corridor is being actively farmed. There are no existing bridges, box culverts or drainage floodways within the project. No protected plants or threatened, endangered or candidate species have been determined potentially occurring in the corridor. The Arizona Game and Fish Department has indicated a special status species documented as occurring within the project area. The black-bellied whistling-duck occurs in the vicinity of the corridor. The construction of this project will not impact any sensitive species.

The three alternatives will not have significant adverse impacts on natural vegetation or wetlands, wildlife resources, surface water quality or hazardous material sites.

### b) Construction Impacts-

Construction of Alternative 2 or Alternative 3 will impact overhead electric, telephone and cable television facilities, SRP irrigation, private irrigation and surface features of other underground utilities. These alternatives have nearly identical impacts on utility features.

Construction activities must be staged to maintain one lane of traffic in each direction and access to local residences and businesses at all times. During construction some disruption in access and inconvenience will occur. Access by emergency vehicles must be maintained and delays minimized.

Decreased air quality may occur during construction, due to traffic delays, construction dust and exhaust emissions from construction equipment. Increased noise levels may also result from operation of construction equipment and construction activities.

A Section 402 National Pollutant Discharge Elimination System (NPDES) permit will be required. This effort will include preparation of a Storm Water Pollution Prevention Plan (SWPPP), Notice of Intent (NOI) and Notice of Termination (NOT). These items will be addressed in the Construction Special Provisions and Plan Documents.

c) Socioeconomic Impacts-

Street improvements on Northern Avenue are not expected to cause significant adverse impacts to existing social or economic conditions. Acceleration of land use changes and development may result from the improved street.

Table 4.1 depicts the impacts of Alternatives 1 through 3 on existing property owners. The table indicates the number of parcels affected, right-of-way area required, the area of agricultural land required, and numbers of residential and business relocations.

TABLE 4.1 - RIGHT-OF-WAY REQUIREMENTS			
	ALTERNATIVES		
	1	2	3
Parcels Affected	0	113	107
Right-of-Way Required (Hectares)	0	5.45	4.97
Agricultural Land Required (Hectares)	0	2.53	2.23
Residential Relocations	0	0	0
Business Relocations	0	0	0

Table 4.2 provides a cost comparison of the three alternatives. Detailed estimates are included in Section 6, Table 6.1 and Table 6.2.

**TABLE 4.2 - ALTERNATIVES COST COMPARISON**  
**NORTHERN AVENUE (LOOP 101 TO 67TH AVENUE)**  
**WORK ORDER NO. 68915**

Project Activity Description	Factors	Enhanced Maintenance of Existing Alignment (Alt. 1)	Improved Section (Alt. 2)	Improved Section with 83 <sup>rd</sup> Ave. Adjustment (Alt. 3)
<b>Construction Costs</b>				
MCDOT	N/A	\$0	\$3,941,310	\$3,930,440
MCFCD	N/A	\$0	\$423,500	\$423,500
City of Glendale	N/A	\$0	\$430,000	\$430,000
City of Peoria	N/A	\$0	\$790,900	\$790,900
<b>DCR, Right-of-Way &amp; Roadway Design</b>				
MCDOT	N/A	\$0	\$454,450	\$454,450
City of Glendale	N/A	\$0	\$81,050	\$81,050
City of Peoria	N/A	\$0	\$71,000	\$71,000
<b>Construction Management</b>				
MCDOT	15%	\$0	\$591,400	\$589,400
MCFCD	15%	\$0	\$63,500	\$63,500
City of Glendale	15%	\$0	\$64,500	\$64,500
City of Peoria	15%	\$0	\$118,600	\$118,600
<b>Right-of-Way Acquisition</b>				
MCDOT	N/A	\$0	\$539,000	\$491,000
City of Glendale	N/A	\$0	\$0	\$0
<b>Utility Relocation</b>				
MCDOT	N/A	\$0	\$382,000	\$382,000
City of Glendale	N/A	\$0	\$0	\$0
<b>Salt River Valley Water Users Association</b>				
MCDOT ( Design)	14%	\$0	\$118,000	\$118,000
MCDOT ( Construction)	N/A	\$0	\$774,000	\$774,000
MCDOT ( Construction Management)	15%	\$0	\$116,550	\$116,550
City of Glendale ( Design)	10%	\$0	\$25,000	\$25,000
City of Glendale ( Construction)	N/A	\$0	\$250,000	\$250,000
City of Glendale ( Construction Management)	15%	\$0	\$37,450	\$37,450
<b>Administration</b>				
MCDOT	10%	\$0	\$559,000	\$557,000
<b>TOTAL PROJECT COST</b>				
MCDOT Total Cost		\$0	\$9,831,210	\$9,768,340
MCFCD Total Cost		\$0	\$7,475,710	\$7,412,840
MCFCD Total Cost		\$0	\$487,000	\$487,000
City of Glendale Total Cost		\$0	\$888,000	\$888,000
City of Peoria Total Cost		\$0	\$980,500	\$980,500

### 4.3 Evaluation of Alternatives

Table 4.3 presents a quantitative summary and comparison in matrix form of the impacts of the various evaluation criteria. The three alternatives are compared for each evaluation criteria on a quantitative basis where possible. The remaining evaluation criteria are evaluated subjectively and are assigned a positive, negative, more negative, or neutral designation. These designations are keyed as follows:

Positive ---- P

Negative ---- N

More Negative ---- MN

Neutral ---- --

This evaluation matrix also includes public responses from input obtained from participants in the Public Meeting for the Northern Avenue Project. Additional information and comments on the Public responses can be found in Appendix C.



## 5.0 SELECTION OF PREFERRED ALTERNATIVE

Alternative 2 has been selected because it meets the goals of improving safety and level of service of the existing roadway. Additional factors in selection of alternative 2 as the preferred alternative include:

- Alternative 2 requires a lesser shift of the Northern Avenue roadway at 83<sup>rd</sup> Avenue thereby providing less disruption of the traffic on Northern Avenue. This alternative also closely balances the shifts required on both Northern Avenue and 83<sup>rd</sup> Avenue.
- Alternative 2 more evenly distributes the right-of-way impacts on the parcels at the 83<sup>rd</sup> Avenue intersection.
- This alternative will provide an adequate facility to meet the needs of the transportation system in the area for the design year with the least impact possible on the existing property owners and utilities.

The "Enhanced Maintenance" alternative (Alternative 1) was not selected because it fails to address the goals of improving the safety and level of service of the facility. It also has a detrimental impact on important factors such as air quality which will worsen with increased traffic congestion.

None of the identified alternatives will have significant adverse impacts on hazardous material sites, cultural resources or the natural environment. Alternative 2 and Alternative 3 will have equal impacts on noise and air quality.

MCDOT is currently performing archaeological surveys for the alignment of the preferred alternative. The final alignment will be subject to the results of archaeology surveys, SHPO requirements, and results of any required archaeological data recovery.

## 6.0 CONCEPT DESIGN

### 6.1 Roadway Design

The three alternatives for Northern Avenue are described in Section 4.0 of this report. Based upon the factors evaluated the preferred alternative is Alternative number 2. Plan sheets for the selected alternative are included in APPENDIX E.

During the design process, final alignment adjustments may occur based on measured data to accommodate specific considerations and provide improved roadway characteristics. The intent will be to lessen the impacts on adjacent properties by reducing shifts in the alignment using minimum possible values.

Consideration of a northerly shift of Northern Avenue centerline at the future 77<sup>th</sup> Avenue alignment has been requested by the affected property owner. The impacts and limitations of this proposed shift will be reviewed during the project design phase.

The profile design will match closely with the grade of existing Northern Avenue and generally falls from east to west at about 0.0027m/m.

Horizontal and vertical alignments will be in conformance with the design criteria summarized in Table 3.1. The Northern Avenue roadway typical section is shown on Figure 3.1. The pavement structural section shown in Figure 3.1 is used for budgeting purposes only. The actual pavement section used will be determined by soil testing at the time of design.

All horizontal alignment shifts will be accomplished using a 70:1 rate to maintain deflections less than the one degree maximum.

The lead agency for this project is MCDOT with participation of the FCDMC, City of Glendale and the City of Peoria. MCDOT has entered into IGA's with the aforementioned agencies to incorporate additional elements of work and areas into the project limits.

Traffic volumes for the design year 2020 were provided by MCDOT. Supplemental data was acquired by performing intersection traffic counts for each intersection. Analysis of the intersections at 91<sup>st</sup> Avenue, 83<sup>rd</sup> Avenue, and 71<sup>st</sup> Avenue have been performed to determine operational characteristics and level of service. This analysis with the provided traffic projections determined

that the basic laneage with single left turn lanes will provide acceptable level of service at these three intersections. Right turn volumes at each intersection were not sufficient to warrant inclusion of auxiliary right turn lanes.

## **6.2 Drainage Design**

In accordance with the Consultant Services Contract, Maricopa County design criteria and various verbal and written directives from MCDOT, the following summarizes the major applicable drainage design criteria and considerations for this project:

1. Plans, drainage report and calculations shall be in metric format;
2. Design of roadway catch basins, laterals, and flow spread shall be based on a 10-year storm using only the road right-of-way as contributing area;
3. One dry 3.6m lane in each direction shall be provided based on the above design storm;
4. The design of storm drain trunkline shall be based on the 2-year, 6-hour discharges from the Wood/Patel HEC-1 model;
5. The roadway shall be designed so that drainage follows historical paths and does not create offsite flooding or adverse ponding within the right-of-way;
6. The 100-year runoff shall be contained below finished floors of adjacent buildings;
7. The maximum flow velocity in the roadway section shall not exceed 3m/s and the maximum discharge shall not exceed  $2.8\text{m}^3/\text{s}$  based on a 100-year storm;
8. Runoff crossing dip sections or topping the roadway at any location shall be no deeper than 152mm at the roadway crown for a 100-year storm;
9. Hydrology for the roadway drainage design will be based on the Rational method as presented in the MCFCD Drainage Design Manual, Volume 1, Hydrology.

At this point in time, it is not anticipated that any parallel roadside ditches, open channels, culverts or retention will be necessary as part of the roadway drainage design and that design criteria normally associated with these features will not be applicable.

City of Phoenix Standard Detail Type "M" catch basins will be used to intercept roadway drainage where required to meet flow spread criteria and satisfy other design considerations. This catch basin has a curb opening with a maintenance basin of 0.91m in length and optional one or two wing basins with lengths of 0.91m, 1.83m, 3.05m and 5.18m each. There is no surface inlet grate associated with this basin. All catch basins will be sized and spaced to intercept flows to meet dry lane criteria.

There are a number of residential structures located along both sides of Northern Avenue within the project limits. Some of these structures have floor elevations that may be at or below the existing Northern Avenue roadway profile. Particular care must be exercised in designing the new roadway profile with regard to drainage where these structures exist.

### **6.3 Earthwork**

Preliminary review of the existing profile and site conditions indicate that major changes in the existing profile are not required. It is expected that subgrade preparation will generate sufficient volume to complete any minimal profile adjustments and shoulder grading.

### **6.4 Utilities**

New utility features will be constructed with the Northern Avenue project for the City of Peoria. These utilities include:

- Extension of a sixteen (16) inch class 150 DIP water line from 87<sup>th</sup> Avenue to 71<sup>st</sup> Avenue, including eight (8) inch class 150 DIP stub-outs at 1/4 mile intervals from 91<sup>st</sup> Avenue to 71<sup>st</sup> Avenue. Stub outs shall be installed only on the north side to the new right-of-way limits.
- Installation of eight (8) inch VCP sanitary sewer stub-outs from existing manholes unless otherwise requested, at 1/4 mile intervals from 91<sup>st</sup> Avenue to 75<sup>th</sup> Avenue. Stub outs shall be installed only on the north side to the new right-of-way limits.

Salt River Project has indicated they will tile their facilities along Northern Avenue with this project. The anticipated location for their new facilities will be under the future sidewalk location. Salt River Project will provide new junction and turnout structures with their improvements. New connections and replacement of private irrigation facilities will be required in conjunction with the Salt River Project relocations and right-of-way acquisitions.

Salt River Project power and US West have not indicated any utility upgrades or new facilities planned in this corridor.

### **6.5 Constructibility**

The Northern Avenue corridor is occupied by numerous utilities. Coordination of the required relocations of these utilities will be extremely important. Many of the utilities have specific constraints associated with their utilities. Some of these constraints are as follows:

- The electric utilities require that relocation of their facilities take place during the off-peak season between October 15 and April 15.
- The Agua Fria Generating Station requires uninterrupted water and natural gas supplies during the peak generating season.
- Salt River Project irrigation and private irrigation relocations require coordination with agricultural interests.

The Northern Avenue Project will be constructed in a single phase. Road closures and or separate detour roadways are not anticipated. Temporary pavement widening will be required to maintain traffic on paved surfaces during construction. Traffic control during construction will comply with MCDOT permit provisions and conform to the requirements outlined in the Manual of Uniform Traffic Control Devices (MUTCD). Two way traffic and access to local residences and businesses will be maintained at all times.

### **6.6 Construction Cost Estimate**

The probable construction cost has been estimated and included in Table 6.1. Costs are based upon data contained in 1996 bid tabulations and 1996 ADOT Cost Data.

### **6.7 Schedule**

The Northern Avenue Project is included in the current MCDOT Capital Improvements Program and is programmed to be constructed in Fiscal Year 1999. The significant milestones in the schedule are as follows:

Begin Detailed Design	September 1997
Begin Right-of-way Acquisition	February 1998
Begin Utility Relocations	March 1999
Bid Opening	June 1999
Begin Construction	August 1999
Construction Completion	November 2000

### **6.8 Political Feasibility**

This project has the support of the City of Glendale and the City of Peoria. Public support from residents in the area is mixed with the majority favoring the MCDOT plans to improve Northern Avenue.

### **6.9 Economic Feasibility**

MCDOT has allocated funds for the Northern Avenue Project in the current Capital Improvement Program.

**TABLE 6.1 - PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST FOR ALTERNATIVE 2**

Description	Quantity	Unit	Unit Price	Amount
Private Earthen Tailwater Ditch	1,240	Meter	\$3.28	\$4,070
Private Earthen Supply Ditch	650	Meter	\$6.56	\$4,260
Subgrade Preparation	116,721	M <sup>2</sup>	\$2.39	\$278,960
Aggregate Base Course (250mm)	65,439	M Ton	\$9.00	\$588,950
Asphalt Concrete Pavement (100mm)	27,110	M Ton	\$25.08	\$679,920
Concrete Curb and Gutter, MSD 220, Type A	10,499	Meter	\$17.22	\$180,790
Concrete Sidewalk MSD 230	624	M <sup>2</sup>	\$16.15	\$10,080
Concrete Driveways, MSD 250	5,233	M <sup>2</sup>	\$32.29	\$168,970
Bus Bay	2	Each	\$5,000.00	\$10,000
Adjust Manhole Frame & Cover, MSD 422	50	Each	\$375.00	\$18,750
Adjust Water Valve Box & Cover MSD 391, Type A	74	Each	\$200.00	\$14,800
Adjust Survey Marker Box & Cover MSD 391, Type A	7	Each	\$200.00	\$1,400
Removal of Concrete Lined Ditch (1.5m to 2.4m wide)	2,657	Meter	\$29.53	\$78,460
Traffic Signals (Arterial to Arterial), (4 Leg Intersection)	1	Each	\$81,000.00	\$81,000
1.8m x 18m Quadropole Loop	18	Each	\$800.00	\$14,400
1.8m x 1.8m Loop Detector	20	Each	\$400.00	\$8,000
Conduit Interconnect	4,023	Meter	\$13.12	\$52,800
Conduit & Junction Boxes (3 locations)	1	Lump Sum	\$6,300.00	\$6,300
Signing, Striping, and Pavement Markings	1	Lump Sum	\$50,000.00	\$50,000
Catch Basin Type M	53	Each	\$1,500.00	\$79,500
Manhole MSD 520 & 522	20	Each	\$1,800.00	\$36,000
Manhole MSD 521 & 522	15	Each	\$2,100.00	\$31,500
Single Cell 2400mm x 900mm RCBC	6	Meter	\$1,640.41	\$9,840
Private Concrete Lined Supply Ditch	927	Meter	\$49.21	\$45,620
Restoration of Property Owner Improvements (Walls, Fencing)	1	Lump Sum	\$100,000.00	\$100,000
460mm RGRCP, Class IV	500	Meter	\$141.08	\$70,540
610mm RGRCP, Class IV	125	Meter	\$164.04	\$20,510
690mm RGRCP, Class IV	880	Meter	\$180.45	\$158,800
760mm RGRCP, Class IV	800	Meter	\$196.85	\$157,480
1520mm RGRCP, Class IV	780	Meter	\$442.91	\$345,470
1830mm RGRCP, Class IV	1,240	Meter	\$754.59	\$935,690
400mm DIP Waterline	2,277	Meter	\$136.67	\$311,250
200mm VCP Sewerline	91	Meter	\$153.11	\$14,000
Extend Water Service & Reinstall Meter/Box	30	Each	\$500.00	\$15,000
Extend Fire Hydrant Line & Reinstall Fire Hydrant	17	Each	\$800.00	\$13,600
<b>SUBTOTAL</b>				<b>\$4,596,710</b>
Mobilization (2.5%)	1	Lump Sum	\$115,000.00	\$115,000
Traffic Control (4%)	1	Lump Sum	\$184,000.00	\$184,000
Contingencies (15%)				\$690,000
<b>TOTAL OF PROBABLE CONSTRUCTION COSTS</b>				<b>\$5,585,710</b>
Right-of-Way Acquisition				\$539,000
SRVWUA (Irrigation Construction)				\$1,024,000
SRVWUA (Irrigation Design) (14%)				\$143,000
SRVWUA (Irrigation Construction Management) (15%)				\$154,000
Overhead Electric Construction				\$382,000
DCR, Right-of-Way & Roadway Design				\$606,500
Administration (10%)				\$559,000
Construction Management (15%)				\$838,000
<b>TOTAL OF PROBABLE PROJECT COSTS</b>				<b>\$9,831,210</b>

**TABLE 6.2 - PRELIMINARY ESTIMATE OF PROBABLE CONSTRUCTION COST FOR ALTERNATIVE 3**

Description	Quantity	Unit	Unit Price	Amount
Private Earthen Tailwater Ditch	1,240	Meter	\$3.28	\$4,070
Private Earthen Supply Ditch	650	Meter	\$6.56	\$4,260
Subgrade Preparation	116,050	M <sup>2</sup>	\$2.39	\$277,360
Aggregate Base Course (250mm)	65,063	M Ton	\$9.00	\$585,570
Asphalt Concrete Pavement (100mm)	26,955	M Ton	\$25.08	\$676,030
Concrete Curb and Gutter, MSD 220, Type A	10,499	Meter	\$17.22	\$180,790
Concrete Sidewalk MSD 230	624	M <sup>2</sup>	\$16.15	\$10,080
Concrete Driveways, MSD 250	5,233	M <sup>2</sup>	\$32.29	\$168,970
Bus Bay	2	Each	\$5,000.00	\$10,000
Adjust Manhole Frame & Cover, MSD 422	50	Each	\$375.00	\$18,750
Adjust Water Valve Box & Cover MSD 391, Type A	74	Each	\$200.00	\$14,800
Adjust Survey Marker Box & Cover MSD 391, Type A	7	Each	\$200.00	\$1,400
Removal of Concrete Lined Ditch (1.5m to 2.4m wide)	2,657	Meter	\$29.53	\$78,460
Traffic Signals (Arterial to Arterial), (4 Leg Intersection)	1	Each	\$81,000.00	\$81,000
1.8m x 18m Quadropole Loop	18	Each	\$800.00	\$14,400
1.8m x 1.8m Loop Detector	20	Each	\$400.00	\$8,000
Conduit Interconnect	4,023	Meter	\$13.12	\$52,800
Conduit & Junction Boxes (3 locations)	1	Lump Sum	\$6,300.00	\$6,300
Signing, Striping, and Pavement Markings	1	Lump Sum	\$50,000.00	\$50,000
Catch Basin Type M	53	Each	\$1,500.00	\$79,500
Manhole MSD 520 & 522	20	Each	\$1,800.00	\$36,000
Manhole MSD 521 & 522	15	Each	\$2,100.00	\$31,500
Single Cell 2400mm x 900mm RCBC	6	Meter	\$1,640.41	\$9,840
Private Concrete Lined Supply Ditch	927	Meter	\$49.21	\$45,620
Restoration of Property Owner Improvements (Walls, Fencing)	1	Lump Sum	\$100,000.00	\$100,000
460mm RGRCP, Class IV	500	Meter	\$141.08	\$70,540
610mm RGRCP, Class IV	125	Meter	\$164.04	\$20,510
690mm RGRCP, Class IV	880	Meter	\$180.45	\$158,800
760mm RGRCP, Class IV	800	Meter	\$196.85	\$157,480
1520mm RGRCP, Class IV	780	Meter	\$442.91	\$345,470
1830mm RGRCP, Class IV	1,240	Meter	\$754.59	\$935,690
400mm DIP Waterline	2,277	Meter	\$136.67	\$311,250
200mm VCP Sewerline	91	Meter	\$153.11	\$14,000
Extend Water Service & Reinstall Meter/Box	30	Each	\$500.00	\$15,000
Extend Fire Hydrant Line & Reinstall Fire Hydrant	17	Each	\$800.00	\$13,600
<b>SUBTOTAL</b>				<b>\$4,587,840</b>
Mobilization (2.5%)	1	Lump Sum	\$115,000.00	\$115,000
Traffic Control (4%)	1	Lump Sum	\$184,000.00	\$184,000
Contingencies (15%)				\$688,000
<b>TOTAL OF PROBABLE CONSTRUCTION COSTS</b>				<b>\$5,574,840</b>
Right-of-Way Acquisition				\$491,000
SRVWUA (Irrigation Construction)				\$1,024,000
SRVWUA (Irrigation Design) (14%)				\$143,000
SRVWUA (Irrigation Construction Management) (15%)				\$154,000
Overhead Electric Construction				\$382,000
DCR, Right-of-Way & Roadway Design				\$606,500
Administration (10%)				\$557,000
Construction Management (15%)				\$836,000
<b>TOTAL OF PROBABLE PROJECT COSTS</b>				<b>\$9,768,340</b>

## 7.0 PUBLIC PARTICIPATION

The Public Involvement effort involved notification of concerned agencies, local officials, public interest organizations and utility companies at the beginning of the Design Concept Report Phase. These contacts were made by letter advising of the project and requesting information and comments or concerns regarding the proposed project. Copies of the mailing list, letters, and responses have been included in Appendix C.

A public meeting was held on June 19, 1997 at the Cotton Boll Elementary School on 8549 West Butler Drive between 6:00 p.m. and 8:00 p.m. The alternatives were presented at this meeting and the public was invited to provide comments and input. Notices of this meeting were mailed to those on the agency and contact lists and to all property owners along the project. Notices were also published in the Glendale Star on June 12, 1997 and Peoria Times on June 13, 1997. Copies of the meeting notice and mailing lists are included in Appendix C.

A sign-in sheet, informational handout, comment sheet and meeting survey were prepared and distributed at the meeting. Written comments and completed surveys were collected at the meeting or accepted via U.S. Mail for two weeks following the meeting date. The meeting sign-in sheet, meeting surveys and any written comments have been consolidated into a Meeting Summary Report. A copy of this report is included in Appendix C.

APPENDIX A

**TRAFFIC MEMORANDUM**

**NORTHERN AVENUE**

**LOOP 101 TO 71ST AVENUE**

**TRAFFIC MEMORANDUM**

**MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION**

**Work Order No. 68915  
Contract No. CY 1996-58**

**April 23, 1997**



**STANLEY CONSULTANTS**

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## 1.0 INTRODUCTION

### 1.1 Introduction and Purpose:

The Maricopa County Department of Transportation has programmed the construction of Northern Avenue, between the Aqua Fria Freeway (SR101L) and 71st Avenue, for bid advertisement in Fiscal Year 2000. The project is partially located within the jurisdictions of Maricopa County, the City of Glendale and the City of Peoria.

MCDOT will widen Northern Avenue from the existing two-lane rural roadway to the Standard MCDOT Urban Minor Arterial Roadway Section, including vertical curb and gutter along both sides of the roadway. This typical roadway section consists of two lanes of traffic in each direction of travel, separated by a continuous left-turn lane.

Intersection crossroads at 71st Avenue, 83rd Avenue and 91st Avenue will be designed in accordance with the MCDOT Urban Minor Arterial Roadway Section unless superseded by an alternative local jurisdiction standard typical roadway section as required by the City of Glendale or the City of Peoria.

The intersection crossroad at 75th Avenue is currently under design by MCDOT. The implemented Northern Avenue typical roadway section will match this project. The 75th Avenue intersection approaches are designed with two thru-lanes in each direction of travel, with a single left-turn lane. Right-turn lanes are not included within this design.

### 1.2 Project Location:

The Northern Avenue project is located in Maricopa County, Arizona, adjacent to Sections 33, 34, 35 and 36 of Township 3 North, Range 1 East of the Gila and Salt River Base & Meridian. A vicinity map is illustrated in Figure 1. A project location map is presented in Figure 2.

### 1.3 Study Purpose:

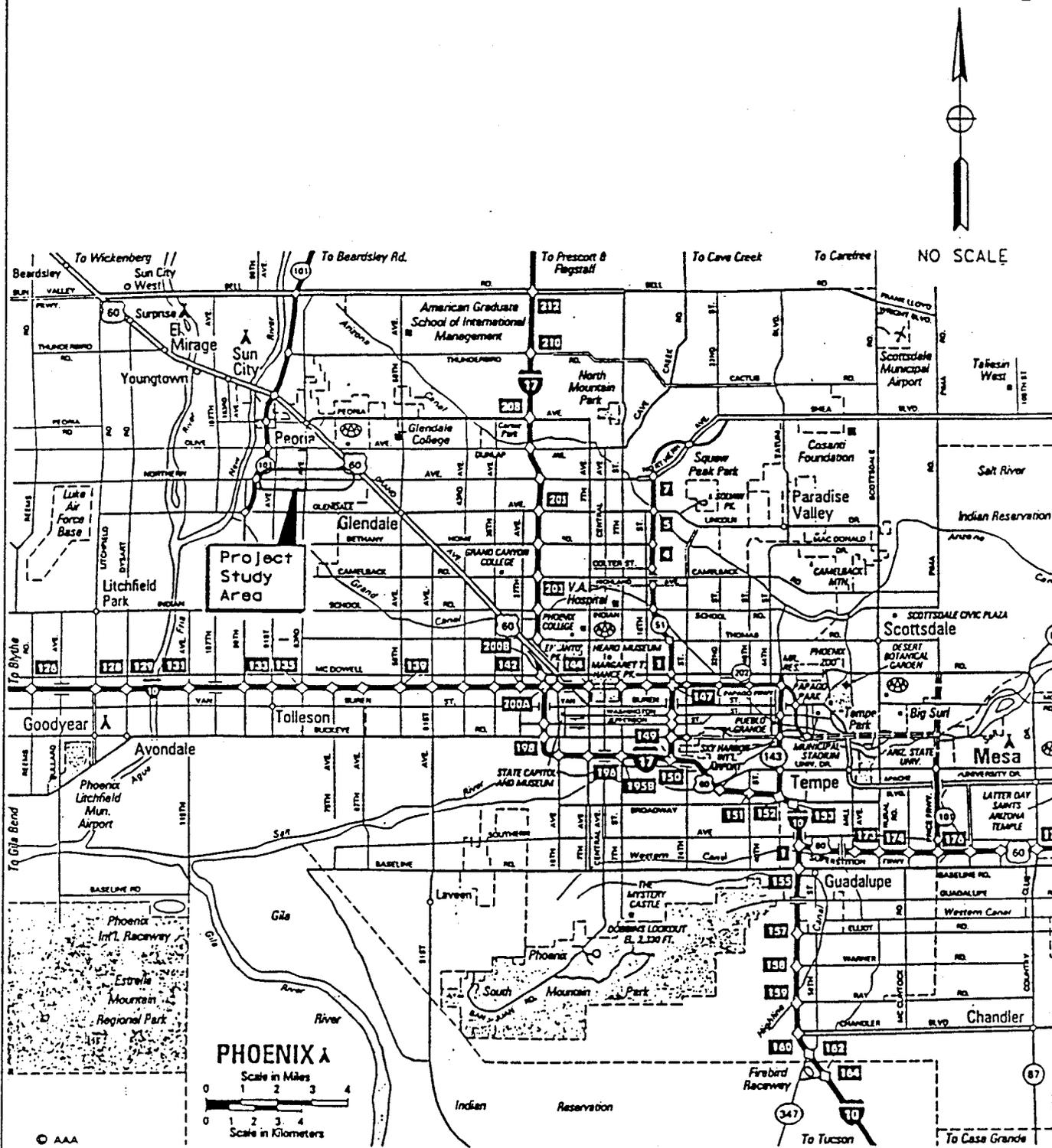
The purpose of this traffic study is to determine the basic intersection configuration required at each major crossroad intersection. The results of this traffic study will allow MCDOT to determine the number and types of auxiliary lanes necessary at each intersection approach roadway to allow the intersection to operate at an acceptable Level-of-Service in Design Year 2020.

The intersections which were addressed within this study include the following:

- Northern Avenue/71st Avenue Intersection.
- Northern Avenue/83rd Avenue Intersection.
- Northern Avenue/91st Avenue Intersection.

Based upon the requirements of the MCDOT Roadway Design Manual, Section 2.3, each intersection should meet the following Level-of-Service criteria for each type of traffic movement:

- Intersection Through Movement: LOS D.
- Intersection Turning Movement: LOS E.
- Overall Intersection: LOS C.

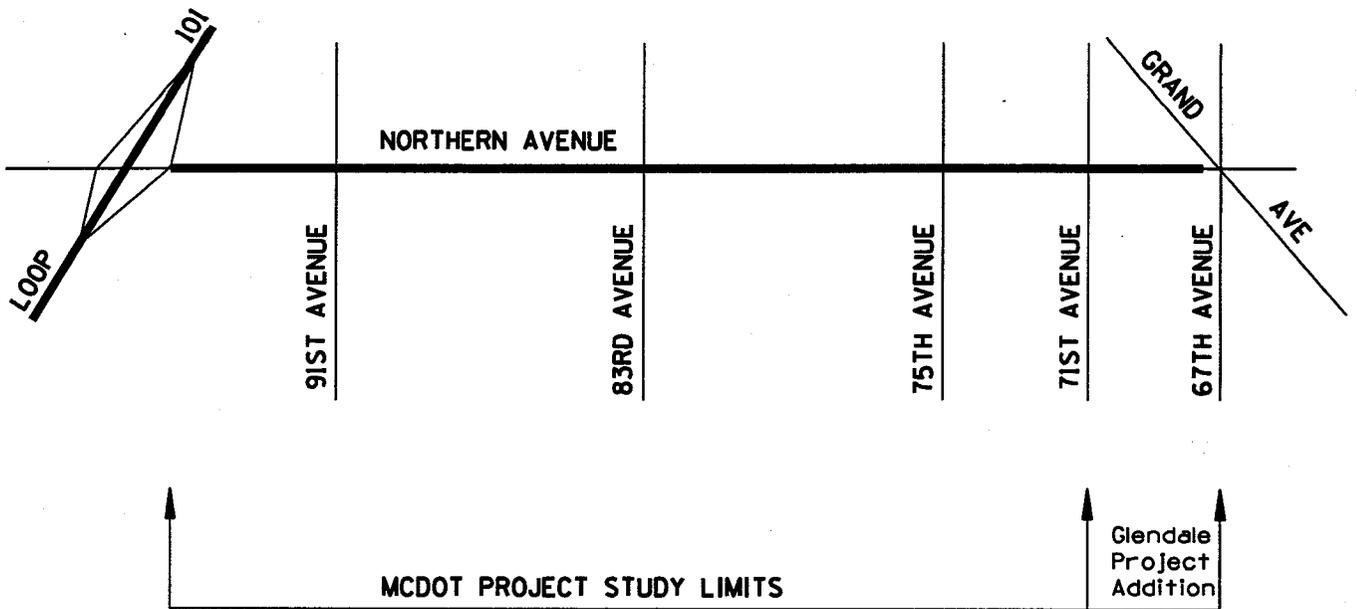


SOURCE: AUTOMOBILE CLUB OF SOUTHERN CALIFORNIA

FIGURE 1

REGIONAL VICINITY

# PROJECT LOCATION MAP



	NAME	DATE
DESIGN	SDW	4/97
DRAWN	REB	4/97
CHECKED	SDW	4/97
<b>STANLEY CONSULTANTS, INC.</b> <small>2701 EAST CAMELBACK ROAD, SUITE 120                      PHOENIX, ARIZONA 85016 • 602 955-6500</small>		

PROJECT LOCATION MAP  
FIGURE 2

## 2.0 ALTERNATIVES ANALYSIS

### 2.1 Traffic Projections:

Existing (1996) and Design Year 2020 Average Daily Traffic (ADT) volumes were provided by MCDOT within the project Scope of Work, as follows:

- **Locp 101 to 91st Avenue**  
MAG 1995 ADT = 6,000 vpd  
MAG 2020 ADT = 17,000 vpd
  
- **91st Avenue to 83rd Avenue**  
MAG 1995 ADT = 5,000 vpd  
MAG 2020 ADT = 22,000 vpd
  
- **83rd Avenue to 75th Avenue**  
MAG 1995 ADT = 8,000 vpd  
MAG 2020 ADT = 23,000 vpd
  
- **75th Avenue to Grande Avenue**  
MAG 1995 ADT = 13,000 vpd  
MAG 2020 ADT = 24,000 vpd

Based upon the MCDOT Roadway Design Manual, Table 2.1, the following ADT traffic adjustment factors were used to derive the AM and PM peak hour volumes:

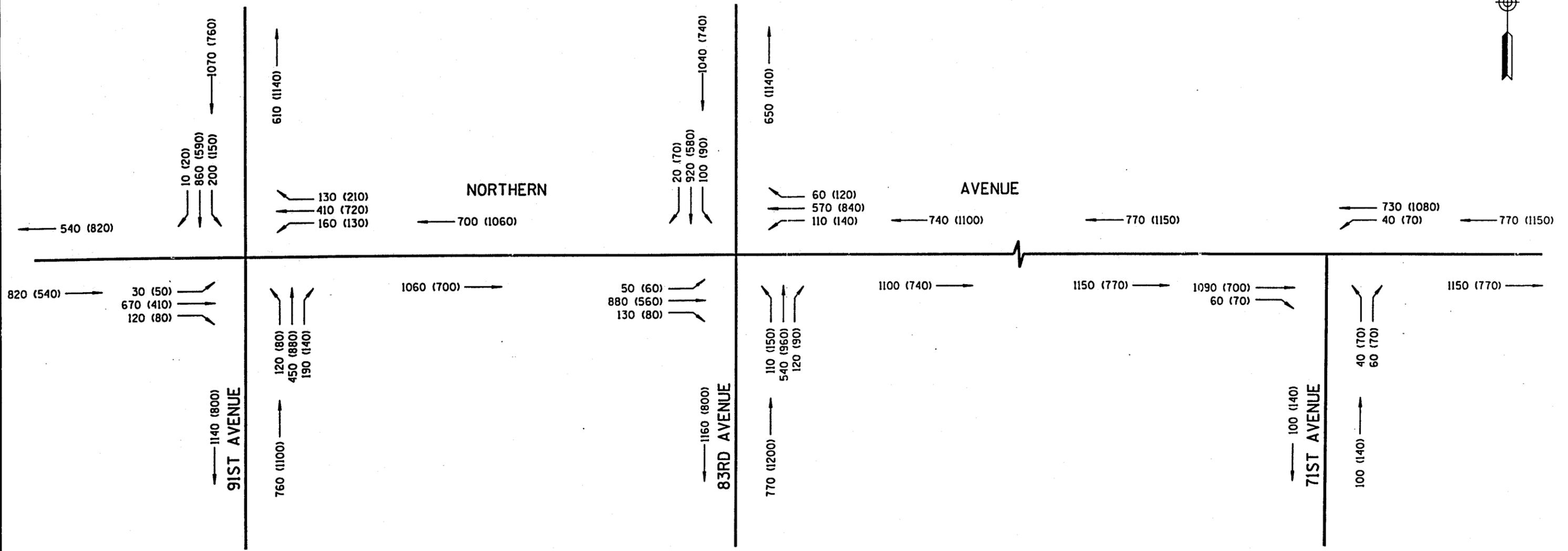
- $K = 0.08.$
- $D = 60/40.$
- $PHF = 0.95$

Turning movement counts were conducted at each intersection on February 25, 1997 between the hours of 6:00 am and 6:00 pm. This information was used to project the initial percentage of traffic which may complete turning or through movements at each intersection approach in Design Year 2020. Intersection approach and turning movement design-hourly (2020) volumes were subsequently determined for the AM and PM peak hours for each at-grade intersection. The AM and PM peak hour turning movement volumes are shown in Figure 3.

### 2.2 Capacity and Level-of-Service Analysis:

A capacity and level-of-service analysis was completed to provide a direct comparison between intersection approach volumes and level-of-service for each intersection alternative. Intersection level-of-service analysis was completed utilizing the current methodology contained within Chapter 9 of the Highway Capacity Manual, published by the Transportation Research Board. The Highway Capacity Software for signalized intersections was used to perform the calculations necessary to determine individual traffic movement, approach, and total intersection level-of-service for each intersection.

Signal cycle length, phase sequence, and phase length for the affected intersections were assumed to be based upon a 94 second cycle length. The results of the level-of-service analysis, with required lane configuration, for each intersection is shown in Figure 4, Figure 5, Figure 6 and Figure 7.



**LEGEND**  
 VOLUME → AM (PM)

	NAME	DATE
DESIGN	SDW	4/97
DRAWN	REB	4/97
CHECKED	SDW	4/97

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 PHOENIX, ARIZONA 85016 • 602 962-5400

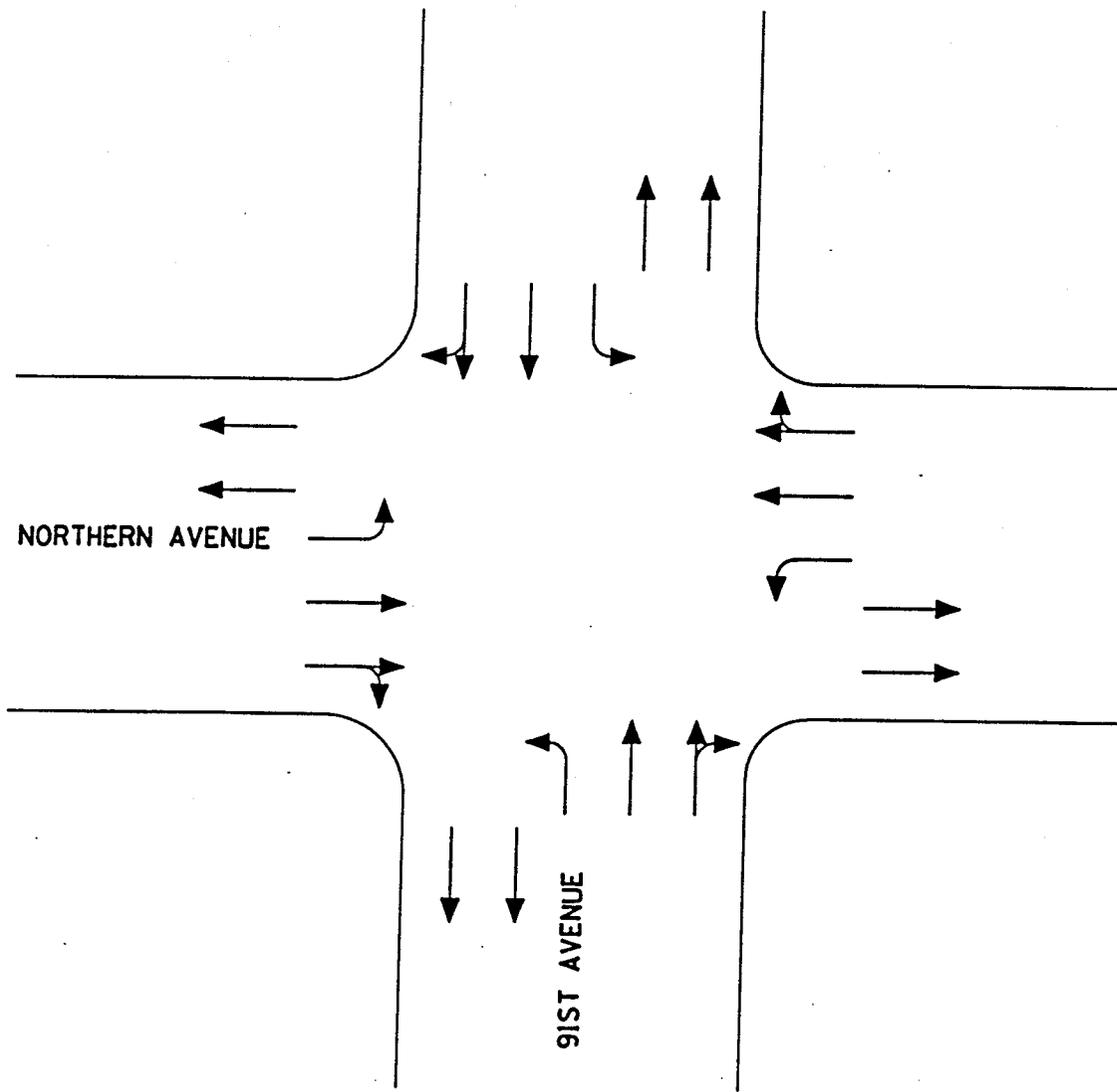
DESIGN YEAR 2020  
 A.M. AND P.M. PEAK HOUR  
 TRAFFIC VOLUMNS  
 FIGURE 3

**NORTHERN AVENUE  
INTERSECTION LEVEL-OF-SERVICE SUMMARY  
94 SECOND CYCLE LENGTH**

		91st Avenue		83rd Avenue		71st Avenue	
Approach Direction	Traffic Movement	A.M. Peak Hr. LOS	P.M. Peak Hr. LOS	A.M. Peak Hr. LOS	P.M. Peak Hr. LOS	A.M. Peak Hr. LOS	P.M. Peak Hr. LOS
NB	Left	B	B	B	B	C	C
	Thru	C	D	C	D		
	Right Approach	"	"	"	"	C	C
SB	Left	C	B	B	B		
	Thru	C	C	C	C		
	Right Approach	"	"	"	"		
EB	Left	B	B	B	B		
	Thru	C	C	D	C	B	B
	Right Approach	"	"	"	"	"	"
WB	Left	B	B	B	B	A	A
	Thru	C	D	C	D	A	A
	Right Approach	"	"	"	"	"	"
Overall Intersection LOS							
		C	C	C	D	B	B

**NORTHERN AVENUE  
AT-GRADE INTERSECTIONS  
LEVEL-OF-SERVICE ANALYSIS SUMMARY  
INTERSECTION CONCEPTS**

**Figure 4**



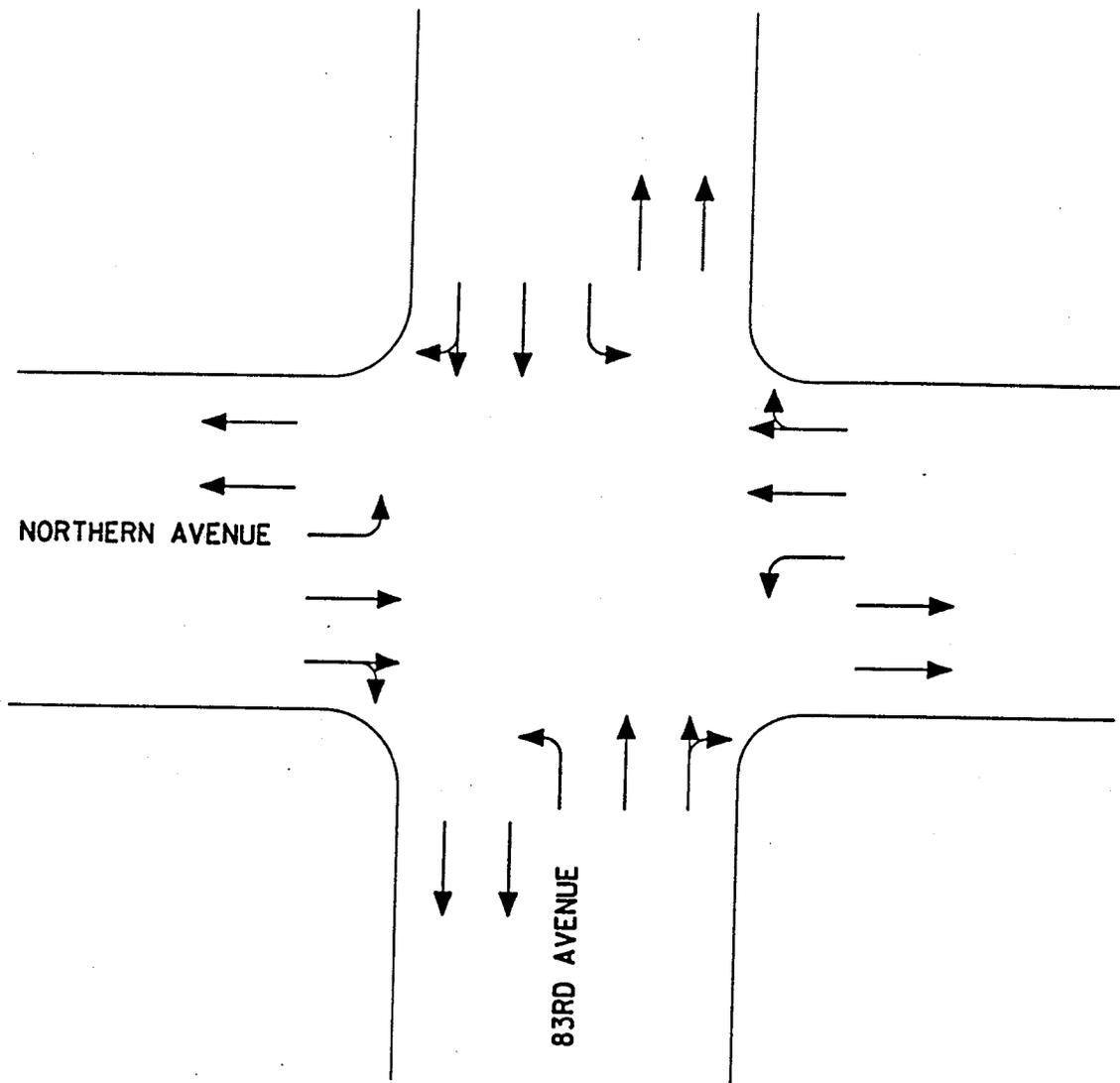
**NOTE:**

1. THIS IS THE LANEAGE REQUIRED TO ACHIEVE THE LOS CRITERIA DESCRIBED IN THE TEXT AT 91ST AVENUE IN THE DESIGN YEAR 2020 PEAK HOURS.

	NAME	DATE
DESIGN	SOW	4/97
DRAWN	REB	4/97
CHECKED	SOW	4/97

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NORTHERN AVENUE / 91ST AVENUE  
INTERSECTION DESIGN-YEAR 2020  
FIGURE 5



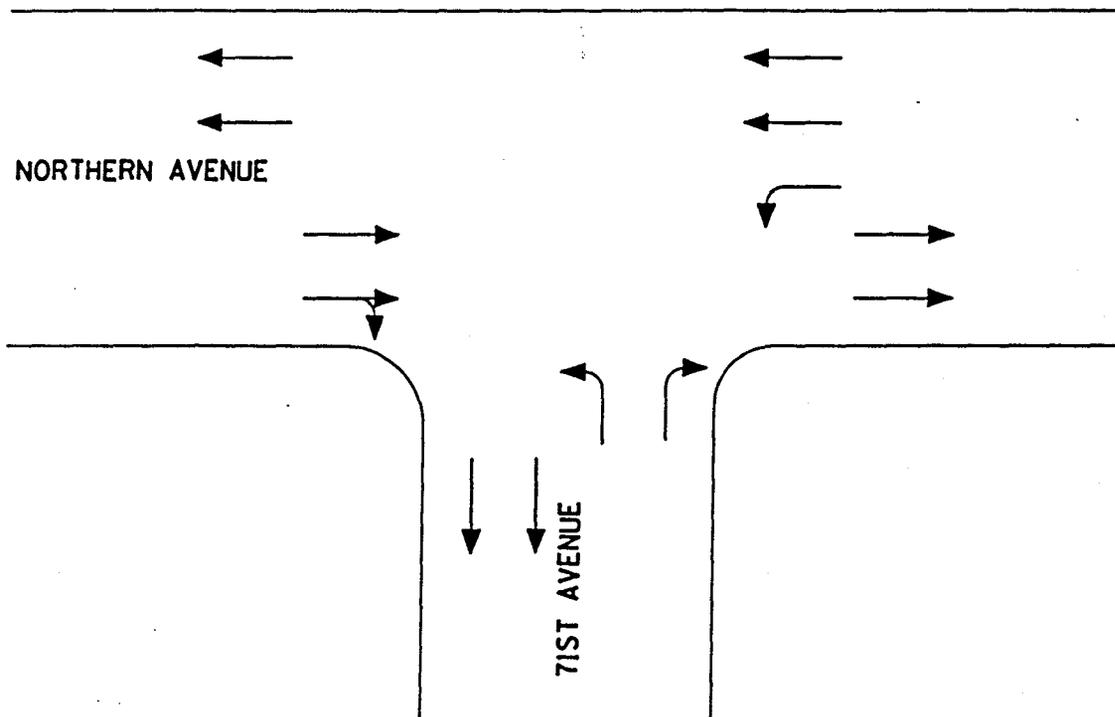
**NOTE:**

1. THIS IS THE LANEAGE REQUIRED TO ACHIEVE THE LOS CRITERIA DESCRIBED IN THE TEXT AT 83RD AVENUE IN THE DESIGN YEAR 2020 PEAK HOURS.

	NAME	DATE
DESIGN	SDW	4/97
DRAWN	REB	4/97
CHECKED	SDW	4/97


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 DENVER, COLORADO 80231-1000

NORTHERN AVENUE / 83RD AVENUE  
 INTERSECTION DESIGN-YEAR 2020  
 FIGURE 6



**NOTE:**

1. THIS IS THE LANEAGE REQUIRED TO ACHIEVE THE LOS CRITERIA DESCRIBED IN THE TEXT AT 71ST AVENUE IN THE DESIGN YEAR 2020 PEAK HOURS.

	NAME	DATE
DESIGN	SDW	4/97
DRAWN	REB	4/97
CHECKED	SDW	4/97

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209 EAST CAMELBACK ROAD, SUITE 110  
PHOENIX, ARIZONA 85016 • 480 952-6600

**NORTHERN AVENUE / 71ST AVENUE  
INTERSECTION DESIGN-YEAR 2020  
FIGURE 7**

### 2.3 Left-Turn Storage Requirements:

The left-turn storage length requirements for each intersection approach was determined utilizing the following assumptions:

- Signal Cycle Length: 94 seconds.
- Vehicle Length: 6.0m (20 feet).

The results of the left-turn storage length calculations indicate the following storage lengths are necessary:

#### **NORTHERN AVE/71ST AVENUE INTERSECTION**

South Approach (NB):	Not Applicable
East Approach (WB):	45m (150 ft)
West Approach (EB):	Not Applicable

#### **NORTHERN AVE/83RD AVENUE INTERSECTION**

South Approach (NB):	50m (160 ft)
North Approach (SB):	45m (150 ft)
East Approach (WB):	45m (150 ft)
West Approach (EB):	50m (160 ft)

#### **NORTHERN AVE/91ST AVENUE INTERSECTION**

South Approach (NB):	50m (160 ft)
North Approach (SB):	73m (240 ft)
East Approach (WB):	45m (150 ft)
West Approach (EB):	60m (200 ft)

### 3.0 SUMMARY AND CONCLUSIONS:

The at-grade signalized intersections at 71st Avenue, 83rd Avenue and 91st Avenue, were analyzed utilizing Design Year 2020 traffic volumes. The analysis of each at-grade intersection indicates the standard MCDOT Minor Urban Arterial roadway section will be adequate to allow the each individual traffic movement, approach, and total intersection to operate at a level-of-service consistent with MCDOT policy. Therefore, additional turning lanes are not warranted for the intersections analyzed within the project study limits.

**APPENDIX A**

**INTERSECTION TURNING MOVEMENT VOLUMES  
1997**



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*

Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
Study ID: 97167 Interval : 15 min Intervals: 48  
Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/red  
Weather : CLEAR Correction: 1.00

\*\*\*\*\*

Begins	Hour	Auto	From North				From South				From East				From West				Inter Total
			RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
			0	0	0	0	0	3	0	6	0	9	316	0	0	0	403	15	75
		Sm Truck	0	0	0	0	0	0	0	0	0	1	13	0	0	0	13	1	2
		Lg Truck	0	0	0	0	0	0	0	0	0	0	5	0	0	0	7	1	1
		Peds				0				0				0				0	
		All	0	0	0	0	0	3	0	6	0	10	334	0	0	0	423	17	75
		‡	0.0	0.0	0.0	0.0	0.0	0.4	0.0	0.8	0.0	1.3	42.1	0.0	0.0	0.0	53.3	2.1	100.
								9				344				440			
8:00		Auto	0	0	0	0	0	2	0	5	0	9	81	0	0	0	105	7	20
		Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	3	0	
		Peds				0				0				0				0	
8:15		Auto	0	0	0	0	0	5	0	4	0	7	67	0	0	0	87	6	15
		Sm Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	3	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	
		Peds				0				0				0				0	
8:30		Auto	0	0	0	0	0	4	0	4	0	2	43	0	0	0	76	2	11
		Sm Truck	0	0	0	0	0	0	0	0	0	1	1	0	0	0	1	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	
		Peds				0				0				0				0	
8:45		Auto	0	0	0	0	0	1	0	3	0	2	48	0	0	0	69	1	12
		Sm Truck	0	0	0	0	0	0	0	0	0	0	5	0	0	0	5	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	0	
		Peds				0				0				0				0	
Hour		Auto	0	0	0	0	0	12	0	16	0	20	239	0	0	0	337	16	64
		Sm Truck	0	0	0	0	0	0	0	0	0	1	9	0	0	0	10	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	13	0	0	0	12	0	
		Peds				0				0				0				0	
		All	0	0	0	0	0	12	0	16	0	21	261	0	0	0	359	16	66
		‡	0.0	0.0	0.0	0.0	0.0	1.8	0.0	2.3	0.0	3.1	38.1	0.0	0.0	0.0	52.4	2.3	100.
9:00		Auto	0	0	0	0	0	3	0	1	0	3	51	0	0	0	49	1	10
		Sm Truck	0	0	0	0	0	0	0	2	0	0	1	0	0	0	2	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	5	0	0	0	3	0	
		Peds				0				0				0				0	
9:15		Auto	0	0	0	0	0	3	0	1	0	3	38	0	0	0	53	0	9
		Sm Truck	0	0	0	0	0	0	0	0	0	0	3	0	0	0	5	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	8	0	1
		Peds				0				0				0				0	

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*

Location: 71ST AVENUE & NORTHERN

Starts : 02/25/97 at 06:00

Notes : NORTHERN=E/W

Ends : 02/25/97 at 18:00

Study ID: 97167

Interval : 15 min Intervals: 48

Operator: TRA

S/N : 0

Type: C, SmT, LgT, P-rt/red

Weather : CLEAR

Correction: 1.00

\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Tue 2/25/1997																	
9:30	Auto	0	0	0	0	1	0	3	0	0	34	0	0	0	36	2	
	Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0	
	Peds				0			0				0				0	
9:45	Auto	0	0	0	0	0	0	3	0	3	65	0	0	0	67	5	14
	Sm Truck	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	
	Lg Truck	0	0	0	0	0	0	1	0	0	3	0	0	0	4	0	
	Peds				0			0				0				0	
Hour	Auto	0	0	0	0	7	0	8	0	9	188	0	0	0	205	8	42
	Sm Truck	0	0	0	0	0	0	2	0	0	6	0	0	0	10	0	
	Lg Truck	0	0	0	0	0	0	1	0	0	14	0	0	0	21	0	
	Peds				0			0				0				0	
	All	0	0	0	0	7	0	11	0	9	208	0	0	0	236	8	47
	Σ	0.0	0.0	0.0	0.0	1.5	0.0	2.3	0.0	1.9	43.4	0.0	0.0	0.0	49.3	1.7	100
10:00	Auto	0	0	0	0	2	0	1	0	2	52	0	0	0	57	2	12
	Sm Truck	0	0	0	0	0	0	0	0	0	6	0	0	0	4	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	1	0	0	0	7	0	
	Peds				0			0				0				0	
10:15	Auto	0	0	0	0	2	0	2	0	1	55	0	0	0	92	1	19
	Sm Truck	0	0	0	0	0	0	0	0	0	2	0	0	0	2	1	
	Lg Truck	0	0	0	0	0	0	0	0	0	6	0	0	0	2	0	
	Peds				0			0				0				0	
10:30	Auto	0	0	0	0	1	0	4	0	1	59	0	0	0	58	2	12
	Sm Truck	0	0	0	0	0	0	0	0	0	3	0	0	0	1	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	3	0	0	0	4	0	
	Peds				0			0				0				0	
10:45	Auto	0	0	0	0	2	0	3	0	3	60	0	0	0	78	4	17
	Sm Truck	0	0	0	0	1	0	0	0	0	2	0	0	0	6	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	4	0	0	0	3	0	
	Peds				0			0				0				0	
Hour	Auto	0	0	0	0	7	0	10	0	7	226	0	0	0	285	9	57
	Sm Truck	0	0	0	0	1	0	0	0	0	13	0	0	0	13	1	2
	Lg Truck	0	0	0	0	0	0	0	0	0	14	0	0	0	16	0	3
	Peds				0			0				0				0	
	All	0	0	0	0	8	0	10	0	7	253	0	0	0	314	10	60
	Σ	0.0	0.0	0.0	0.0	1.3	0.0	1.7	0.0	1.2	42.0	0.0	0.0	0.0	52.2	1.7	100

HIGH COUNT DUE TO FUN

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
 Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00:  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00:  
 Study ID: 97167 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/red  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Begins		From North				From South				From East				From West				Interval Total
		RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Tue 2/25/1997																		
11:00	Auto	0	0	0	0	0	1	0	3	0	2	68	0	0	0	63	1	138
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5
	Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	0	7
	Peds				0				0				0				0	0
11:15	Auto	0	0	0	0	0	2	0	2	0	2	57	0	0	0	57	0	120
	Sm Truck	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	5
	Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	3
	Peds				0				0				0				0	0
11:30	Auto	0	0	0	0	0	0	0	2	0	1	52	0	0	0	60	2	117
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	5	0	7
	Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	5
	Peds				0				0				0				0	0
11:45	Auto	0	0	0	0	0	0	0	1	0	0	54	0	0	0	60	3	118
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4
	Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	4
	Peds				0				0				0				0	0
Hour	Auto	0	0	0	0	0	3	0	8	0	5	231	0	0	0	240	6	49
	Sm Truck	0	0	0	0	0	0	0	0	0	0	9	0	0	0	12	0	2
	Lg Truck	0	0	0	0	0	0	0	0	0	0	8	0	0	0	10	0	18
	Peds				0				0				0				0	0
	All	0	0	0	0	0	3	0	8	0	5	248	0	0	0	262	6	53
	†	0.0	0.0	0.0	0.0	0.0	0.6	0.0	1.5	0.0	0.9	46.6	0.0	0.0	0.0	49.2	1.1	100.
AM																		
	Auto	0	0	0	0	0	34	0	62	0	53	1444	0	0	0	1758	61	3415
	†	0.0	0.0	0.0	0.0	0.0	0.9	0.0	1.7	0.0	1.4	39.4	0.0	0.0	0.0	47.9	1.7	93.
	Sm Truck	0	0	0	0	0	2	0	3	0	4	59	0	0	0	59	2	12
	†	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	1.6	0.0	0.0	0.0	1.6	0.1	3.
	Lg Truck	0	0	0	0	0	0	0	1	0	2	55	0	0	0	67	1	12
	†	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.5	0.0	0.0	0.0	1.8	0.0	3.
	Peds				0				0				0				0	0
	All	0	0	0	0	0	36	0	66	0	59	1558	0	0	0	1884	64	366
	†	0.0	0.0	0.0	0.0	0.0	1.0	0.0	1.8	0.0	1.6	42.5	0.0	0.0	0.0	51.4	1.7	100.
							122				1617				1948			
12:00	Auto	0	0	0	0	0	0	0	2	0	3	51	0	0	0	66	1	120
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0	2
	Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	4
	Peds				0				0				0				0	0
12:15	Auto	0	0	0	0	0	0	0	7	0	1	56	0	0	0	71	3	138
	Sm Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	1
	Lg Truck	0	0	0	0	0	0	0	0	0	0	3	0	0	0	2	0	3
	Peds				0				0				0				0	0

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
 Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
 Study ID: 97167 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/ret  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Begins		From North				From South				From East				From West				Inter Total
		RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Tue 2/25/1997																		
12:30	Auto	0	0	0	0	0	2	0	5	0	4	52	0	0	0	58	3	12
	Sm Truck	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	
	Lg Truck	0	0	0	0	0	1	0	0	0	1	5	0	0	0	3	0	1
	Peds				0				0				0				0	
12:45	Auto	0	0	0	0	0	1	0	11	0	1	36	0	0	0	48	1	9
	Sm Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	6	0	1
	Lg Truck	0	0	0	0	0	0	0	1	0	0	4	0	0	0	5	0	1
	Peds				0				0				0				0	
Hour	Auto	0	0	0	0	0	3	0	25	0	9	195	0	0	0	243	8	48
	Sm Truck	0	0	0	0	0	0	0	0	0	1	7	0	0	0	9	0	1
	Lg Truck	0	0	0	0	0	1	0	1	0	1	14	0	0	0	12	0	2
	Peds				0				0				0				0	
	All	0	0	0	0	0	4	0	26	0	11	216	0	0	0	264	8	52
	†	0.0	0.0	0.0	0.0	0.0	0.8	0.0	4.9	0.0	2.1	40.8	0.0	0.0	0.0	49.9	1.5	100.
13:00	Auto	0	0	0	0	0	1	0	1	0	1	34	0	0	0	45	3	8
	Sm Truck	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	
	Peds				0				0				0				0	
13:15	Auto	0	0	0	0	0	1	0	1	0	1	57	0	0	0	60	3	12
	Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	Lg Truck	0	0	0	0	0	1	0	0	0	0	1	0	0	0	2	0	
	Peds				0				0				0				0	
13:30	Auto	0	0	0	0	0	2	0	5	0	0	65	0	0	0	67	1	14
	Sm Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	2	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	0	3	0	0	0	3	0	
	Peds				0				1				0				0	
13:45	Auto	0	0	0	0	0	3	0	6	0	4	70	0	0	0	52	0	13
	Sm Truck	0	0	0	0	0	0	0	1	0	0	2	0	0	0	0	0	
	Lg Truck	0	0	0	0	0	1	0	0	0	0	3	0	0	0	2	0	
	Peds				0				0				0				0	
Hour	Auto	0	0	0	0	0	7	0	13	0	6	226	0	0	0	224	7	48
	Sm Truck	0	0	0	0	0	1	0	1	0	0	3	0	0	0	4	0	
	Lg Truck	0	0	0	0	0	2	0	0	0	0	7	0	0	0	10	0	1
	Peds				0				1				0				0	
	All	0	0	0	0	0	10	0	14	0	6	236	0	0	0	238	7	51
	†	0.0	0.0	0.0	0.0	0.0	2.0	0.0	2.7	0.0	1.2	46.2	0.0	0.0	0.0	46.6	1.4	100.



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

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Date: 2/28/1

\*\*\*\*\*

Location: 71ST AVENUE & NORTHERN

Notes : NORTHERN=E/W

Study ID: 97167

Operator: TRA

Weather : CLEAR

Starts : 02/25/97 at 06:00

Ends : 02/25/97 at 18:00

Interval : 15 min Intervals: 48

S/N : 0

Type: C, SmT, LgT, P-rt/re

Correction: 1.00

\*\*\*\*\*

Begins	Hour	Auto	From North				From South				From East				From West				Inter	Total
			RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
			0	0	0	0	0	9	0	26	0	14	281	0	0	0	338	5		
		Sm Truck	0	0	0	0	0	0	0	0	0	0	11	0	0	0	11	2		
		Lg Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	13	0		
		Peds				0				4				0				0		
		All	0	0	0	0	0	9	0	26	0	14	296	0	0	0	362	7		71
		†	0.0	0.0	0.0	0.0	0.0	1.3	0.0	3.6	0.0	2.0	41.5	0.0	0.0	0.0	50.7	1.0		100.
16:00		Auto	0	0	0	0	0	5	0	4	0	5	83	0	0	0	84	2		18
		Sm Truck	0	0	0	0	0	1	0	0	0	0	1	0	0	0	3	1		
		Lg Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0		
		Peds				0				0				0				0		
16:15		Auto	0	0	0	0	0	3	0	2	0	2	95	0	0	0	103	2		20
		Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	1		
		Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		
		Peds				0				0				0				0		
6:30		Auto	0	0	0	0	0	4	0	4	0	4	111	0	0	0	112	1		23
		Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	6	0		
		Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0		
		Peds				0				0				0				0		
16:45		Auto	0	0	0	0	0	1	0	0	0	1	83	0	0	0	106	1		19
		Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1		
		Lg Truck	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0		
		Peds				0				0				0				0		
Hour		Auto	0	0	0	0	0	13	0	10	0	12	372	0	0	0	405	6		81
		Sm Truck	0	0	0	0	0	1	0	0	0	0	3	0	0	0	17	3		2
		Lg Truck	0	0	0	0	0	0	0	0	0	1	1	0	0	0	3	0		
		Peds				0				0				0				0		
		All	0	0	0	0	0	14	0	10	0	13	376	0	0	0	425	9		84
		†	0.0	0.0	0.0	0.0	0.0	1.7	0.0	1.2	0.0	1.5	44.4	0.0	0.0	0.0	50.2	1.1		100.
								24				389					434			
17:00		Auto	0	0	0	0	0	2	0	6	0	3	112	0	0	0	90	0		21
		Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0		
		Lg Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0		
		Peds				0				0				0				0		
17:15		Auto	0	0	0	0	0	5	0	7	0	1	75	0	0	0	87	0		17
		Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	1	0		
		Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0		
		Peds				0				0				0				0		

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: - 8  
Date: 2/28/1997

\*\*\*\*\*  
Location: 71ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W Starts : 02/25/97 at 06:00  
Study ID: 97167 Ends : 02/25/97 at 18:00  
Operator: TRA Interval : 15 min Intervals: 48  
Weather : CLEAR S/N : 0 Type: C, SmT, LgT, P-rt/rec  
Correction: 1.00  
\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
17:30	Auto	0	0	0	0	0	1	0	0	0	0	91	0	0	0	77	0	16
	Sm Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	2	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	
	Peds																	
17:45	Auto	0	0	0	0	0	5	0	4	0	0	85	0	0	0	93	1	18
	Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Peds																	
Hour	Auto	0	0	0	0	0	13	0	17	0	4	363	0	0	0	347	1	74
	Sm Truck	0	0	0	0	0	0	0	0	0	0	6	0	0	0	6	0	1
	Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	3	0	
	Peds																	
	All	0	0	0	0	0	13	0	17	0	4	371	0	0	0	356	1	76
	†	0.0	0.0	0.0	0.0	0.0	1.7	0.0	2.2	0.0	0.5	48.7	0.0	0.0	0.0	46.7	0.1	100.
PM																		
	Auto	0	0	0	0	0	52	0	98	0	55	1720	0	0	0	1858	42	382
	†	0.0	0.0	0.0	0.0	0.0	1.3	0.0	2.4	0.0	1.4	42.5	0.0	0.0	0.0	45.9	1.0	94.
	Sm Truck	0	0	0	0	0	3	0	1	0	1	45	0	0	0	58	7	11
	†	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.0	1.1	0.0	0.0	0.0	1.4	0.2	2.
	Lg Truck	0	0	0	0	0	3	0	1	0	3	36	0	0	0	60	2	10
	†	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.9	0.0	0.0	0.0	1.5	0.0	2.
	Peds																	
	All	0	0	0	0	0	58	0	100	0	59	1801	0	0	0	1976	51	404
	†	0.0	0.0	0.0	0.0	0.0	1.4	0.0	2.5	0.0	1.5	44.5	0.0	0.0	0.0	48.9	1.3	100.
Day																		
	Auto	0	0	0	0	0	86	0	160	0	108	3164	0	0	0	3616	103	723
	†	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.1	0.0	1.4	41.0	0.0	0.0	0.0	46.9	1.3	93.
	Sm Truck	0	0	0	0	0	5	0	4	0	5	104	0	0	0	117	9	24.
	†	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	1.3	0.0	0.0	0.0	1.5	0.1	3.
	Lg Truck	0	0	0	0	0	3	0	2	0	5	91	0	0	0	127	3	23.
	†	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	1.6	0.0	3.
	Peds																	
	All	0	0	0	0	0	94	0	166	0	118	3359	0	0	0	3860	115	771
	†	0.0	0.0	0.0	0.0	0.0	1.2	0.0	2.2	0.0	1.5	43.6	0.0	0.0	0.0	50.1	1.5	100.

0 260 3977 3975

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

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Date: 2/28/19

\*\*\*\*\*  
Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
Study ID: 97167 Interval : 15 min Intervals: 48  
Operator: TRA S/N : 0 Type: C, Smt, LgT, P-rt/red  
Weather : CLEAR Correction: 1.00  
\*\*\*\*\*

	From North				From South				From East				From West				Total
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Grand																	
Total Auto	0	0	0	0	0	86	0	160	0	108	3164	0	0	0	3616	103	723
‡	0.0	0.0	0.0	0.0	0.0	1.1	0.0	2.1	0.0	1.4	41.0	0.0	0.0	0.0	46.9	1.3	93
Sm Truck	0	0	0	0	0	5	0	4	0	5	104	0	0	0	117	9	24
‡	0.0	0.0	0.0	0.0	0.0	0.1	0.0	0.1	0.0	0.1	1.3	0.0	0.0	0.0	1.5	0.1	3
Lg Truck	0	0	0	0	0	3	0	2	0	5	91	0	0	0	127	3	23
‡	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.1	1.2	0.0	0.0	0.0	1.6	0.0	3
Peds				0				6				0				0	0
All	0	0	0	0	0	94	0	166	0	118	3359	0	0	0	3860	115	771
‡	0.0	0.0	0.0	0.0	0.0	1.2	0.0	2.2	0.0	1.5	43.6	0.0	0.0	0.0	50.1	1.5	100

TURNING MOVEMENTS FOR TOTAL INTERSECTION

		From North ( Peds = 0 )				From East ( Peds = 0 )			
		Approach 0		Depart 0		Approach 0		Depart 0	
		Rt/red	Right	Thru	Left	Rt/red	Right	Thru	Left
Total 7428		0	0	0	0	0	0	0	0
From West (Peds = 0)		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From East (Peds = 0)		Approach 3477		Thru 3477		Left 118	
From North ( Peds = 0 )		Approach 0		Depart 0		Approach 0		Depart 0	
Total 7428		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From West (Peds = 0)		Approach 3477		Thru 3477		Left 118	
From East ( Peds = 0 )		Approach 0		Depart 0		Approach 0		Depart 0	
Total 7428		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From North ( Peds = 0 )		Approach 0		Depart 0		Approach 0	
Total 7428		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From South ( Peds = 6 )		Approach 260		Thru 260		Right 233	
Total 7428		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From East ( Peds = 0 )		Approach 0		Depart 0		Approach 0	
Total 7428		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From West (Peds = 0)		Approach 3477		Thru 3477		Left 118	
From North ( Peds = 0 )		Approach 0		Depart 0		Approach 0		Depart 0	
Total 7428		Left 0		Thru 3860		Right 115		Rt/Red 0	
Approach 3975		Thru 3860		Right 115		Rt/Red 0			
Depart 3453		3359		94					
Total 7500		From South ( Peds = 6 )		Approach 260		Thru 260		Right 233	

SUSAN MEDLAND  
 Three Vehicle Analysis with Right on Red

Page: 10  
 Date: 2/28/1997

\*\*\*\*\*  
 Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
 Study ID: 97167 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/rec  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

TOTAL INTERSECTION PEAK HOUR ANALYSIS

Total Intersection Peak is: Tue Feb 25 16:15:00 1997

DIRECTION	VOLUME						Peak Factor	PERCENTS				
	Peds	Rt/Red	Left	Thru	Right	Total		Rt/Red	Left	Thru	Right	Total
From North	0	0	0	0	0	0	N.A.	0.0%	0.0%	0.0%	0.0%	0.0%
From South	0	0	10	0	12	22	0.69	0.0%	45.5%	0.0%	54.5%	100.0%
From East	0	0	11	404	0	415	0.89	0.0%	2.7%	97.3%	0.0%	100.0%
From West	0	0	0	430	6	436	0.91	0.0%	0.0%	98.6%	1.4%	100.0%
Totals	0	0	21	834	18	873	0.89	0.0%	2.4%	95.5%	2.1%	100.0%

		From North ( Peds = 0 )				From East ( Peds = 0 )			
		Approach 0		Depart 0		Approach 415		Depart 442	
		Rt/red	Right	Thru	Left	Rt/Red	Right	Thru	Left
		0	0	0	0	0	0	0	0
Total 850		N W + E S				Total 857			
From West (Peds = 0)		Left		Thru		From East (Peds = 0)		Left	
Approach 436		0		430		0		11	
		Right		6		430		12	
		Rt/Red		0		12		0	
		6		0		11		10	
		0		11		10		0	
		11		10		12		0	
		Left		Thru		Right		Rt/Red	
Depart 17				Approach 22					
		Total		39					
		From South							

( Peds = 0 )

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 11  
Date: 2/28/1997

\*\*\*\*\*  
Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
Study ID: 97167 Interval : 15 min Intervals: 48  
Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/red  
Weather : CLEAR Correction: 1.00  
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INDIVIDUAL DIRECTIONS PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:00	0	0	0	0	0	0	N.A.	0.0%	0.0%	0.0%	0.0%	0.0%	
From South	2/25/97	14:45	4	0	11	0	26	37	0.62	0.0%	29.7%	0.0%	70.3%	100.0%	
From East	2/25/97	16:15	0	0	11	404	0	415	0.89	0.0%	2.7%	97.3%	0.0%	100.0%	
From West	2/25/97	7:15	0	0	0	434	23	457	0.87	0.0%	0.0%	95.0%	5.0%	100.0%	
			From North ( Peds = 0 ) Total 0 Approach 0      Depart 0 Rt/red Right Thru Left 0      0      0      0      0      0      0												
Total 872			N W + E S							Total 875					
From West (Peds = 0)			Left 0 Approach 457 Thru 434 Right 23 Rt/Red 0							From East (Peds = 0) 0 434 Thru Approach 415 11 Left 26 Right					
			23      0      11      11      0      26      0 Left Thru Right Rt/Red												
			Depart 34      Approach 37 Total 71 From South ( Peds = 4 )												

SUSAN MEDLAND  
 Three Vehicle Analysis with Right on Red

Page: 12  
 Date: 2/28/1998

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 cation: 71ST AVENUE & NORTHERN  
 Notes : NORTHERN=E/W Starts : 02/25/97 at 06:00:  
 Study ID: 97167 Ends : 02/25/97 at 18:00:  
 Operator: TRA Interval : 15 min Intervals: 48  
 Weather : CLEAR S/N : 0 Type: C, SmT, LgT, P-rt/red  
 Correction: 1.00  
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AUTOMOBILE PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:00	0	0	0	0	0	0	N.A.	0.0%	0.0%	0.0%	0.0%	0.0%	
From South	2/25/97	14:45	4	0	10	0	26	36	0.60	0.0%	27.8%	0.0%	72.2%	100.0%	
From East	2/25/97	16:15	0	0	10	401	0	411	0.89	0.0%	2.4%	97.6%	0.0%	100.0%	
From West	2/25/97	7:15	0	0	0	415	21	436	0.85	0.0%	0.0%	95.2%	4.8%	100.0%	

From North		( Peds = 0 )	
Total	0		
Approach	0	Depart	0
Rt/red	0	Right	0
Thru	0	Left	0
Total 847		Total 852	

0	Rt/Red	
0	Right	
Depart 411	401	401 Thru Approach 411
10	10	10 Left
From West	From East	
(Peds = 0)	(Peds = 0)	
Left	0	0
Approach 436	Thru 415	415 Depart 441
Right	21	26
Rt/Red	0	

21	0	10	10	0	26	0
Left		Thru		Right		Rt/Red
Depart 31	Approach 36					
Total	67					
From South						
( Peds = 4 )						



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 14  
Date: 2/28/19

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Location: 71ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W Starts : 02/25/97 at 06:00:  
Study ID: 97167 Ends : 02/25/97 at 18:00:  
Operator: TRA Interval : 15 min Intervals: 48  
Weather : CLEAR S/N : 0 Type: C, Smt, LgT, P-rt/red  
Correction: 1.00  
\*\*\*\*\*

LARGE TRUCK PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:00	0	0	0	0	0	0	N.A.	0.0%	0.0%	0.0%	0.0%	0.0	
From South	2/25/97	12:30	4	0	2	0	1	3	0.75	0.0%	66.7%	0.0%	33.3%	100.0	
From East	2/25/97	7:45	0	0	0	16	0	16	0.67	0.0%	0.0%	100.0%	0.0%	100.0	
From West	2/25/97	9:15	0	0	0	25	0	25	0.78	0.0%	0.0%	100.0%	0.0%	100.0	

From North		Approach 0		Depart 0		Total 0	
Rt/red	Right	Thru	Left	Rt/Red	Right	Thru	Left
0	0	0	0	0	0	0	0
From West (Peds = 0)		Approach 25		Depart 26		Total 42	
Left	0	Right	0	Thru	16	Approach	16
Approach	25	Thru	25	Left	0	Left	0
Right	0	Right	0	Right	0	Right	0
Rt/Red	0	Rt/Red	0	Rt/Red	0	Rt/Red	0
From South (Peds = 4)		Approach 3		Depart 0		Total 3	
Left	2	Thru	0	Right	1	Rt/Red	0
Thru	0	Right	0	Left	0	Thru	0
Right	0	Right	0	Right	0	Right	0
Rt/Red	0	Rt/Red	0	Rt/Red	0	Rt/Red	0

Three Vehicle Analysis with Right on Red

Location: 71ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W  
Study ID: 97167  
Operator: TRA  
Weather : CLEAR

Starts : 02/25/97 at 06:00:  
Ends : 02/25/97 at 18:00:  
Interval : 15 min Intervals: 48  
S/N : 0 Type: C, SmT, LgT, P-rt/rec  
Correction: 1.00

Graph of Total Volume per Interval

Tue 2/25/1997			65	130	195	2
6:00	101	1.3%	*****			
6:15	95	1.2%	*****			
6:30	186	2.4%	*****			
6:45	194	2.5%	*****			
7:00	181	2.3%	*****			
7:15	185	2.4%	*****			
7:30	191	2.5%	*****			
7:45	236	3.1%	*****			
8:00	219	2.8%	*****			
8:15	188	2.4%	*****			
8:30	140	1.8%	*****			
8:45	138	1.8%	*****			
9:00	121	1.6%	*****			
9:15	118	1.5%	*****			
9:30	86	1.1%	*****			
9:45	154	2.0%	*****			
10:00	134	1.7%	*****			
10:15	166	2.2%	*****			
10:30	136	1.8%	*****			
10:45	166	2.2%	*****			
11:00	150	1.9%	*****			
11:15	128	1.7%	*****			
11:30	129	1.7%	*****			
11:45	125	1.6%	*****			
12:00	130	1.7%	*****			
12:15	145	1.9%	*****			
12:30	136	1.8%	*****			
12:45	118	1.5%	*****			
13:00	90	1.2%	*****			
13:15	128	1.7%	*****			
13:30	149	1.9%	*****			
13:45	144	1.9%	*****			
14:00	146	1.9%	*****			
14:15	200	2.6%	*****			
14:30	159	2.1%	*****			
14:45	177	2.3%	*****			
5:00	157	2.0%	*****			
5:15	222	2.9%	*****			

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

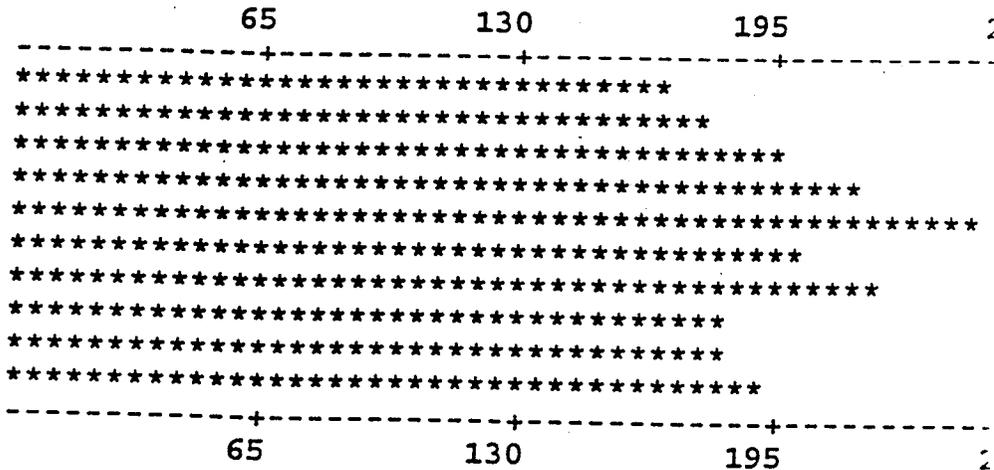
Page: 16  
Date: 2/28/1997

\*\*\*\*\*  
 Location: 71ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
 Study ID: 97167 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/re  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Graph of Total Volume per Interval

Tue 2/25/1997

15:30	163	2.1%
15:45	172	2.2%
16:00	191	2.5%
16:15	215	2.8%
16:30	245	3.2%
16:45	196	2.5%
17:00	217	2.8%
17:15	180	2.3%
17:30	176	2.3%
17:45	189	2.5%
Total -	7712	100.0%



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

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Location: 71ST AVENUE & NORTHERN

Starts : 02/25/97 at 06:00:

Notes : NORTHERN=E/W

Ends : 02/25/97 at 18:00:

Study ID: 97167

Interval : 15 min Intervals: 48

Operator: TRA

S/N : 0 Type: C, SmT, LgT, P-rt/red

Weather : CLEAR

Correction: 1.00

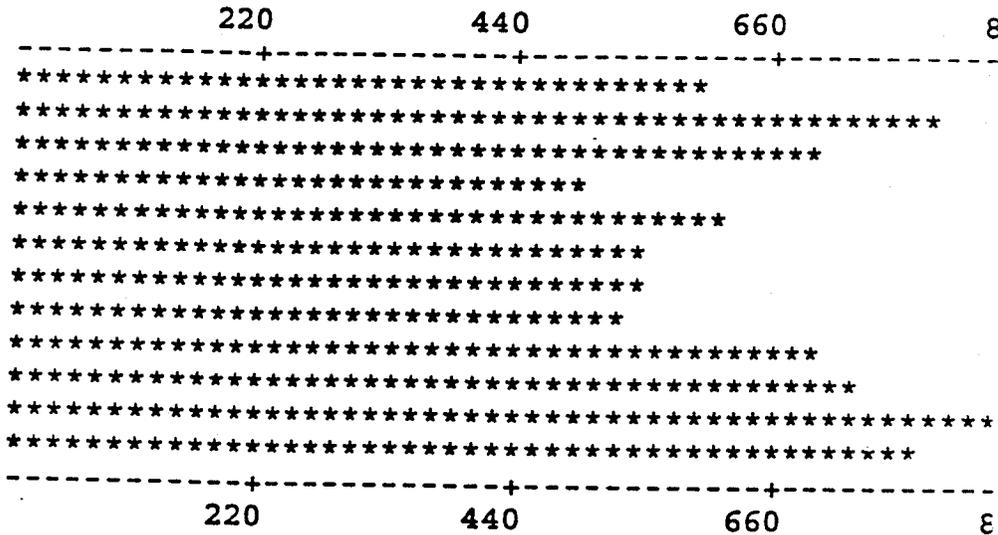
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Graph of Total Volume per Hour

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Tue 2/25/1997

6:00	576	7.5%
7:00	793	10.3%
8:00	685	8.9%
9:00	479	6.2%
10:00	602	7.8%
11:00	532	6.9%
12:00	529	6.9%
13:00	511	6.6%
14:00	682	8.8%
15:00	714	9.3%
16:00	847	11.0%
7:00	762	9.9%
Total -	7712	100.0%



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220 440 660 880

TRAFFIC RESEARCH AND ANALYSIS  
TURNING MOVEMENT COUNT

SUSAN MEDLAND

Page: 1  
Date: 2/27/97

Three Vehicle Analysis with Right on Red

Location: 83RD AVENUE & NORTHERN

Starts : 02/25/97 at 06:00:

Notes : NORTHERN=E/W

Ends : 02/25/97 at 18:00:

Study ID: 97166

Interval : 15 min Intervals: 48

Operator: TRA

S/N : 0 Type: C, SmT, LgT, P-rt/red

Weather : CLEAR

Correction: 1.00

\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
6:00	Auto	0	7	78	2	0	3	27	7	0	6	24	7	0	2	34	6	20
	Sm Truck	0	1	2	0	0	0	0	0	0	0	0	0	0	0	0	0	
	Lg Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	
	Peds				0				0				0				0	
6:15	Auto	0	9	63	3	0	8	56	14	0	10	28	2	0	1	42	8	24
	Sm Truck	0	0	2	0	0	0	1	0	0	0	1	0	0	0	1	0	
	Lg Truck	0	0	3	0	0	0	1	0	0	0	3	1	0	0	0	0	
	Peds				0				0				0				0	
6:30	Auto	0	16	93	2	0	7	74	15	0	7	70	3	0	4	49	10	35
	Sm Truck	0	0	0	0	0	1	1	0	0	0	1	1	0	0	0	0	
	Lg Truck	0	0	4	0	0	0	0	0	0	1	1	0	0	0	0	0	
	Peds				0				0				0				0	
6:45	Auto	0	11	105	0	0	5	86	9	0	12	44	4	0	3	61	10	35
	Sm Truck	0	0	2	0	0	0	1	0	0	0	1	0	0	1	1	0	
	Lg Truck	0	0	1	0	0	1	0	0	0	2	3	0	0	1	0	2	1
	Peds				0				0				0				0	
Hour	Auto	0	43	339	7	0	23	243	45	0	35	166	16	0	10	186	34	114
	Sm Truck	0	1	6	0	0	1	3	0	0	0	3	1	0	1	2	0	1
	Lg Truck	0	0	8	0	0	1	2	0	0	3	7	1	0	1	2	2	2
	Peds				0				0				0				0	
	All	0	44	353	7	0	25	248	45	0	38	176	18	0	12	190	36	119
	%	0.0	3.7	29.6	0.6	0.0	2.1	20.8	3.8	0.0	3.2	14.8	1.5	0.0	1.0	15.9	3.0	100.
7:00	Auto	0	19	112	5	0	6	50	5	0	5	29	4	0	1	59	9	30
	Sm Truck	0	0	0	0	0	0	2	1	0	0	2	0	0	0	1	0	
	Lg Truck	0	0	1	0	0	0	0	0	0	0	2	0	0	1	3	0	
	Peds				0				0				0				0	
7:15	Auto	0	13	113	2	0	12	80	16	0	10	34	2	0	2	71	11	36
	Sm Truck	0	0	0	0	0	2	3	0	0	0	1	0	0	0	1	0	
	Lg Truck	0	1	0	0	0	0	0	1	0	0	1	0	0	0	1	0	
	Peds				0				0				0				0	
7:30	Auto	0	14	98	2	0	8	85	13	0	15	57	9	0	4	68	13	38
	Sm Truck	0	0	1	0	0	0	2	0	0	1	3	0	0	0	0	0	
	Lg Truck	0	0	2	1	0	1	3	2	0	0	3	0	0	0	4	0	1
	Peds				0				0				0				0	
7:45	Auto	0	10	97	1	0	9	105	13	0	6	49	6	0	3	53	8	36
	Sm Truck	0	0	1	0	0	0	0	0	0	1	0	1	0	1	0	0	
	Lg Truck	0	0	1	0	0	0	0	0	0	0	5	0	0	2	1	0	
	Peds				0				0				0				0	

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
 Location: 83RD AVENUE & NORTHERN Starts : 02/25/97 at 06:00:  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00:  
 Study ID: 97166 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/red  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Begins		From North				From South				From East				From West				Inter Total
		RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Hour	Auto	0	56	420	10	0	35	320	47	0	36	169	21	0	10	251	41	141
	Sm Truck	0	0	2	0	0	2	7	1	0	2	6	1	0	1	2	0	2
	Lg Truck	0	1	4	1	0	1	3	3	0	0	11	0	0	3	9	0	3
	Peds				0				0			0					0	0
	All	0	57	426	11	0	38	330	51	0	38	186	22	0	14	262	41	147
	%	0.0	3.9	28.9	0.7	0.0	2.6	22.4	3.5	0.0	2.6	12.6	1.5	0.0	0.9	17.8	2.8	100.
			494				419				246				317			
8:00	Auto	0	16	55	2	0	6	84	12	0	13	39	11	0	3	54	8	30
	Sm Truck	0	0	1	0	0	1	1	0	0	0	3	1	0	1	1	0	0
	Lg Truck	0	0	1	0	0	1	1	0	0	1	6	0	0	1	5	0	1
	Peds				0				0			0					0	0
8:15	Auto	0	10	57	1	0	10	61	14	0	8	36	14	0	3	52	5	27
	Sm Truck	0	2	1	0	0	1	1	0	0	0	2	0	0	0	1	0	0
	Lg Truck	0	0	1	0	0	2	1	1	0	1	6	0	0	0	2	0	1
	Peds				0				0			0					0	0
8:30	Auto	0	11	49	1	0	10	52	7	0	9	29	3	0	5	57	4	23
	Sm Truck	0	0	2	0	0	0	0	0	0	0	1	1	0	1	0	0	0
	Lg Truck	0	0	0	2	0	0	2	0	0	0	4	0	0	0	4	0	1
	Peds				0				0			0					0	0
8:45	Auto	0	11	31	1	0	7	45	5	0	3	23	9	0	2	40	2	17
	Sm Truck	0	1	0	1	0	1	1	2	0	0	4	1	0	0	1	0	1
	Lg Truck	0	1	3	0	0	0	1	0	0	1	1	0	0	0	6	0	1
	Peds				0				0			0					0	0
Hour	Auto	0	48	192	5	0	33	242	38	0	33	127	37	0	13	203	19	99
	Sm Truck	0	3	4	1	0	3	3	2	0	0	10	3	0	2	3	0	3
	Lg Truck	0	1	5	2	0	3	5	1	0	3	17	0	0	1	17	0	5
	Peds				0				0			0					0	0
	All	0	52	201	8	0	39	250	41	0	36	154	40	0	16	223	19	107
	%	0.0	4.8	18.6	0.7	0.0	3.6	23.2	3.8	0.0	3.3	14.3	3.7	0.0	1.5	20.7	1.8	100.
9:00	Auto	0	11	38	1	0	3	53	5	0	2	31	6	0	6	33	5	19
	Sm Truck	0	0	1	1	0	0	1	0	0	0	2	0	0	0	3	0	0
	Lg Truck	0	0	2	0	0	0	1	1	0	0	7	0	0	1	5	0	1
	Peds				0				0			0					0	0
9:15	Auto	0	6	36	0	0	7	31	9	0	5	23	3	0	1	34	4	15
	Sm Truck	0	0	4	0	0	0	2	0	0	0	0	1	0	0	3	0	1
	Lg Truck	0	0	1	0	0	0	1	0	0	0	5	0	0	0	5	0	1
	Peds				0				0			0					0	0

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: - 3  
Date: 2/27/1

\*\*\*\*\*

Location: 83RD AVENUE & NORTHERN  
 Notes : NORTHERN=E/W  
 Study ID: 97166  
 Operator: TRA  
 Weather : CLEAR  
 Starts : 02/25/97 at 06:00  
 Ends : 02/25/97 at 18:00  
 Interval : 15 min Intervals: 48  
 S/N : 0 Type: C, SmT, LgT, P-rt/re  
 Correction: 1.00

\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	

Tue 2/25/1997																	
Begins	Auto	Sm Truck	Lg Truck	Peds	RtRed	Left	Thru	Right	Auto	Sm Truck	Lg Truck	Peds	RtRed	Left	Thru	Right	Inter Total
9:30	0	5	30	1	0	4	51	7	0	3	28	5	0	3	31	1	16
	0	0	1	0	0	0	0	1	0	0	1	0	0	1	3	0	
	0	1	1	0	0	0	2	0	0	1	0	0	0	0	4	0	
				0				0				0				0	
9:45	0	5	34	2	0	5	42	5	0	8	35	9	0	1	45	8	19
	0	0	0	0	0	1	3	0	0	0	1	0	0	0	3	0	
	0	0	0	0	0	2	1	0	0	1	3	1	0	0	5	0	1
				0				0				0				0	
Hour	0	27	138	4	0	19	177	26	0	18	117	23	0	11	143	18	72
	0	0	6	1	0	1	6	1	0	0	4	1	0	1	12	0	3
	0	1	4	0	0	2	5	1	0	2	15	1	0	1	19	0	5
				0				0				0				0	
All	0	28	148	5	0	22	188	28	0	20	136	25	0	13	174	18	80
†	0.0	3.5	18.4	0.6	0.0	2.7	23.4	3.5	0.0	2.5	16.9	3.1	0.0	1.6	21.6	2.2	100.
10:00	0	10	41	2	0	7	39	4	0	6	31	7	0	5	39	5	19
	0	0	1	1	0	0	2	0	0	0	1	0	0	0	1	0	
	0	0	0	0	0	0	0	1	0	0	1	0	0	0	4	0	
				0				0				0				0	
10:15	0	3	41	2	0	8	34	6	0	5	34	4	0	1	72	4	21
	0	0	1	0	0	0	1	0	0	0	2	0	0	0	1	0	
	0	0	2	0	0	0	1	0	0	0	5	1	0	0	2	0	1
				0				0				0				0	
10:30	0	7	38	3	0	3	58	8	0	7	38	3	0	3	41	7	21
	0	0	2	0	0	0	1	0	0	0	1	1	0	0	4	0	
	0	1	1	1	0	0	1	0	0	0	4	0	0	0	0	0	
				0				0				0				0	
10:45	0	4	36	2	0	4	48	7	0	9	40	6	0	5	49	8	21
	0	1	1	1	0	0	1	0	0	0	0	1	0	1	3	0	
	0	1	0	1	0	0	2	0	0	0	4	0	0	0	3	0	1
				0				0				0				0	
Hour	0	24	156	9	0	22	179	25	0	27	143	20	0	14	201	24	84
	0	1	5	2	0	0	5	0	0	0	4	2	0	1	9	0	2
	0	2	3	2	0	0	4	1	0	0	14	1	0	0	9	0	3
				0				0				0				0	
All	0	27	164	13	0	22	188	26	0	27	161	23	0	15	219	24	90
†	0.0	3.0	18.0	1.4	0.0	2.4	20.7	2.9	0.0	3.0	17.7	2.5	0.0	1.7	24.1	2.6	100.



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
 Location: 83RD AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
 Study ID: 97166 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/rec  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
12:30	Auto	0	8	44	3	0	1	42	8	0	5	27	3	0	6	33	0	18
	Sm Truck	0	1	0	0	0	0	0	1	0	0	1	0	0	1	3	1	
	Lg Truck	0	0	0	0	0	0	0	1	0	0	2	1	0	1	4	0	
	Peds				0				0								0	
12:45	Auto	0	3	36	3	0	9	67	9	0	8	30	11	0	0	28	0	20
	Sm Truck	0	0	1	1	0	1	2	1	0	2	0	0	0	0	7	0	1
	Lg Truck	0	0	1	0	0	0	2	1	0	1	3	0	0	0	9	1	1
	Peds				0				0								0	
Hour	Auto	0	14	157	14	0	19	203	31	0	22	116	29	0	9	129	13	75
	Sm Truck	0	1	2	1	0	2	4	2	0	4	5	1	0	1	12	2	3
	Lg Truck	0	0	1	0	0	1	3	2	0	4	10	1	0	2	16	1	
	Peds				0				0								0	
	All	0	15	160	15	0	22	210	35	0	30	131	31	0	12	157	16	82
	Σ	0.0	1.8	19.2	1.8	0.0	2.6	25.2	4.2	0.0	3.6	15.7	3.7	0.0	1.4	18.8	1.9	100
13:00	Auto	0	12	48	4	0	11	24	12	0	4	28	2	0	3	45	6	15
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	1	0	1	2	0	
	Lg Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	
	Peds				0				0								0	
13:15	Auto	0	3	48	3	0	4	35	4	0	4	40	12	0	2	37	5	15
	Sm Truck	0	0	0	0	0	0	4	0	0	1	2	0	0	0	2	0	
	Lg Truck	0	1	0	0	0	0	1	0	0	0	2	0	0	1	5	0	1
	Peds				0				0								0	
13:30	Auto	0	4	61	0	0	5	57	7	0	5	37	9	0	6	49	8	24
	Sm Truck	0	0	1	1	0	0	3	1	0	1	2	0	0	0	0	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	
	Peds				0				0								0	
13:45	Auto	0	4	57	5	0	8	56	8	0	10	29	12	0	7	48	5	24
	Sm Truck	0	0	2	1	0	0	5	2	0	0	0	0	0	0	0	0	1
	Lg Truck	0	0	1	0	0	1	1	0	0	0	4	0	0	0	4	1	1
	Peds				0				0								0	
Hour	Auto	0	23	214	12	0	28	172	31	0	23	134	35	0	18	179	24	89
	Sm Truck	0	0	3	2	0	0	12	3	0	2	6	1	0	1	4	0	3
	Lg Truck	0	1	2	0	0	1	2	0	0	0	10	0	0	1	11	2	3
	Peds				0				0								0	
	All	0	24	219	14	0	29	186	34	0	25	150	36	0	20	194	26	95
	Σ	0.0	2.5	22.9	1.5	0.0	3.0	19.4	3.6	0.0	2.6	15.7	3.8	0.0	2.1	20.3	2.7	100

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: - 5  
Date: 2/27/97

\*\*\*\*\*

Location: 83RD AVENUE & NORTHERN

Notes : NORTHERN=E/W

Study ID: 97166

Operator: TRA

Weather : CLEAR

Starts : 02/25/97 at 06:00

Ends : 02/25/97 at 18:00

Interval : 15 min Intervals: 48

S/N : 0 Type: C, SmT, LgT, P-rt/re

Correction: 1.00

\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
12:30	Auto	0	8	44	3	0	1	42	8	0	5	27	3	0	6	33	0	18
	Sm Truck	0	1	0	0	0	0	0	1	0	0	1	0	0	1	3	1	
	Lg Truck	0	0	0	0	0	0	0	1	0	0	2	1	0	1	4	0	
	Peds				0				0									
12:45	Auto	0	3	36	3	0	9	67	9	0	8	30	11	0	0	28	0	20
	Sm Truck	0	0	1	1	0	1	2	1	0	2	0	0	0	0	7	0	1
	Lg Truck	0	0	1	0	0	0	2	1	0	1	3	0	0	0	9	1	1
	Peds				0				0									
Hour	Auto	0	14	157	14	0	19	203	31	0	22	116	29	0	9	129	13	75
	Sm Truck	0	1	2	1	0	2	4	2	0	4	5	1	0	1	12	2	3
	Lg Truck	0	0	1	0	0	1	3	2	0	4	10	1	0	2	16	1	4
	Peds				0				0									
	All	0	15	160	15	0	22	210	35	0	30	131	31	0	12	157	16	83
	t	0.0	1.8	19.2	1.8	0.0	2.6	25.2	4.2	0.0	3.6	15.7	3.7	0.0	1.4	18.8	1.9	100.
13:00	Auto	0	12	48	4	0	11	24	12	0	4	28	2	0	3	45	6	19
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	1	0	1	2	0	
	Lg Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	0	
	Peds				0				0									
13:15	Auto	0	3	48	3	0	4	35	4	0	4	40	12	0	2	37	5	19
	Sm Truck	0	0	0	0	0	0	4	0	0	1	2	0	0	0	2	0	
	Lg Truck	0	1	0	0	0	0	1	0	0	0	2	0	0	1	5	0	1
	Peds				0				0									
13:30	Auto	0	4	61	0	0	5	57	7	0	5	37	9	0	6	49	8	24
	Sm Truck	0	0	1	1	0	0	3	1	0	1	2	0	0	0	0	0	
	Lg Truck	0	0	0	0	0	0	0	0	0	0	4	0	0	0	0	1	
	Peds				0				0									
13:45	Auto	0	4	57	5	0	8	56	8	0	10	29	12	0	7	48	5	24
	Sm Truck	0	0	2	1	0	0	5	2	0	0	0	0	0	0	0	0	1
	Lg Truck	0	0	1	0	0	1	1	0	0	0	4	0	0	0	4	1	1
	Peds				0				0									
Hour	Auto	0	23	214	12	0	28	172	31	0	23	134	35	0	18	179	24	89
	Sm Truck	0	0	3	2	0	0	12	3	0	2	6	1	0	1	4	0	3
	Lg Truck	0	1	2	0	0	1	2	0	0	0	10	0	0	1	11	2	3
	Peds				0				0									
	All	0	24	219	14	0	29	186	34	0	25	150	36	0	20	194	26	95
	t	0.0	2.5	22.9	1.5	0.0	3.0	19.4	3.6	0.0	2.6	15.7	3.8	0.0	2.1	20.3	2.7	100.

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: - 6  
Date: 2/27/97

\*\*\*\*\*  
Location: 83RD AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
Study ID: 97166 Interval : 15 min Intervals: 48  
Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/re  
Weather : CLEAR Correction: 1.00  
\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
14:00	Auto	0	7	58	3	0	5	63	12	0	7	36	8	0	5	48	7	25
	Sm Truck	0	1	4	0	0	0	6	0	0	1	3	0	0	0	4	0	
	Lg Truck	0	0	1	0	0	0	1	0	0	0	1	0	0	0	2	0	
	Peds				0				0				0				0	
14:15	Auto	0	7	61	2	0	9	57	6	0	14	46	8	0	1	39	2	25
	Sm Truck	0	0	0	0	0	0	3	2	0	1	5	0	0	1	0	0	
	Lg Truck	0	0	0	0	0	1	1	0	0	0	1	0	0	0	8	1	
	Peds				0				0				0				0	
14:30	Auto	0	6	79	4	0	3	72	7	0	7	42	7	0	3	41	7	27
	Sm Truck	0	0	1	0	0	0	2	0	0	2	4	1	0	0	1	0	
	Lg Truck	0	0	2	0	0	2	0	0	0	0	3	0	0	0	5	0	
	Peds				0				0				0				0	
14:45	Auto	0	6	67	3	0	7	64	10	0	12	42	8	0	2	60	6	28
	Sm Truck	0	0	0	0	0	0	3	1	0	0	0	0	0	0	2	0	
	Lg Truck	0	0	1	1	0	0	1	0	0	0	4	0	0	0	7	0	
	Peds				0				0				0				0	
Hour	Auto	0	26	265	12	0	24	256	35	0	40	166	31	0	11	188	22	10
	Sm Truck	0	1	5	0	0	0	14	3	0	4	12	1	0	1	7	0	
	Lg Truck	0	0	4	1	0	3	3	0	0	0	9	0	0	0	22	1	
	Peds				0				0				0				0	
	All	0	27	274	13	0	27	273	38	0	44	187	32	0	12	217	23	11
	†	0.0	2.3	23.5	1.1	0.0	2.3	23.4	3.3	0.0	3.8	16.0	2.7	0.0	1.0	18.6	2.0	100
15:00	Auto	0	9	58	5	0	14	66	10	0	12	47	7	0	5	54	4	25
	Sm Truck	0	0	1	2	0	0	3	0	0	1	1	0	0	0	0	0	
	Lg Truck	0	0	3	0	0	0	0	0	0	1	1	0	0	0	5	0	
	Peds				0				0				0				0	
15:15	Auto	0	10	64	5	0	8	72	17	0	12	40	11	0	9	68	2	37
	Sm Truck	0	0	1	0	0	0	3	2	0	0	3	0	0	1	2	0	
	Lg Truck	0	0	0	0	0	1	0	0	0	0	0	0	0	0	3	0	
	Peds				0				0				0				0	
15:30	Auto	0	13	81	3	0	18	88	6	0	16	49	18	0	8	58	10	34
	Sm Truck	0	0	1	0	0	0	1	0	0	0	2	0	0	0	2	0	
	Lg Truck	0	0	0	0	0	0	1	0	0	0	1	0	0	0	3	0	
	Peds				0				0				0				0	
15:45	Auto	0	12	67	1	0	4	94	13	0	16	47	9	0	2	53	6	32
	Sm Truck	0	1	0	0	0	0	5	1	0	0	3	0	0	1	0	0	
	Lg Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	1	1	0	
	Peds				0				0				0				0	

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: - 7  
Date: 2/27/19

\*\*\*\*\*

Location: 83RD AVENUE & NORTHERN

Notes : NORTHERN=E/W

Study ID: 97166

Operator: TRA

Weather : CLEAR

Starts : 02/25/97 at 06:00:

Ends : 02/25/97 at 18:00:

Interval : 15 min Intervals: 48

S/N : 0

Type: C, SmT, LgT, P-rt/red

Correction: 1.00

\*\*\*\*\*

Begins	Hour	Auto	From North				From South				From East				From West				Inter Total
			RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
			0	44	270	14	0	44	320	46	0	56	183	45	0	24	233	22	130
		Sm Truck	0	1	3	2	0	0	12	3	0	1	9	0	0	2	4	0	3
		Lg Truck	0	0	4	0	0	1	1	0	0	1	2	0	0	1	12	0	2
		Peds				0				0				0				0	
		All	0	45	277	16	0	45	333	49	0	58	194	45	0	27	249	22	136
		‡	0.0	3.3	20.4	1.2	0.0	3.3	24.5	3.6	0.0	4.3	14.3	3.3	0.0	2.0	18.3	1.6	100.
16:00		Auto	0	5	50	5	0	14	125	11	0	12	59	5	0	5	59	7	35
		Sm Truck	0	0	1	0	0	1	2	0	0	0	0	0	0	0	5	0	
		Lg Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	3	0	
		Peds				0				0				0				0	
16:15		Auto	0	11	67	4	0	10	87	9	0	10	51	13	0	2	63	17	34
		Sm Truck	0	0	1	0	0	0	1	0	0	0	1	0	0	0	2	0	
		Lg Truck	0	0	0	0	0	1	2	0	0	0	0	0	0	1	0	1	
		Peds				0				0				0				0	
6:30		Auto	0	7	79	6	0	13	123	12	0	17	60	15	0	12	59	14	41
		Sm Truck	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	
		Lg Truck	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	
		Peds				0				0				0				0	
16:45		Auto	0	7	82	8	0	11	120	10	0	12	48	16	0	3	70	10	39
		Sm Truck	0	0	0	0	0	0	1	1	0	0	0	0	0	1	0	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	
		Peds				0				0				0				0	
Hour		Auto	0	30	278	23	0	48	455	42	0	51	218	49	0	22	251	48	151
		Sm Truck	0	0	3	0	0	1	4	1	0	1	1	0	0	1	7	0	1
		Lg Truck	0	0	0	0	0	1	5	0	0	0	0	0	0	1	6	1	1
		Peds				0				0				0				0	
		All	0	30	281	23	0	50	464	43	0	52	219	49	0	24	264	49	154
		‡	0.0	1.9	18.2	1.5	0.0	3.2	30.0	2.8	0.0	3.4	14.1	3.2	0.0	1.6	17.1	3.2	100.
17:00		Auto	0	5	93	1	0	8	152	13	0	18	70	17	0	6	58	12	45
		Sm Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	0	4	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	
		Peds				0				0				0				0	
17:15		Auto	0	8	87	8	0	12	143	9	0	13	49	9	0	6	51	13	40
		Sm Truck	0	0	2	0	0	0	0	0	0	1	1	0	0	0	2	0	
		Lg Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	
		Peds				0				0				0				0	



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: -9  
Date: 2/27/19

\*\*\*\*\*  
 cation: 83RD AVENUE & NORTHERN  
 Notes : NORTHERN=E/W Starts : 02/25/97 at 06:00  
 Study ID: 97166 Ends : 02/25/97 at 18:00  
 Operator: TRA Interval : 15 min Intervals: 48  
 Weather : CLEAR S/N : 0 Type: C, SmT, LgT, P-rt/rec  
 Correction: 1.00  
 \*\*\*\*\*

	From North				From South				From East				From West				Total
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Grand																	
Total Auto	0	383	2929	145	0	365	3320	458	0	429	1926	374	0	171	2296	321	1311
†	0.0	2.8	21.1	1.0	0.0	2.6	23.9	3.3	0.0	3.1	13.9	2.7	0.0	1.2	16.5	2.3	94.
Sm Truck	0	9	46	9	0	12	79	17	0	16	70	13	0	13	78	4	36.
†	0.0	0.1	0.3	0.1	0.0	0.1	0.6	0.1	0.0	0.1	0.5	0.1	0.0	0.1	0.6	0.0	2.
Lg Truck	0	8	37	6	0	15	37	10	0	13	104	6	0	11	135	9	39.
†	0.0	0.1	0.3	0.0	0.0	0.1	0.3	0.1	0.0	0.1	0.7	0.0	0.0	0.1	1.0	0.1	2.
Peds				0				0				0				0	
All	0	400	3012	160	0	392	3436	485	0	458	2100	393	0	195	2509	334	1387
†	0.0	2.9	21.7	1.2	0.0	2.8	24.8	3.5	0.0	3.3	15.1	2.8	0.0	1.4	18.1	2.4	100.

TURNING MOVEMENTS FOR TOTAL INTERSECTION

		From North ( Peds = 0 )				From East ( Peds = 0 )			
		Rt/red	Right	Thru	Left	Rt/Red	Right	Thru	Left
Total 7596		Approach 3572				Depart 4024			
Total 5690		0	160	3012	400	195	3436	393	0
From West ( Peds = 0 )		Approach 3038				Depart 3394			
Total 634		0	195	2509	334	485	3012	458	0
From South ( Peds = 0 )		Approach 4313				Depart 3804			
Total 8117		334	3012	458	0	392	3436	485	0





SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: -12  
Date: 2/27/19

\*\*\*\*\*  
Location: 83RD AVENUE & NORTHERN  
Notes : NORTHERN=E/W  
Study ID: 97166  
Operator: TRA  
Weather : CLEAR  
Starts : 02/25/97 at 06:00:  
Ends : 02/25/97 at 18:00:  
Interval : 15 min Intervals: 48  
S/N : 0 Type: C, SmT, LgT, P-rt/red  
Correction: 1.00  
\*\*\*\*\*

AUTOMOBILE PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:45	0	0	57	428	9	494	0.91	0.0%	11.5%	86.6%	1.8%	100.	
From South	2/25/97	17:00	0	0	49	551	57	657	0.93	0.0%	7.5%	83.9%	8.7%	100.	
From East	2/25/97	17:00	0	0	63	242	48	353	0.84	0.0%	17.8%	68.6%	13.6%	100.	
From West	2/25/97	16:15	0	0	23	250	53	326	0.96	0.0%	7.1%	76.7%	16.3%	100.	

From North			
( Peds = 0 )			
Total 1116			
Approach 494			Depart 622
Rt/red	Right	Thru	Left
0	9	428	57

Depart 300		242	0		Rt/Red
		49	48		Right
		63	242		Thru Approach 353
		23	63		Left
Total 626		N		Total 717	
From West		W + E		From East	
(Peds = 0)		8		(Peds = 0)	
Left		23	57		
Approach 326		Thru	250	250	
		Right	53	Depart 364	
		Rt/Red	0	57	

53	428	63	49	551	57	0
		Left		Thru	Right	Rt/Red
Depart 544				Approach 657		
		Total 1201				
		From South				
		( Peds = 0 )				

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 13  
Date: 2/27/1997

\*\*\*\*\*  
 Location: 83RD AVENUE & NORTHERN  
 Notes : NORTHERN=E/W Starts : 02/25/97 at 06:00  
 Study ID: 97166 Ends : 02/25/97 at 18:00  
 Operator: TRA Interval : 15 min Intervals: 48  
 Weather : CLEAR S/N : 0 Type: C, SMT, LgT, P-rt/red  
 Correction: 1.00  
 \*\*\*\*\*

LIGHT TRUCK PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	8:30	0	0	1	7	2	10	0.63	0.0%	10.0%	70.0%	20.0%	100.	
From South	2/25/97	13:30	0	0	0	17	5	22	0.79	0.0%	0.0%	77.3%	22.7%	100.	
From East	2/25/97	13:45	0	0	4	12	1	17	0.61	0.0%	23.5%	70.6%	5.9%	100.	
From West	2/25/97	12:15	0	0	2	13	2	17	0.61	0.0%	11.8%	76.5%	11.8%	100.	

From North  
 ( Peds = 0 )  
 Total 30  
 Approach 10 Depart 20  
 RT/red Right Thru Left  
 0 2 7 1

Depart 14  
 12  
 0  
 Total 31  
 From West  
 (Peds = 0)  
 Left 2  
 Approach 17  
 Thru 13  
 Right 2  
 Rt/Red 0

0 Rt/Red  
 1 Right  
 12 Thru Approach 17  
 4 Left  
 N  
 W + E  
 S  
 From East  
 (Peds = 0)  
 1  
 13 Depart 19  
 5  
 2 7 4 0 17 5 0  
 Left Thru Right Rt/Red  
 Depart 13 Approach 22  
 Total 35  
 From South  
 ( Peds = 0 )

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 14  
Date: 2/27/19

\*\*\*\*\*  
 cation: 83RD AVENUE & NORTHERN Starts : 02/25/97 at 06:00  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00  
 Study ID: 97166 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/rec  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

LARGE TRUCK PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:15	0	0	0	9	0	9	0.56	0.0%	0.0%	100.0%	0.0%	100.0%	
From South	2/25/97	7:30	0	0	4	5	3	12	0.50	0.0%	33.3%	41.7%	25.0%	100.0%	
From East	2/25/97	7:45	0	0	2	21	0	23	0.82	0.0%	8.7%	91.3%	0.0%	100.0%	
From West	2/25/97	14:15	0	0	0	25	1	26	0.72	0.0%	0.0%	96.2%	3.8%	100.0%	

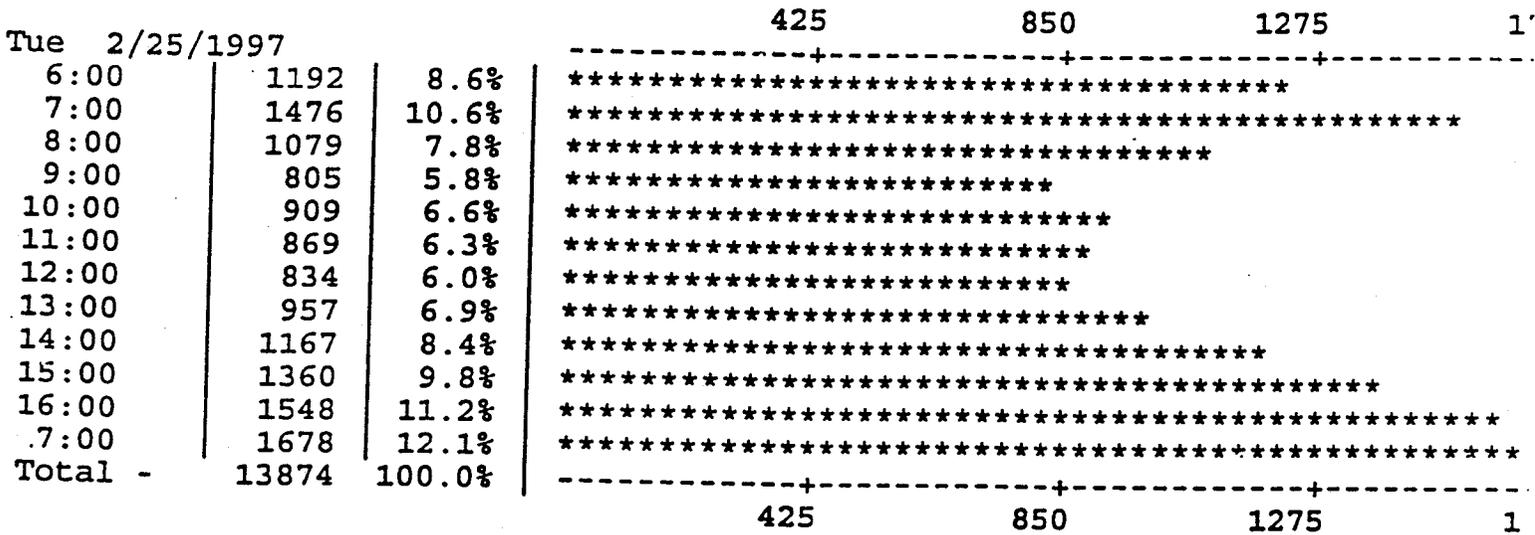
From North		From South		From East		From West		Total	
( Peds = 0 )								14	
Approach 9		Depart 5							
Rt/red	Right	Thru	Left						
0	0	9	0	0	5	0			
Total 51		Total 51		Total 51		Total 51		Total 51	
From West (Peds = 0)		From East (Peds = 0)		From South (Peds = 0)		From North (Peds = 0)		Total 51	
Left 0		Right 0		Thru 25		Approach 12		Total 24	
Approach 26		Depart 28		Approach 12		Approach 12		Total 24	
Right 1		Approach 12		Approach 12		Approach 12		Total 24	
Rt/Red 0		Approach 12		Approach 12		Approach 12		Total 24	
Total 51		Total 51		Total 51		Total 51		Total 51	

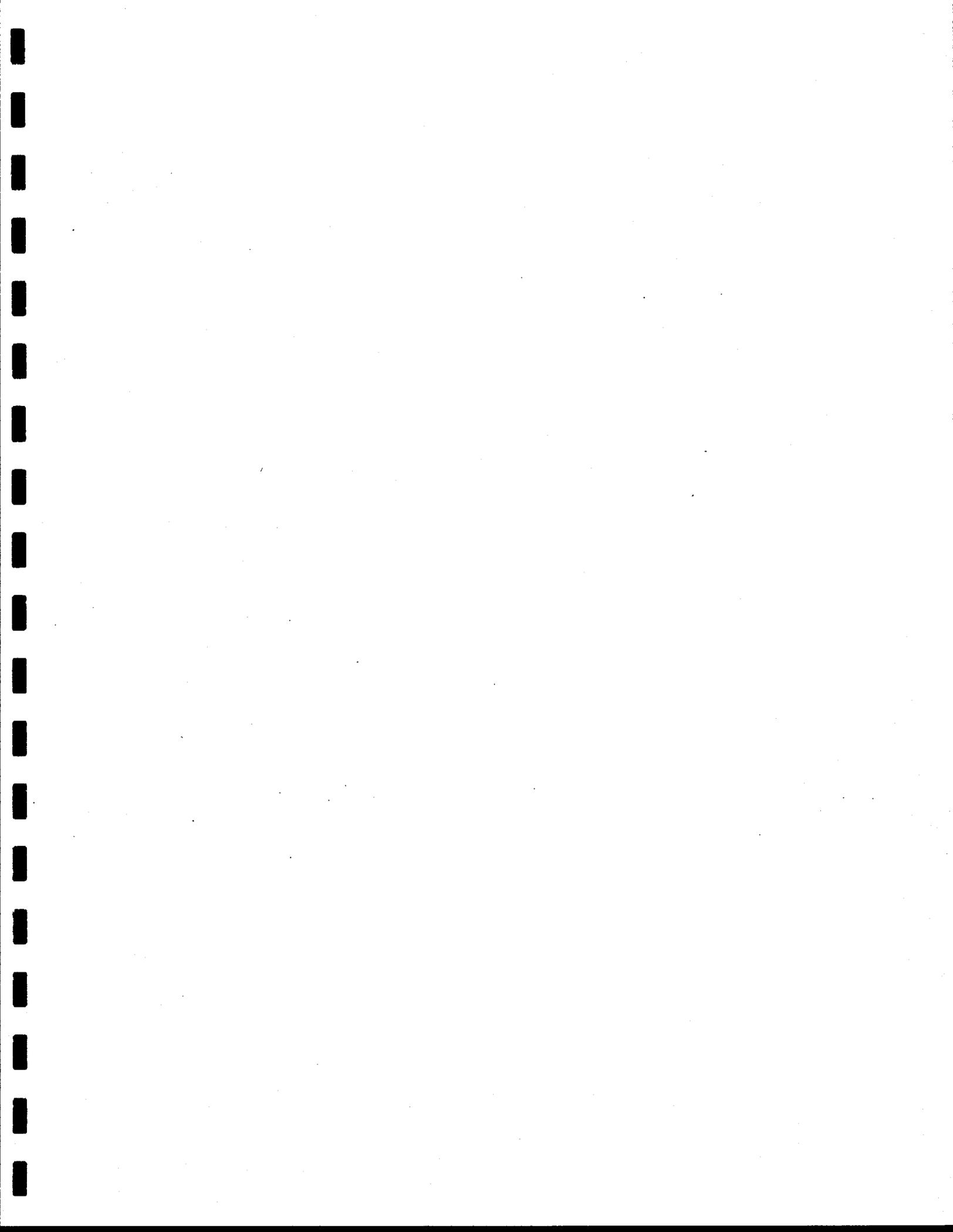


Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
 Location: 83RD AVENUE & NORTHERN Starts : 02/25/97 at 06:00:  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00:  
 Study ID: 97166 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/rec  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Graph of Total Volume per Hour





TRAFFIC RESEARCH AND ANALYSIS  
TURNING MOVEMENT COUNT

SUSAN MEDLAND

Page: 1  
Date: 2/28/97

Three Vehicle Analysis with Right on Red

\*\*\*\*\*

Location: 91ST AVENUE & NORTHERN

Starts : 02/25/97 at 06:00:

Notes : NORTHERN=E/W

Ends : 02/25/97 at 18:00:

Study ID: 97165

Interval : 15 min Intervals: 48

Operator: TRA

S/N : 0

Type: C, SmT, LgT, P-rt/red

Weather : CLEAR

Correction: 1.00

\*\*\*\*\*

Begins	From North				From South				From East				From West				Interv Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
6:00	Auto	0	3	106	6	0	17	41	4	0	3	26	3	0	1	33	35	278
	Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lg Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2	1	4
	Peds				0				0				0					0
6:15	Auto	0	5	100	5	0	16	57	5	0	6	24	1	0	1	33	39	292
	Sm Truck	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	0	3
	Lg Truck	0	0	1	0	0	0	0	0	0	0	1	2	0	0	0	0	4
	Peds				0				0				0					0
6:30	Auto	0	7	168	10	0	28	90	7	0	9	22	2	0	1	45	41	430
	Sm Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	2
	Lg Truck	0	0	3	0	0	1	1	0	0	0	1	0	0	0	1	1	8
	Peds				0				0				0					0
6:45	Auto	0	8	98	3	0	18	63	4	0	1	33	2	0	0	45	30	305
	Sm Truck	0	0	0	0	0	1	1	0	0	0	1	0	0	0	1	0	4
	Lg Truck	0	0	1	0	0	1	1	0	0	0	1	1	0	0	2	0	7
	Peds				0				0				0					0
Hour	Auto	0	23	472	24	0	79	251	20	0	19	105	8	0	3	156	145	1305
	Sm Truck	0	0	2	0	0	3	1	0	0	0	1	0	0	0	2	0	5
	Lg Truck	0	0	6	0	0	2	2	0	0	0	3	3	0	0	5	2	20
	Peds				0				0				0					0
	All	0	23	480	24	0	84	254	20	0	19	109	11	0	3	163	147	1337
	%	0.0	1.7	35.9	1.8	0.0	6.3	19.0	1.5	0.0	1.4	8.2	0.8	0.0	0.2	12.2	11.0	100.0
7:00	Auto	0	3	175	3	0	14	70	6	0	9	36	6	0	3	60	48	435
	Sm Truck	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0	2
	Lg Truck	0	0	2	0	0	0	0	0	0	1	1	1	0	1	4	0	10
	Peds				0				0				0					0
7:15	Auto	0	6	135	2	0	22	75	10	0	2	38	3	0	1	55	51	400
	Sm Truck	0	0	0	0	0	0	2	0	0	0	0	0	0	0	1	0	3
	Lg Truck	0	0	2	0	0	4	1	0	0	0	2	1	0	0	1	1	12
	Peds				0				0				0					0
7:30	Auto	0	7	112	5	0	18	73	8	0	8	55	5	0	1	55	40	387
	Sm Truck	0	0	4	0	0	1	1	0	0	0	0	0	0	0	0	0	6
	Lg Truck	0	1	0	0	0	0	0	0	0	1	4	1	0	2	6	0	15
	Peds				0				0				0					0
7:45	Auto	0	6	74	5	0	16	74	3	0	6	45	5	0	3	47	27	311
	Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	Lg Truck	0	0	2	0	0	0	1	0	0	0	5	0	0	1	1	1	12
	Peds				0				0				0					0

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*

Location: 91ST AVENUE & NORTHERN

Starts : 02/25/97 at 06:00:

Notes : NORTHERN=E/W

Ends : 02/25/97 at 18:00:

Study ID: 97165

Interval : 15 min Intervals: 48

Operator: TRA

S/N : 0

Type: C, SmT, LgT, P-rt/rec

Weather : CLEAR

Correction: 1.00

\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Hour	Auto	0	22	496	15	0	70	292	27	0	25	174	19	0	8	217	166	153
	Sm Truck	0	0	4	0	0	1	3	0	0	0	1	0	0	0	2	0	1
	Lg Truck	0	1	6	0	0	4	2	0	0	2	12	3	0	4	12	2	4
	Peds				0				0				0					0
	All	0	23	506	15	0	75	297	27	0	27	187	22	0	12	231	168	159
	v	0.0	1.4	31.8	0.9	0.0	4.7	18.7	1.7	0.0	1.7	11.8	1.4	0.0	0.8	14.5	10.6	100.
			544				399				236				411			
8:00	Auto	0	4	57	4	0	6	58	3	0	3	38	6	0	5	44	19	24
	Sm Truck	0	0	1	0	0	1	2	0	0	1	3	1	0	0	0	0	0
	Lg Truck	0	0	0	0	0	3	1	2	0	2	8	1	0	0	5	1	2
	Peds				0				0				0					0
8:15	Auto	0	9	61	4	0	9	53	7	0	5	29	7	0	3	45	14	24
	Sm Truck	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
	Lg Truck	0	0	0	1	0	1	1	0	0	2	8	0	0	0	3	1	1
	Peds				0				0				0					0
8:30	Auto	0	4	57	2	0	8	42	6	0	3	40	4	0	0	39	8	21
	Sm Truck	0	1	2	0	0	0	1	0	0	0	1	1	0	0	0	0	0
	Lg Truck	0	0	0	0	0	1	0	0	0	0	5	0	0	0	3	2	1
	Peds				0				0				0					0
8:45	Auto	0	5	28	2	0	9	42	4	0	2	27	3	0	0	32	7	16
	Sm Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	2	0	0
	Lg Truck	0	0	1	0	0	2	1	0	0	0	5	0	0	0	6	0	1
	Peds				0				0				0					0
Hour	Auto	0	22	203	12	0	32	195	20	0	13	134	20	0	8	160	48	86
	Sm Truck	0	1	3	0	0	1	5	0	0	1	5	2	0	0	2	0	2
	Lg Truck	0	0	1	1	0	7	3	2	0	4	26	1	0	0	17	4	6
	Peds				0				0				0					0
	All	0	23	207	13	0	40	203	22	0	18	165	23	0	8	179	52	95
	v	0.0	2.4	21.7	1.4	0.0	4.2	21.3	2.3	0.0	1.9	17.3	2.4	0.0	0.8	18.8	5.5	100.
9:00	Auto	0	4	31	2	0	2	26	1	0	4	30	5	0	4	29	7	14
	Sm Truck	0	0	0	0	0	0	0	1	0	0	1	0	0	0	1	0	0
	Lg Truck	0	0	0	0	0	0	0	1	0	0	5	0	0	0	4	0	1
	Peds				0				0				0					0
9:15	Auto	0	3	31	3	0	3	28	3	0	3	28	3	0	2	26	7	14
	Sm Truck	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0
	Lg Truck	0	0	0	0	0	1	1	0	0	0	5	0	0	0	5	0	1
	Peds				0				0				0					0

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
 Location: 91ST AVENUE & NORTHERN  
 Notes : NORTHERN=E/W  
 Study ID: 97165  
 Operator: TRA  
 Weather : CLEAR  
 Starts : 02/25/97 at 06:00:  
 Ends : 02/25/97 at 18:00:  
 Interval : 15 min Intervals: 48  
 S/N : 0 Type: C, SmT, LgT, P-rt/red  
 Correction: 1.00  
 \*\*\*\*\*

Begins	From North				From South				From East				From West				Interv Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
12:30	Auto	0	7	27	4	0	11	50	1	0	3	25	2	0	2	35	8	175
	Sm Truck	0	0	1	0	0	1	0	1	0	1	1	0	0	0	4	1	10
	Lg Truck	0	0	0	0	0	1	2	0	0	0	3	0	0	0	6	1	13
	Peds				0				0				0				0	
12:45	Auto	0	0	33	3	0	3	43	2	0	3	34	4	0	3	29	7	164
	Sm Truck	0	0	1	1	0	0	1	1	0	0	0	0	0	0	1	1	6
	Lg Truck	0	0	2	0	0	2	1	3	0	0	4	1	0	0	11	1	25
	Peds				0				0				0				0	
Hour	Auto	0	10	134	17	0	32	172	7	0	10	103	17	0	12	130	22	666
	Sm Truck	0	1	2	1	0	3	4	3	0	1	4	0	0	0	8	2	25
	Lg Truck	0	0	4	0	0	5	4	4	0	1	11	1	0	0	17	3	50
	Peds				0				0				0				0	
	All	0	11	140	18	0	40	180	14	0	12	118	18	0	12	155	27	745
	Σ	0.0	1.5	18.8	2.4	0.0	5.4	24.2	1.9	0.0	1.6	15.8	2.4	0.0	1.6	20.8	3.6	100.0
13:00	Auto	0	6	43	2	0	6	41	3	0	7	28	12	0	2	39	2	193
	Sm Truck	0	0	2	0	0	0	2	1	0	0	0	0	0	1	1	0	7
	Lg Truck	0	0	0	0	0	0	3	0	0	0	0	1	0	0	2	0	7
	Peds				0				0				0				0	
13:15	Auto	0	3	51	7	0	12	55	3	0	5	32	7	0	2	37	9	223
	Sm Truck	0	0	1	0	0	0	3	0	0	0	1	1	0	0	1	1	8
	Lg Truck	0	0	1	0	0	4	0	0	0	1	3	0	0	0	5	2	10
	Peds				0				0				0				0	
13:30	Auto	0	5	40	2	0	11	49	4	0	4	24	6	0	4	49	9	207
	Sm Truck	0	0	0	1	0	1	1	0	0	0	1	0	0	0	0	0	4
	Lg Truck	0	1	1	0	0	1	1	0	0	0	4	0	0	1	4	1	11
	Peds				0				0				0				0	
13:45	Auto	0	3	46	2	0	9	65	7	0	2	33	7	0	5	44	11	233
	Sm Truck	0	0	1	1	0	0	3	0	0	0	2	0	0	0	0	1	7
	Lg Truck	0	0	0	0	0	2	3	0	0	0	4	0	0	1	2	2	11
	Peds				0				0				0				0	
Hour	Auto	0	17	180	13	0	38	210	17	0	18	117	32	0	13	169	31	857
	Sm Truck	0	0	4	2	0	1	9	1	0	0	4	1	0	1	2	2	27
	Lg Truck	0	1	2	0	0	7	7	0	0	1	11	1	0	2	13	5	50
	Peds				0				0				0				0	
	All	0	18	186	15	0	46	226	18	0	19	132	34	0	16	184	38	933
	Σ	0.0	1.9	20.0	1.6	0.0	4.9	24.2	1.9	0.0	2.0	14.2	3.6	0.0	1.7	19.7	4.1	100.0



SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: -7  
Date: 2/28/97

\*\*\*\*\*

Location: 91ST AVENUE & NORTHERN

Notes : NORTHERN=E/W

Study ID: 97165

Operator: TRA

Weather : CLEAR

Starts : 02/25/97 at 06:00:

Ends : 02/25/97 at 18:00:

Interval : 15 min Intervals: 48

S/N : 0

Type: C, SmT, LgT, P-rt/red

Correction: 1.00

\*\*\*\*\*

Begins	Hour	Auto	From North				From South				From East				From West				Inter-Total
			RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
			0	22	186	20	0	108	361	19	0	14	169	31	0	18	235	57	124
		Sm Truck	0	0	4	1	0	0	8	0	0	1	3	0	0	0	5	1	2
		Lg Truck	0	0	4	1	0	1	1	0	0	0	4	0	0	1	13	2	2
		Peds				0				0									0
		All	0	22	194	22	0	109	370	19	0	15	176	31	0	19	253	60	129
		‡	0.0	1.7	15.0	1.7	0.0	8.4	28.7	1.5	0.0	1.2	13.6	2.4	0.0	1.5	19.6	4.7	100
16:00		Auto	0	4	46	4	0	32	130	8	0	5	61	8	0	10	64	26	39
		Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	
		Lg Truck	0	0	0	0	0	0	0	1	0	0	1	1	0	0	0	1	
		Peds				0				0									0
16:15		Auto	0	7	65	10	0	44	145	5	0	5	56	12	0	10	69	13	44
		Sm Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	8	1	1
		Lg Truck	0	1	0	0	0	0	0	0	0	1	0	0	0	0	4	0	
		Peds				0				0									0
6:30		Auto	0	2	59	3	0	37	129	6	0	7	49	17	0	6	75	20	41
		Sm Truck	0	0	0	1	0	0	0	0	0	0	0	0	0	1	1	0	
		Lg Truck	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	
		Peds				0				0									0
16:45		Auto	0	5	57	5	0	36	135	11	0	6	46	6	0	4	59	13	38
		Sm Truck	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4	1	
		Lg Truck	0	0	1	0	0	0	3	0	0	0	0	0	0	0	2	1	
		Peds				0				0									0
Hour		Auto	0	18	227	22	0	149	539	30	0	23	212	43	0	30	267	72	163
		Sm Truck	0	0	0	1	0	0	1	0	0	0	2	0	0	1	15	2	2
		Lg Truck	0	1	2	0	0	0	4	1	0	1	1	1	0	0	7	2	2
		Peds				0				0									0
		All	0	19	229	23	0	149	544	31	0	24	215	44	0	31	289	76	167
		‡	0.0	1.1	13.7	1.4	0.0	8.9	32.5	1.9	0.0	1.4	12.8	2.6	0.0	1.9	17.3	4.5	100
17:00		Auto	0	11	76	5	0	42	149	4	0	10	50	15	0	7	59	10	43
		Sm Truck	0	0	1	0	0	0	1	0	0	0	0	0	0	1	3	0	
		Lg Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	2	0	
		Peds				0				1									0
17:15		Auto	0	6	72	5	0	50	183	6	0	5	48	13	0	6	54	13	46
		Sm Truck	0	0	1	0	0	0	5	1	0	0	1	0	0	0	0	1	
		Lg Truck	0	0	1	0	0	0	1	0	0	0	0	0	0	0	1	0	
		Peds				0				0									0

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
Location: 91ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W  
Study ID: 97165  
Operator: TRA  
Weather : CLEAR  
Interval : 15 min  
S/N : 0  
Correction: 1.00  
Starts : 02/25/97 at 06:00:  
Ends : 02/25/97 at 18:00:  
Type: C, SmT, LgT, P-rt/red  
\*\*\*\*\*

Begins	From North				From South				From East				From West				Inter Total	
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right		
Tue 2/25/1997																		
17:30	Auto	0	8	54	8	0	60	174	6	0	6	54	14	0	8	46	18	45
	Sm Truck	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0
	Lg Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	4	0	0
	Peds				0				0									0
17:45	Auto	0	0	41	10	0	42	147	7	0	5	43	17	0	6	36	6	36
	Sm Truck	0	0	0	0	0	0	1	0	0	0	1	0	0	0	0	0	0
	Lg Truck	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0
	Peds				0				0									0
Hour	Auto	0	25	243	28	0	194	653	23	0	26	195	59	0	27	195	47	171
	Sm Truck	0	0	2	0	0	0	7	1	0	0	4	0	0	1	3	1	1
	Lg Truck	0	0	1	0	0	0	3	0	0	0	2	0	0	0	7	0	1
	Peds				0				1									0
	All	0	25	246	28	0	194	663	24	0	26	201	59	0	28	205	48	174
	†	0.0	1.4	14.1	1.6	0.0	11.1	38.0	1.4	0.0	1.5	11.5	3.4	0.0	1.6	11.7	2.7	100.
			299				881				286				281			
PM																		
	Auto	0	107	1151	124	0	565	2189	108	0	117	933	206	0	111	1165	273	704
	†	0.0	1.4	15.5	1.7	0.0	7.6	29.5	1.5	0.0	1.6	12.6	2.8	0.0	1.5	15.7	3.7	95.
	Sm Truck	0	1	18	5	0	4	34	6	0	3	21	3	0	3	37	11	14
	†	0.0	0.0	0.2	0.1	0.0	0.1	0.5	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.5	0.1	2.
	Lg Truck	0	2	17	2	0	16	24	6	0	4	45	4	0	4	83	18	22
	†	0.0	0.0	0.2	0.0	0.0	0.2	0.3	0.1	0.0	0.1	0.6	0.1	0.0	0.1	1.1	0.2	3.
	Peds				1				1									0
	All	0	110	1186	131	0	585	2247	120	0	124	999	213	0	118	1285	302	742
	†	0.0	1.5	16.0	1.8	0.0	7.9	30.3	1.6	0.0	1.7	13.5	2.9	0.0	1.6	17.3	4.1	100.
Day																		
	Auto	0	217	2666	204	0	813	3336	253	0	226	1722	311	0	165	2089	716	1271
	†	0.0	1.6	19.8	1.5	0.0	6.0	24.8	1.9	0.0	1.7	12.8	2.3	0.0	1.2	15.5	5.3	94.
	Sm Truck	0	2	32	8	0	12	51	7	0	4	37	5	0	3	59	12	23
	†	0.0	0.0	0.2	0.1	0.0	0.1	0.4	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.1	1.
	Lg Truck	0	5	40	5	0	42	43	13	0	14	123	12	0	10	159	38	50
	†	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.1	0.0	0.1	0.9	0.1	0.0	0.1	1.2	0.3	3.
	Peds				1				3									0
	All	0	224	2738	217	0	867	3430	273	0	244	1882	328	0	178	2307	766	1345
	†	0.0	1.7	20.4	1.6	0.0	6.4	25.5	2.0	0.0	1.8	14.0	2.4	0.0	1.3	17.1	5.7	100.

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: -9  
Date: 2/28/97

\*\*\*\*\*  
Location: 91ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W  
Study ID: 97165  
Operator: TRA  
Weather : CLEAR  
\*\*\*\*\*

Starts : 02/25/97 at 06:00:

Ends : 02/25/97 at 18:00:

Interval : 15 min Intervals: 48

S/N : 0 Type: C, SMT, LgT, P-rt/red

Correction: 1.00  
\*\*\*\*\*

	From North				From South				From East				From West				Total
	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	RtRed	Left	Thru	Right	
Grand																	
Total Auto	0	217	2666	204	0	813	3336	253	0	226	1722	311	0	165	2089	716	12716
†	0.0	1.6	19.8	1.5	0.0	6.0	24.8	1.9	0.0	1.7	12.8	2.3	0.0	1.2	15.5	5.3	94.5
Sm Truck	0	2	32	8	0	12	51	7	0	4	37	5	0	3	59	12	232
†	0.0	0.0	0.2	0.1	0.0	0.1	0.4	0.1	0.0	0.0	0.3	0.0	0.0	0.0	0.4	0.1	1.7
Lg Truck	0	5	40	5	0	42	43	13	0	14	123	12	0	10	159	38	504
†	0.0	0.0	0.3	0.0	0.0	0.3	0.3	0.1	0.0	0.1	0.9	0.1	0.0	0.1	1.2	0.3	3.7
Peds				1				3				1				0	
All	0	224	2738	217	0	867	3430	273	0	244	1882	328	0	178	2307	766	13454
†	0.0	1.7	20.4	1.6	0.0	6.4	25.5	2.0	0.0	1.8	14.0	2.4	0.0	1.3	17.1	5.7	100.0

TURNING MOVEMENTS FOR TOTAL INTERSECTION

From North ( Peds = 1 )			
Total	7115		
Approach	3179		
Depart		3936	
Rt/red Right	Thru	Left	
0	217	2738	224
			178 3430 328

From West (Peds = 0)		From East (Peds = 1)	
Left	178	Thru	2307
Approach	3251	Right	766
		Rt/Red	0
		Depart	2804
			273
			766 2738 244
			867 3430 273 0
			Left Thru Right Rt/Red
			Depart 3748
			Approach 4570
			Total 8318
			From South ( Peds = 3 )

total 6217 .....

..... Total 525

217  
Depart 2966 1882  
867

0 Rt/Red  
328 Right  
1882 Thru Approach 2454  
244 Left

From West  
(Peds = 0)  
Left 178  
Approach 3251  
Thru 2307  
Right 766  
Rt/Red 0

From East  
(Peds = 1)  
224  
2307  
Depart 2804  
273

SUSAN MEDLAND  
 Three Vehicle Analysis with Right on Red

Page: 10  
 Date: 2/28/1997

\*\*\*\*\*  
 Location: 91ST AVENUE & NORTHERN  
 Notes : NORTHERN=E/W  
 Study ID: 97165  
 Operator: TRA  
 Weather : CLEAR

Starts : 02/25/97 at 06:00:00  
 Ends : 02/25/97 at 18:00:00  
 Interval : 15 min Intervals: 48  
 S/N : 0 Type: C, SmT, LgT, P-rt/red  
 Correction: 1.00  
 \*\*\*\*\*

TOTAL INTERSECTION PEAK HOUR ANALYSIS

Total Intersection Peak is: Tue Feb 25 16:45:00 1997

DIRECTION	VOLUME						Peak Factor	PERCENTS				
	Peds	Rt/Red	Left	Thru	Right	Total		Rt/Red	Left	Thru	Right	Total
From North	0	0	30	263	23	316	0.85	0.0%	9.5%	83.2%	7.3%	100.0%
From South	1	0	188	652	28	868	0.88	0.0%	21.7%	75.1%	3.2%	100.0%
From East	0	0	27	203	48	278	0.90	0.0%	9.7%	73.0%	17.3%	100.0%
From West	0	0	26	234	57	317	0.94	0.0%	8.2%	73.8%	18.0%	100.0%
Totals	1	0	271	1352	156	1779	0.94	0.0%	15.2%	76.0%	8.8%	100.0%

		From North					
		( Peds = 0 )					
		Total 1042					
		Approach 316		Depart 726			
		Rt/red	Right	Thru	Left		
		0	23	263	30	26	652 48
		23		0 Rt/Red			
		48		48 Right			
Depart 414		203		203 Thru		Approach 278	
		188		27 Left			
Total 731				N			
From West				W + E			
(Peds = 0)				S			
Left		26		30		From East	
						(Peds = 0)	
Approach 317		Thru 234		234		Depart 292	
		Right 57		28			
		Rt/Red 0					
		57 263 27		188 652 28 0			
		Left Thru Right		Rt/Red			
Depart 347				Approach 868			
		Total 1215					
		From South					

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 11  
Date: 2/28/1997

\*\*\*\*\*  
 Location: 91ST AVENUE & NORTHERN  
 Notes : NORTHERN=E/W  
 Study ID: 97165  
 Operator: TRA  
 Weather : CLEAR  
 Starts : 02/25/97 at 06:00:  
 Ends : 02/25/97 at 18:00:  
 Interval : 15 min Intervals: 48  
 S/N : 0  
 Type: C, SmT, LgT, P-rt/red  
 Correction: 1.00  
 \*\*\*\*\*

INDIVIDUAL DIRECTIONS PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:30	0	0	24	585	18	627	0.83	0.0%	3.8%	93.3%	2.9%	100.0	
From South	2/25/97	17:00	1	0	194	663	24	881	0.90	0.0%	22.0%	75.3%	2.7%	100.0	
From East	2/25/97	15:45	0	0	24	215	47	286	0.92	0.0%	8.4%	75.2%	16.4%	100.0	
From West	2/25/97	7:00	0	0	12	231	168	411	0.88	0.0%	2.9%	56.2%	40.9%	100.0	

		From North ( Peds = 0 )			
		Total 1349			
		Approach 627		Depart 722	
		Rt/red	Right	Thru	Left
		0	18	585	24
		18			
Depart 427		215			
		194			
Total 838		N		Total 565	
From West (Peds = 0)		W + E		From East (Peds = 0)	
Left 12		S		24	
Approach 411		Thru 231		231	Depart 279
		Right 168			
		Rt/Red 0		24	
		168	585	24	194
		Left Thru Right Rt/Red		663	24
		Depart 777		Approach 881	
		Total 1658		From South ( Peds = 1 )	

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 12  
Date: 2/28/97

\*\*\*\*\*  
Location: 91ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W Starts : 02/25/97 at 06:00:  
Study ID: 97165 Ends : 02/25/97 at 18:00:  
Operator: TRA Interval : 15 min Intervals: 48  
Weather : CLEAR S/N : 0 Type: C, Smt, LgT, P-rt/red  
Correction: 1.00  
\*\*\*\*\*

AUTOMOBILE PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	6:30	0	0	24	576	18	618	0.84	0.0%	3.9%	93.2%	2.9%	100.	
From South	2/25/97	17:00	1	0	194	653	23	870	0.91	0.0%	22.3%	75.1%	2.6%	100.	
From East	2/25/97	17:00	0	0	26	195	59	280	0.93	0.0%	9.3%	69.6%	21.1%	100.	
From West	2/25/97	7:00	0	0	8	217	166	391	0.88	0.0%	2.0%	55.5%	42.5%	100.	

From North  
( Peds = 0 )  
Total 1338  
Approach 618  
Depart 720  
Rt/red Right Thru Left  
0 18 576 24  
8 653 59

18  
Depart 407  
195  
194  
Total 798  
From West  
(Peds = 0)  
Left 8  
Approach 391  
Thru 217  
Right 166  
Rt/Red 0

0 Rt/Red  
59 Right  
195 Thru Approach 280  
26 Left  
Total 544  
From East  
(Peds = 0)  
24  
217 Depart 264  
23

166 576 26 194 653 23 0  
Left Thru Right Rt/Red  
Depart 768  
Approach 870  
Total 1638  
From South  
( Peds = 1 )

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 13  
Date: 2/28/1997

Location: 91ST AVENUE & NORTHERN

Notes : NORTHERN=E/W

Study ID: 97165

Operator: TRA

Weather : CLEAR

Starts : 02/25/97 at 06:00:00

Ends : 02/25/97 at 18:00:00

Interval : 15 min Intervals: 48

S/N : 0

Type: C, SMT, LgT, P-rt/red

Correction: 1.00

LIGHT TRUCK PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME							Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total	Rt/Red		Left	Thru	Right	Total	
From North	2/25/97	13:45	0	0	0	7	1	8	0.67	0.0%	0.0%	87.5%	12.5%	100.0	
From South	2/25/97	14:45	1	0	0	11	1	12	0.50	0.0%	0.0%	91.7%	8.3%	100.0	
From East	2/25/97	7:45	0	0	1	5	2	8	0.40	0.0%	12.5%	62.5%	25.0%	100.0	
From West	2/25/97	16:15	0	0	2	16	2	20	0.56	0.0%	10.0%	80.0%	10.0%	100.0	

From North  
( Peds = 0 )

Total 23

Approach 8

Depart 15

Rt/red	Right	Thru	Left
0	1	7	0

2 11 2

1

0 Rt/Red

2 Right

Depart 6

5

5 Thru Approach 8

0

1 Left

Total 26

N

W + E

S

Total 25

From West  
(Peds = 0)

From East

(Peds = 0)

Left 2

0

Approach 20

Thru 16

16

Depart 17

Right 2

Rt/Red 0

1

2	7	1	0	11	1	0
Left	Thru	Right	Rt/Red			

Depart 10

Approach 12

Total 22

From South

( Peds = 1 )

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: 14  
Date: 2/28/1998

Location: 91ST AVENUE & NORTHERN

Notes : NORTHERN=E/W  
Study ID: 97165  
Operator: TRA  
Weather : CLEAR

Starts : 02/25/97 at 06:00:  
Ends : 02/25/97 at 18:00:  
Interval : 15 min Intervals: 48  
S/N : 0 Type: C, SmT, LgT, P-rt/red  
Correction: 1.00

LARGE TRUCK PEAK HOUR ANALYSIS

DIRECTION	PEAK		VOLUME						Peak Factor	PERCENTS				
	DATE	TIME	Peds	Rt/Red	Left	Thru	Right	Total		Rt/Red	Left	Thru	Right	Total
From North	2/25/97	6:30	0	0	0	8	0	8	0.67	0.0%	0.0%	100.0%	0.0%	100.0%
From South	2/25/97	12:30	1	0	7	6	3	16	0.67	0.0%	43.8%	37.5%	18.8%	100.0%
From East	2/25/97	7:30	0	0	5	25	2	32	0.73	0.0%	15.6%	78.1%	6.3%	100.0%
From West	2/25/97	14:00	0	0	1	26	6	33	0.69	0.0%	3.0%	78.8%	18.2%	100.0%

From North  
( Peds = 0 )

Total 17

Approach 8

Depart 9

Rt/red	Right	Thru	Left
0	0	8	0

1 6 2

0

0 Rt/Red

Depart 32

25

2 Right

7

25 Thru Approach 32

5 Left

Total 65

From West

N

(Peds = 0)

W + E

8

Total 61

Left

1

From East

(Peds = 0)

0

Approach 33

Thru

26

26

Depart 29

Right

6

3

Rt/Red

0

6	8	5	7	6	3	0
Left	Thru	Right	Rt/Red			

Depart 19

Approach 16

Total 35

From South

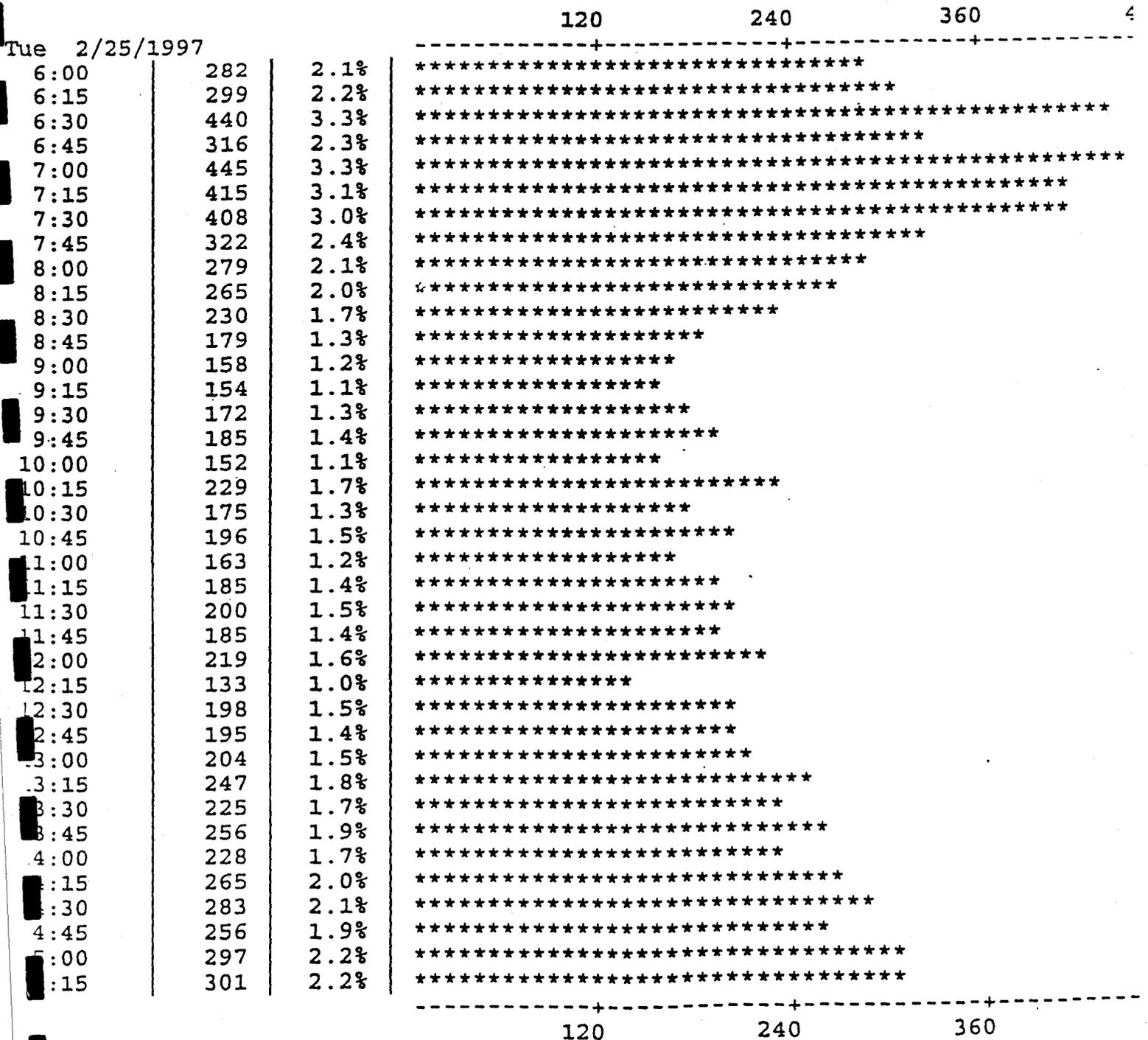
( Peds = 1 )

Three Vehicle Analysis with Right on Red

\*\*\*\*\*  
Location: 91ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W  
Study ID: 97165  
Operator: TRA  
Weather : CLEAR  
\*\*\*\*\*

Starts : 02/25/97 at 06:00:  
Ends : 02/25/97 at 18:00:  
Interval : 15 min Intervals: 48  
S/N : 0 Type: C, SmT, LgT, P-rt/red  
Correction: 1.00  
\*\*\*\*\*

Graph of Total Volume per Interval  
-----



Three Vehicle Analysis with Right on Red

Date: 2/28/1997

\*\*\*\*\*  
 Location: 91ST AVENUE & NORTHERN Starts : 02/25/97 at 06:00:00  
 Notes : NORTHERN=E/W Ends : 02/25/97 at 18:00:00  
 Study ID: 97165 Interval : 15 min Intervals: 48  
 Operator: TRA S/N : 0 Type: C, SmT, LgT, P-rt/red  
 Weather : CLEAR Correction: 1.00  
 \*\*\*\*\*

Graph of Total Volume per Interval

Tue 2/25/1997

			120	240	360	4
15:30	351	2.6%	*****			
15:45	341	2.5%	*****			
16:00	406	3.0%	*****			
16:15	457	3.4%	*****			
16:30	416	3.1%	*****			
16:45	395	2.9%	*****			
17:00	448	3.3%	*****			
17:15	473	3.5%	*****			
17:30	463	3.4%	*****			
17:45	363	2.7%	*****			
Total -	13454	100.0%	-----+-----+-----+-----			
			120	240	360	4

SUSAN MEDLAND

Three Vehicle Analysis with Right on Red

Page: -17  
Date: 2/28/19

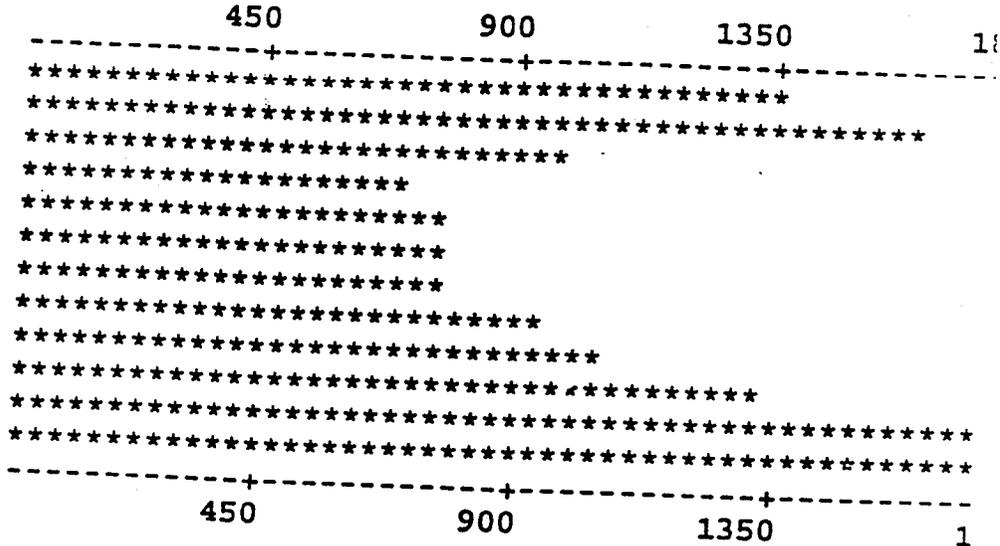
\*\*\*\*\*  
Location: 91ST AVENUE & NORTHERN  
Notes : NORTHERN=E/W  
Study ID: 97165  
Operator: TRA  
Weather : CLEAR  
\*\*\*\*\*

Starts : 02/25/97 at 06:00:  
Ends : 02/25/97 at 18:00:  
Interval : 15 min Intervals: 48  
S/N : 0 Type: C, Smt, LgT, P-rt/rec  
Correction: 1.00  
\*\*\*\*\*

Graph of Total Volume per Hour

Tue 2/25/1997

6:00	1337	9.9%
7:00	1590	11.8%
8:00	953	7.1%
9:00	669	5.0%
10:00	752	5.6%
11:00	733	5.4%
12:00	745	5.5%
13:00	932	6.9%
14:00	1032	7.7%
15:00	1290	9.6%
16:00	1674	12.4%
17:00	1747	13.0%
Total -	13454	100.0%



**APPENDIX B**

**INTERSECTION LEVEL-OF-SERVICE  
ANALYSIS WORKSHEETS**

Streets: (E-W) Northern Avenue (N-S) 71st Avenue  
Analyst: S. Wilcox File Name: AM71.HC9  
Area Type: Other 4-1-97 AM Peak  
Comment: Design Year 2020 - AM Peak Hour

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes		2	<	1	2		1		1			
Plumes		1090	60	40	730		40		60			
HF or PK15		0.95	0.95	0.95	0.95		0.95		0.95			
Lane W (ft)		12.0		12.0	12.0		12.0		12.0			
Grade		0			0			0				
Heavy Veh		2	2	2	2		2		2			
Parking	(Y/N)	N		(Y/N)	N		(Y/N)	N				
Bus Stops			0			0			0			
Un. Peds			0			0			0			
Push Button	(Y/N)	Y	19.0 s	(Y/N)	Y	19.0 s	(Y/N)	Y	19.0 s			0
Dr Type		3		3	3		3		3			
OR Vols			0			0			0			
Wait Time		3.00	3.00	3.00	3.00		3.00		3.00			
Op. Share												
Op. Prot.						14						

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
Left					NB Left			
Thru		*			Thru			
Right		*			Right			
Peds		*			Peds			
Left	*	*			SB Left			
Thru	*	*			Thru			
Right	*	*			Right			
Peds		*			Peds	*		
Right					EB Right			
Right					WB Right			
Green	10.0A	52.0A			Green	20.0A		
Yellow/AR	4.0	4.0			Yellow/AR	4.0		

Phase Length: 94 secs Phase combination order: #5 #2 #1

Intersection Performance Summary

Lane Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:	Delay	LOS
Mvmts	Cap	Flow	Ratio	Ratio	Delay	Delay	LOS	LOS
TR	2084	3696	0.609	0.564	9.2	B	9.2	B
L	289	1770	0.145	0.713	4.7	A	3.3	A
T	2655	3725	0.304	0.713	3.2	A		
L	395	1770	0.106	0.223	18.8	C	19.0	C
R	354	1583	0.178	0.223	19.1	C		

Intersection Delay = 7.4 sec/veh Intersection LOS = B  
Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.450

Streets: (E-W) Northern Avenue (N-S) 83rd Avenue  
Analyst: S. Wilcox File Name: AM83.HC9  
Area Type: Other 4-1-97 AM Peak  
Comment: Design Year 2020 - AM Peak Hour

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	<	1	2	<	1	2	<	1	2	<
Volumes	50	880	130	110	570	60	110	540	120	100	920	20
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Grade		0			0			0			0	
Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Red Button	(Y/N)	Y	19.0 s	(Y/N)	Y	19.0 s	(Y/N)	Y	19.0 s	(Y/N)	Y	19.0 s
Arr Type	3	3		3	3		3	3		3	3	
FOR Vols			0			0			0			0
Post Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.												4

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
Left	*	*			NB Left *	*		
Thru		*			NB Thru	*		
Right		*			NB Right	*		
Peds		*			NB Peds	*		
Left	*	*			SB Left *	*		
Thru		*			SB Thru	*		
Right		*			SB Right	*		
Peds		*			SB Peds	*		
Right					EB Right			
Right					WB Right			
Green	10.0A	29.0A			Green	10.0A	29.0A	
Flow/AR	4.0	4.0			Yellow/AR	4.0	4.0	
Cycle Length:	94 secs	Phase combination order: #5 #2 #1 #6						

Intersection Performance Summary

Lane	Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:	Delay	LOS
Mvmts	Cap	Flow	Ratio	Ratio					
L	286	1770	0.185	0.468	9.8	B	31.8	D	
TR	1166	3653	0.957	0.319	32.9	D			
L	286	1770	0.406	0.468	12.8	B	17.2	C	
TR	1172	3672	0.594	0.319	18.0	C			
L	286	1770	0.406	0.468	12.3	B	17.6	C	
TR	1157	3624	0.630	0.319	18.4	C			
L	286	1770	0.367	0.468	10.7	B	23.6	C	
TR	1185	3714	0.876	0.319	25.0	C			

Intersection Delay = 23.5 sec/veh Intersection LOS = C  
Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.821

Streets: (E-W) Northern Avenue (N-S) 91st Avenue  
 Analyst: S. Wilcox File Name: AM91.HC9  
 Area Type: Other 4-1-97 AM Peak  
 Comment: Design Year 2020 - AM Peak Hour

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	<	1	2	<	1	2	<	1	2	<
Volumes	30	670	120	160	410	130	120	450	190	200	860	10
PHF or PK15	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95	0.95
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
Grade		0			0			0			0	
% Heavy Veh	2	2	2	2	2	2	2	2	2	2	2	2
Parking	(Y/N)	N		(Y/N)	N		(Y/N)	N		(Y/N)	N	
Bus Stops			0			0			0			0
Con. Peds			0			0			0			0
Ped Button	(Y/N)	Y 19.0 s		(Y/N)	Y 19.0 s		(Y/N)	Y 19.0 s		(Y/N)	Y 19.0 s	
Arr Type	3	3		3	3		3	3		3	3	
TOR Vols			0			0			0			0
Lost Time	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
Prop. Share												
Prop. Prot.						16						14

Signal Operations

Phase Combination	1	2	3	4	5	6	7	8
Left	*	*			NB Left *	*		
Thru		*			NB Thru	*		
Right		*			NB Right	*		
Peds		*			NB Peds	*		
Left	*	*			SB Left *	*		
Thru		*			SB Thru	*		
Right		*			SB Right	*		
Peds		*			SB Peds	*		
Right					EB Right			
Right					WB Right			
Green	10.0A	29.0A			Green	10.0A	29.0A	
Yellow/AR	4.0	4.0			Yellow/AR	4.0	4.0	
Cycle Length:	94 secs Phase combination order: #1 #2 #5 #6							

Intersection Performance Summary

Lane Group:	Adj Sat	v/c	g/C	Delay	LOS	Approach:
Mvmts Cap	Flow	Ratio	Ratio			Delay LOS
L	319	1770	0.100	0.468	9.3	B 20.1 C
TR	1162	3641	0.751	0.319	20.5	C
L	286	1770	0.587	0.468	13.8	B 16.5 C
TR	1146	3591	0.521	0.319	17.2	C
L	286	1770	0.441	0.468	12.2	B 17.4 C
TR	1136	3560	0.623	0.319	18.3	C
L	286	1770	0.738	0.468	18.0	C 21.3 C
TR	1187	3719	0.811	0.319	22.0	C

Intersection Delay = 19.1 sec/veh Intersection LOS = C  
 Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.814

**APPENDIX C**

**LEFT-TURN LANE STORAGE  
LENGTH CALCULATIONS**



Computed by Stillecox Date 4/3/97

Checked by \_\_\_\_\_ Date \_\_\_\_\_

Approved by \_\_\_\_\_ Date \_\_\_\_\_

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

71st Avenue

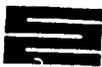
$$\begin{aligned} \text{Minimum Green Time} &= 7.0 + (w/4.0) - Y \\ &= 7.0 + (0/4.0) - 4 \\ &= 18.5 \text{ sec} \Rightarrow \text{Use } 19 \text{ sec} \end{aligned}$$

$$\text{Cycle Length} = 94 \text{ sec} = 38.3 \text{ cycles/hour}$$

Left Turn Lane Length

NB: AM Peak = 40 uph ; PM Peak = 70 uph  
 $70 \text{ uph} (38.3 \text{ cycles/hr}) = 1.83 \text{ veh/cycle} \Rightarrow \text{Use } 2 \text{ veh/cycle}$   
 $2 \times 20 \times 2 = \underline{80 \text{ ft}}$

WB: AM Peak = 40 uph ; PM Peak = 70 uph  
 $70 / 38.3 = 1.83 \Rightarrow \text{Use } 2 \text{ veh/cycle}$   
 $2 \times 20 \times 2 = \underline{80 \text{ ft}}$



Computed by Slubler Date 4/3/97

Subject Northern Avenue  
Traffic Analysis

Checked by \_\_\_\_\_ Date \_\_\_\_\_

Left Turn Lane Storage (83rd Ave)

Approved by \_\_\_\_\_ Date \_\_\_\_\_

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

83rd Avenue

$$\begin{aligned} \text{Minimum Green Time} &= 7.0 + (w/y.o) - 4 \\ &= 7.0 + (61/4.0) - 4 \\ &= 18.5 \text{ sec} \Rightarrow \text{Use } 19 \text{ sec} \end{aligned}$$

$$\text{Cycle Length} = 94 \text{ sec} = 38.3 \text{ cycles/hour}$$

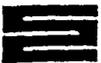
Left Turn Lane Length

NB: AM Peak = 110 uph ; PM Peak = 150 uph  
 $150 \text{ uph} / 38.3 \text{ cycles/hr} = 3.92 \text{ veh/cycle} \Rightarrow \text{Use } 4 \text{ veh/cycle}$   
 $4 \text{ veh} \times 20 \text{ ft/veh} \times 2 = 160 \text{ ft}$

SB: AM Peak = 100 uph ; PM Peak = 90 uph  
 $100 / 38.3 = 2.61 \Rightarrow \text{Use } 3 \text{ veh/cycle}$   
 $3 \times 20 \times 2 = 120 \text{ ft}$

EB: AM Peak = 50 uph ; PM Peak = 60 uph  
 $60 / 38.3 = 1.57 \Rightarrow \text{Use } 2 \text{ veh/cycle}$ ;  $2 \times 20 \times 2 = 80 \text{ ft}$

WB: AM Peak = 110 uph ; PM Peak = 140 uph  
 $140 / 38.3 = 3.66 \Rightarrow \text{Use } 4 \text{ veh/cycle}$   
 $4 \times 20 \times 2 = 160 \text{ ft}$

Computed by M. White Date 4/3/97

Checked by \_\_\_\_\_ Date \_\_\_\_\_

Approved by \_\_\_\_\_ Date \_\_\_\_\_

Traffic Analysis

Left Turn Lane Storage (91st Avenue)

Sheet No. \_\_\_\_\_ of \_\_\_\_\_

91st Avenue

$$\begin{aligned} \text{Minimum Green Time} &= 7.0 + (w/4.0) - 4 \\ &= 7.0 + (6/4.0) - 4 \\ &= 18.5 \text{ sec} \Rightarrow \text{Use } 19 \text{ sec} \end{aligned}$$

$$\text{Cycle Length} = 94 \text{ sec} = 38.3 \text{ cycles per hour}$$

Left Turn Lane Length

$$\begin{aligned} \text{NB: AM Peak} &= 120 \text{ uph}; \text{ PM Peak} = 80 \text{ uph} \\ 120 \text{ uph} / 38.3 &= 3.13 \text{ veh/cycle} \Rightarrow \text{Use } 4 \text{ veh/cycle} \\ 4 \text{ veh} \times 20 \text{ ft/veh} \times 2 &= \underline{160 \text{ ft}} \end{aligned}$$

$$\begin{aligned} \text{SB: AM Peak} &= 200 \text{ uph}; \text{ PM Peak} = 150 \text{ uph} \\ 200 / 38.3 &= 5.22 \Rightarrow \text{Use } 6 \text{ veh/cycle} \\ 6 \text{ veh} \times 20 \text{ ft/veh} \times 2 &= \underline{240 \text{ ft}} \end{aligned}$$

$$\begin{aligned} \text{EB: AM Peak} &= 30 \text{ uph}; \text{ PM Peak} = 50 \text{ uph} \\ 50 / 38.3 &= 1.31 \Rightarrow \text{Use } 2 \text{ veh/cycle} \\ 2 \text{ veh} \times 20 \text{ ft/veh} \times 2 &= \underline{80 \text{ ft}} \end{aligned}$$

$$\begin{aligned} \text{WB: AM Peak} &= 160 \text{ uph}; \text{ PM Peak} = 130 \text{ uph} \\ 160 / 38.3 &= 4.18 \Rightarrow \text{Use } 5 \text{ veh/cycle} \\ 5 \text{ veh} \times 20 \text{ ft/veh} \times 2 &= \underline{200 \text{ ft}} \end{aligned}$$

**APPENDIX B**

**DRAINAGE MEMORANDUM**

# **NORTHERN AVENUE**

**LOOP 101 TO 71ST AVENUE**

**DRAINAGE CONCEPT MEMORANDUM**

**MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION**

**Work Order No. 68915  
Contract No. CY 1996-58**

**May 12, 1997  
Revised July 18, 1997**

 **STANLEY CONSULTANTS**

# NORTHERN AVENUE

LOOP 101 TO 71ST AVENUE

DRAINAGE CONCEPT MEMORANDUM

MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION

Work Order No. 68915  
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May 12, 1997  
Revised July 18, 1997

 STANLEY CONSULTANTS

NORTHERN AVENUE - LOOP 101 TO 71ST AVENUE  
DESIGN CONCEPT REPORT - DRAINAGE

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Appendix A - Supporting Exhibits, Tables and Calculations



**Preface**

This drainage concept memorandum was originally prepared in May 1997 and submitted to MCDOT for review along with a summary of other basic design criteria. This July revision addresses review comments provided by MCDOT regarding minimum catch basin spacing and intercept of the offsite design storm.

## **Introduction and Background**

Regional drainage for the area surrounding the Maricopa County Department of Transportation (MCDOT) Northern Avenue project limits has been analyzed by consultant Wood/Patel Associates for the Flood Control District of Maricopa County (MCFCD). This analysis is part of the Northern/Orangewood Storm Drain Project which includes portions of the Cities of Glendale and Peoria as well as Unincorporated Maricopa County. The purpose of the Northern/Orangewood Storm Drain Study is to establish hydrology, preliminary hydraulics, concept routing and pipe sizing for a regional storm drainage system. The Wood/Patel Associates study is a refinement and finalization of the MCFCD Glendale - Peoria Area Drainage Master Plan done by Camp Dresser & McKee, Inc. and James M. Montgomery Consulting Engineers, Inc. in 1987.

Construction of the Northern/Orangewood Storm Drain System will be funded by MCFCD, MCDOT and the Cities of Glendale and Peoria. The outfall for the Northern/Orangewood Storm Drain System will be the existing Arizona Department of Transportation Agua Fria Freeway Channel which is located at the west limit of the MCDOT Northern Avenue project. As part of the Northern/Orangewood Storm Drain System, detention of storm runoff will be provided in proposed basins that will be connected to the storm drains. These basins will attenuate the discharges carried by the storm drain pipe. A copy of the Wood/Patel Associates Plate 11-3A, Northern/Orangewood Storm Drain Project, Selected Alignments has been included in Appendix A.

Wood/Patel Associates has utilized two different design storm criteria in sizing the Northern/Orangewood Storm Drain System. This criteria is based on Glendale and Peoria design standards, which differ from each other. That portion of the system within the City of Glendale is designed using the 10-year, 6-hour storm. Facilities lying within the City of Peoria will be designed using the 2-year, 6-hour storm. The MCDOT Northern Avenue project currently lies within Unincorporated Maricopa County right-of-way. To the north is Peoria and to the south is Glendale. The design storm used by Wood/Patel Associates for the Northern Avenue portion of the storm drain system is the 2-year, 6-hour storm as mutually agreed among the principal parties.

In addition to the dual storm criteria, Wood/Patel Associates has also considered both existing and future developed conditions in the contributing watershed. Although stormwater detention is required of development in both Peoria and Glendale, future condition discharges were found to be greater than present conditions, primarily because of shorter concentration times. The design storm for the Northern Avenue storm drain trunkline, then, is the 2-year, 6-hour future watershed condition storm, assuming that both right-of-way and offsite areas contribute. Also, in sizing the Northern Avenue trunkline, it has been assumed that design discharges are not restricted to enter the system by catch basins, laterals and other connecting storm drain pipe.

Wood/Patel Associates has indicated the locations of concentration points and anticipated inflow to the storm drain system on their Exhibit A, HEC-1 Schematic Diagram. A reduced copy of this schematic is included in Appendix A along with a summary table of discharges from the Wood/Patel Associates HEC-1 Model which corresponds to the schematic diagram. These concentration points are adequate from a regional modeling standpoint. However, they are not necessarily intended to serve as catch basin inlet locations for roadway drainage design. Actual catch basin and inflow locations will need to be refined by Stanley Consultants as part of the roadway design process.

### **Existing and Proposed Storm Drain**

A portion of the Northern Avenue storm drain has already been constructed. An existing 1520mm diameter concrete pipe runs from the Agua Fria Freeway Channel outfall east to 91st Avenue. Several catch basins have been constructed at the Northern/91st Avenue intersection and storm drain trunkline stubs have been provided to the north and east from the intersection. The stub to the north is approximately 79m of 1220mm concrete pipe and the stub to the east is approximately 91m of 1520mm concrete pipe. The ends of these stubs are capped.

The segment of Northern Avenue storm drain from 91st Avenue to 83rd Avenue will be designed by Wood/Patel Associates for MCFCD. Associated with this design is a regional stormwater detention basin (the Peoria Basin) and a secondary storm drain pipe. These features are located just north of Northern Avenue between the 87th Avenue alignment and 83rd Avenue. The secondary pipe intercepts runoff from 83rd Avenue at a point about ¼ mile north of Northern and conveys it to the Peoria Basin.

According to preliminary plans, the storm drain trunkline in Northern Avenue is 1830mm diameter from 83rd Avenue to the 85th Avenue alignment. At 85th Avenue, this pipe will turn north and discharge into the Peoria Basin.

Because the Peoria Basin attenuates the hydrograph peak from its two contributing storm drain pipes, the storm drain pipe in Northern Avenue downstream from the basin is much smaller than the pipe upstream from the basin. Downstream from the basin, it only carries local runoff and bleedoff from the basin. According to preliminary Wood/Patel design, the Northern Avenue storm drain from Peoria Basin begins at 690mm diameter at 87th Avenue and increased to 760mm diameter near 91st Avenue.

At 83rd Avenue, the Wood/Patel storm drain will transition to a rectangular concrete box structure for a short distance to avoid conflict with an existing 530mm sanitary sewer pipe running north to south along the west side of 83rd Avenue. Wood/Patel's Northern Avenue storm drain design will terminate within the 83rd Avenue intersection just east of this transition structure.

Stanley Consultants' storm drain design will begin where Wood/Patel's design ends. Within the 83rd Avenue intersection, it is anticipated that a storm drain stub will be provided to the north for local runoff consisting primarily of roadway drainage from future 83rd Avenue roadway improvements.

A storm drain pipe in 83rd Avenue is not reflected on the Wood/Patel selected Alignment Plate 11-3A or in their HEC-1 model as a pipe routing reach. However, it is anticipated that this will be a small diameter pipe on the order of 610mm.

From 83rd Avenue, the storm drain will run east to 75th Avenue as shown in the Wood/Patel Selected Alignment Plate 11-3A. According to the Wood/Patel HEC-1 model, the size of pipe in this segment is anticipated to range from 1520mm at 75th Avenue to 1830mm at 83rd Avenue.

At 75th Avenue, there will be a connection provided for a storm drain trunkline currently under design by ASL Sierra Consulting Engineers. This trunkline is part of MCDOT Roadway Improvement Project 68843, 75th Avenue, Glendale Avenue to Olive Avenue. According to ASL Sierra preliminary design, their trunkline will be 910mm in size at Northern Avenue. Currently, it is designed to convey drainage from the future 75th Avenue roadway improvements only, not including offsite runoff. This pipe is not reflected on the Wood/Patel Selected Alignments Plate 11-3A or in their HEC-1 model as a pipe routing reach.

In order to meet flow spread criteria, it is anticipated that a small diameter trunkline will need to be extended east in Northern Avenue from 75th Avenue as part of the Stanley Consultants design. It is currently anticipated that this trunkline will be on the order of 610mm to 760mm in diameter. This trunkline is not shown on the Wood/Patel Selected Alignments Plate 11-3A. However, it is reflected as a 1220mm routing reach pipe in the Wood/Patel HEC-1 model. The cost of the trunkline from 75th Avenue to 71st Avenue will be cost shared 50/50 between Peoria and MCDOT. The cost of catch basins and laterals in this segment will be paid for by MCDOT.

Stanley Consultants will be responsible for design of roadway drainage and meeting flow spread criteria for the entire Northern Avenue roadway project. Stanley will coordinate the locations of catch basin laterals with Wood/Patel for Northern Avenue between 91st Avenue and 83rd Avenue. Stanley will also coordinate with Wood/Patel with regard to hydraulic grade line, design match at 83rd Avenue and stub north at 83rd Avenue. Stanley will coordinate with ASL Sierra with regard to the stub and hydraulic grade line at 75th Avenue.

## Design Criteria

In accordance with the MCDOT/Stanley Consultants Consultant Services Contract, Maricopa County design criteria and various verbal and written directives from MCDOT, the following summarizes the major applicable drainage design criteria and considerations for this project:

1. Plans, drainage report and calculations shall be in metric format;
2. Design of roadway catch basins, laterals, and flow spread shall be based on a 10-year storm using only the road right-of-way as contributing area;
3. One dry 3.6m lane in each direction shall be provided based on the above design storm;
4. The design of storm drain trunkline shall be based on the 2-year, 6-hour discharges from the Wood/Patel HEC-1 model;
5. The roadway shall be designed so that drainage follows historical paths and does not create offsite flooding or adverse ponding within the right-of-way;
6. The 100-year runoff shall be contained below finished floors of adjacent buildings;
7. The maximum flow velocity in the roadway section shall not exceed 3m/s and the maximum discharge shall not exceed 2.8 cms based on a 100-year storm;
8. Runoff crossing dip sections or topping the roadway at any location shall be no deeper than 152mm at the roadway crown for a 100-year storm;
9. Hydrology for the roadway drainage design will be based on the Rational method as presented in the MCFCD Drainage Design Manual, Volume 1, Hydrology.
10. The maximum allowable spacing for new storm drain manholes is 100 m for storm drain pipe 760mm and smaller and 200 m for storm drain pipe larger than 760mm.
11. The maximum spacing for catch basin inlets is 200 m.

12. The minimum pipe size for storm drain trunkline pipe is 610mm and for storm drain laterals is 380mm.

Hydraulic grade lines will be estimated using standard friction loss equations. Minor losses at standard junctions and manholes will typically be disregarded. The storm drain system will be designed so that the hydraulic grade line is no higher than 300mm below each catch basin inlet flow line. Starting hydraulic grade line assumptions for the existing storm drain trunk line and the Wood/Patel trunkline will be coordinated with Wood/Patel because of considerations for concurrence in time with bleedoff flow from the Peoria Basin and flow in the Agua Fria Freeway channel.

At this point in time, it is not anticipated that any parallel roadside ditches, open channels, culverts or retention will be necessary as part of the roadway drainage design and that design criteria normally associated with these features will not be applicable.

### Proposed Drainage Design

Roadway design grades for Northern Avenue have not yet been established. The overall existing grade of the project from end to end is on the order of 0.0027 m/m. Table 1 is a summary of the storm water conveyance capacity for the typical Northern Avenue roadway section assuming a longitudinal grade of 0.0027m/m and a manning 'n' of 0.015. Table 1 velocity and capacity were calculated using procedures from HEC-12. Refer to Appendix A for the typical roadway section.

**TABLE 1**  
**ROADWAY DRAINAGE CONVEYANCE**

Depth @ Gutter (mm)	Flow Spread (m)	Avg. Flow Velocity (m/s)	Carrying Capacity (cms)
109 (dry lane flow spread)	4.6	0.54	0.12
152 (top of curb)	6.8	0.70	0.32
223 (crown of road)	10.3	0.92	0.97
375 (crown + 152mm)	10.3	1.32	4.23

City of Phoenix Standard Detail Type "M" catch basins will be used to intercept roadway drainage where required to meet flow spread criteria and satisfy other design considerations. This catch basin has a curb opening with a maintenance basin of 0.91m in length and optional one or two wing basins with lengths of 0.91m, 1.83m, 3.05m and 5.18m each. There is no surface inlet grate associated with this basin. At this point in time, it is anticipated that most catch basins will be on grade but that some catch basins near intersection returns may be in a sump condition.

Table 2 is a summary of intercept lengths for a Type "M" catch basin on grade based on the typical roadway hydraulics represented in Table 1. Table 2 capture and bypass were calculated using procedures from HEC-12 assuming a catch basin on grade and 100% efficiency. Refer to Appendix A for the City of Phoenix Type "M" catch basin standard detail.

**TABLE 2  
CURB OPENING INTERCEPT LENGTHS**

Depth @ Gutter (mm)	Discharge in Roadway (cms)	Length of Opening (m)	Capture (cms)	Bypass (cms)
109  (dry lane flow spread)	0.12	0.94	0.06	0.06
		2.01	0.10	0.02
		2.92	0.11	0.01
		3.24	0.12	0.00
152  (top of curb)	0.32	0.94	0.08	0.24
		2.01	0.17	0.15
		2.92	0.22	0.10
		4.14	0.28	0.04
		6.03	0.32	00.0
223  (crown of road)	0.97	0.94	0.14	0.83
		2.01	0.28	0.69
		2.92	0.40	0.57
		4.14	0.54	0.43
		6.27	0.74	0.23

Using a 10-year design storm and the typical roadway conveyance from Table 1, the length of half width right-of-way that would produce a flow spread discharge of 0.12 cms is on the order of 400m. Appendix A contains a duration-depth-frequency table and simple rational method calculation in support of this. However, as mentioned in the previous section, the maximum allowable spacing for catch basins is 200 m.

Based on the above results, it is anticipated that typical spacing for catch basins on grade will be at or near the maximum 200 m. Assuming total intercept at each opening with an efficiency of 75%, it is anticipated that the typical catch basin on grade will be no larger than a single wing basin with a wing length of 0.91 m. The lateral pipe connecting to the storm drain trunkline will be on the order of 380mm to 460mm diameter. Actual locations, sizes and spacing will be developed with the roadway design.

Based on preliminary calculations, the 10-year discharge from right-of-way only is significantly less in magnitude than the 2-year, 6-hour future condition offsite discharges from the Wood/Patel Associates Northern/Orangewood Storm Drain study. Therefore, it is anticipated that the storm drain trunkline will have more than adequate capacity for the 10-year design right-of-way only storm as well as a very favorable hydraulic grade line. For design of lateral connecting pipes, it may be adequate to assume a starting hydraulic grade at the inside top of trunkline pipe. This will be confirmed at the time of design.

There has been some initial concern by Wood/Patel on behalf of MCFCD regarding use of the 10-year right-of-way only storm for designing roadway catch basins, laterals and secondary trunkline. The concern is that these features, being designed for flows significantly less in magnitude than the Northern Avenue trunkline flows, may restrict the Wood/Patel design flows from entering the trunkline system. This would potentially negate a portion of its benefit. Although a detailed analysis of this is difficult at this point because no design has been performed yet, we have given it preliminary consideration.

Catch basins will be sized and spaced to intercept flows to meet dry lane and maximum spacing criteria. However, the roadway section is capable of conveying a much larger flow than the flow used to meet spread criteria. If a larger design storm were considered, (for example, the 2-year, 6-hour offsite storm), the water surface may reach roadway crown height on westbound lanes and top of curb height on eastbound lanes. In this scenario, the roadway capacity, based on Table 1, would be 0.97 cms (westbound) + 0.32 (eastbound) = 1.29 cms.

The roadway, then, is capable of directing a much larger flow than the dry lane criteria flow to each catch basin. And, as an example, a 2 m long curb opening catch basin which is capable of intercepting a flow of 0.10 cms at a depth corresponding to dry lane flow spread is capable of intercepting a flow of 0.17 cms at a depth of flow corresponding to top of curb and 0.28 cms at a depth corresponding to crown of road. A detailed analysis using the 2-year, 6-hour offsite storm would be required to conclude that there is no restriction on intercept. However, this is considered beyond Stanley Consultants' present scope of work.

There are a number of residential structures located along both sides of Northern Avenue within the project limits. Some of these structures have floor elevations that may be at or below the existing Northern Avenue roadway profile. Particular care will need to be exercised in designing the new roadway profile with regard to drainage where these structures exist.

**NORTHERN AVENUE - LOOP 101 TO 71ST AVENUE  
DESIGN CONCEPT REPORT - DRAINAGE**

**APPENDIX A**

**SUPPORTING EXHIBITS, TABLES AND CALCULATIONS**

**NORTHERN AVENUE - LOOP 101 TO 71ST AVENUE  
DESIGN CONCEPT REPORT - DRAINAGE**

**TABLE 3**

Summary of 2-year, 6-hour future condition discharges at selected locations along Northern Avenue from Wood/Patel Associates Northern/Orangewood Storm Drain Project HEC-1 model PEO0214A.DAT, October 1995.

Concentration Point	Description	Discharge (cfs)	Discharge (m <sup>3</sup> /s)	Time of Peak (hrs)
30CC	Northern @ 71st Avenue	18	0.501	4.47
30CR	Route 30CC in future Northern Ave 4' SD	18	0.501	4.53
20AR	Route 20AC South on 75th Ave	72	2.035	4.37
40A	Local Sub-basin	76	2.148	4.03
40AC	Combine 30CR, 20AR, 40A	132	3.731	4.13
40AR	Route 40AC in future Northern Ave 5' SD	132	3.731	4.17
40E	Local Sub-basin	21	0.594	4.03
40EC	Combine 40AR, 40E	151	4.268	4.13
40ER	Route 40EC in future Northern Ave 5' SD	151	4.268	4.13
70AR	Route 70AS South along local street	4	0.113	4.43
40D	Local Sub-basin	2	0.057	4.07
40DC	Combine 40ER, 40EC, 40D	155	4.381	4.17
40DR	Route 40 DC in future Northern Ave 5' SD	155	4.381	4.17
90AR	Route 90AC South along future 79th Ave	34	0.961	4.13
90F	Local Sub-basin	1	0.028	4.03
90FC	Combine 40DR, 90AR, 90F	190	5.370	4.17
90FR	Route 90FC in future Northern Ave 6' SD	189	5.342	4.17
90B	Local Sub-basin	4	0.113	4.23
90BC	Combine 90FR, 90B	193	5.455	4.17
90BR	Route 90BC in future Northern Ave 6' SD	193	5.455	4.20

Concentration Point	Description	Discharge (cfs)	Discharge (m <sup>3</sup> /s)	Time of Peak (hrs)
90C	Local Sub-basin	6	0.170	4.03
90CC	Combine 90BR, 90C	197	5.568	4.17
90CR	Route 90CC in future Northern Ave 6' SD	197	5.568	4.20
80BR	Route 80BD South on 83rd Ave	0	0	4.63
90E	Local Sub-basin	17	0.480	4.10
90EC	Combine 80BR, 90E	17	0.480	4.10
90ER	Route 90EC South on 83rd Ave	17	0.480	4.13
90D	Local Sub-basin	1	0.028	4.10
90DC2	Combine 90CR, 90ER, 90D	214	6.049	4.20
90DR	Route 90DC2 in future Northern Ave 6' SD	214	6.049	4.23
120	Local Sub-basin	14	0.396	4.13
91C	Combine 90DR, 120	281	7.942	4.23
91DIV	Divert all but 12cfs into surge basin	269	7.603	2.10
91D	Remaining flow	12	0.339	2.10
91R	Route 91D in future Northern Ave 3.5' SD	12	0.339	2.17
140CDV	Divert flow in excess of 2-yr storm drain capacity and northern ave street capacity south on 87th Ave	0	0	2.17
160AR	Route remaining flow in proposed Northern Ave 3.5' SD	12	0.339	2.27
160AR2	Local Sub-basin	4	0.113	4.40
160B	Combine 160AR, 160AR2, 160B	8	0.226	4.47
160BC	Route 160BC in proposed Northern Ave 4' SD	23	0.650	4.43
160BR	Route 160BC in proposed Northern Ave 4' SD	23	0.650	4.47
200AC	Combine 180R, 200A	12	0.339	4.20
200AR	Route 200AC south in future 91st Ave 4' SD	12	0.339	4.23
200B	Local Sub-basin	2	0.057	4.13

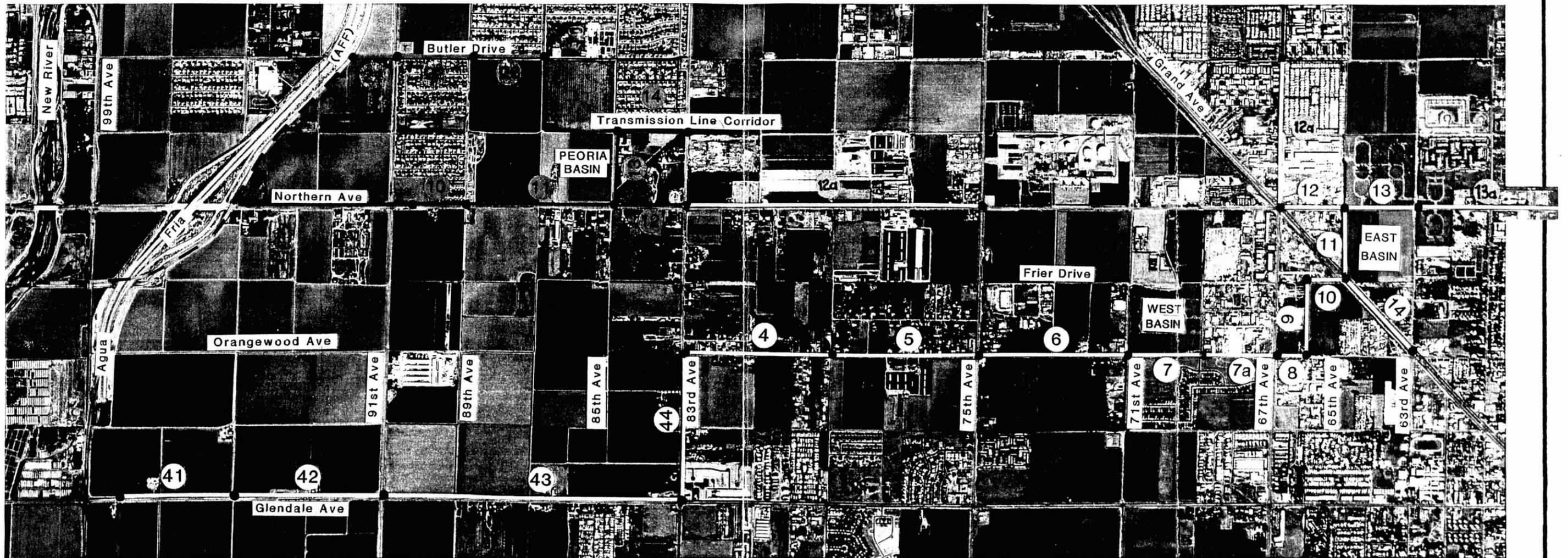
Concentration Point	Description	Discharge (cfs)	Discharge (m <sup>3</sup> /s)	Time of Peak (hrs)
200BC	Combine 160BR, 200AR, 200B	35	0.989	4.27
200BDV	Divert flow in excess of exist Northern Ave SD and street capacity south on 91st Ave	0	0	4.27
200BR	Route 200BC in exist Northern Ave 5' SD	35	0.989	4.30
210A	Local Sub-basin	4	0.113	4.20
210AC	Combine 200BR, 210A	39	1.102	4.30
210AR	Route 210AC in exist Northern Ave 5' SD	39	1.102	4.33
210B	Local Sub-basin	6	0.170	4.50
210BC	Combine 210AR, 210B @ Loop 101	44	1.244	4.33

# NORTHERN/ORANGEWOOD STORM DRAIN PROJECT

## CONCEPT/ROUTING STUDY

Contract FCD 94-12

RECEIVED  
MAR 25 1997  
STANLEY CONSULTANTS



### LEGEND

- |   |                                    |
|---|------------------------------------|
| <u>Existing</u>   | <u>Proposed</u>                    |
| Storm Drain Pipe  | Storm Drain Pipe                   |
| AFF Outlet Channel  | Detention/Surge Basin              |
|   | Future Outfall Channel             |
| NOTE: See Pertinent Table II for Pipe #'s, Sizes and Flows. | Butler Drive Storm Drain Pipe #    |
|   | Northern Avenue Storm Drain Pipe # |
|   | Glendale Avenue Storm Drain Pipe # |

Additional alignments added 6/14/96



1/2 Mile

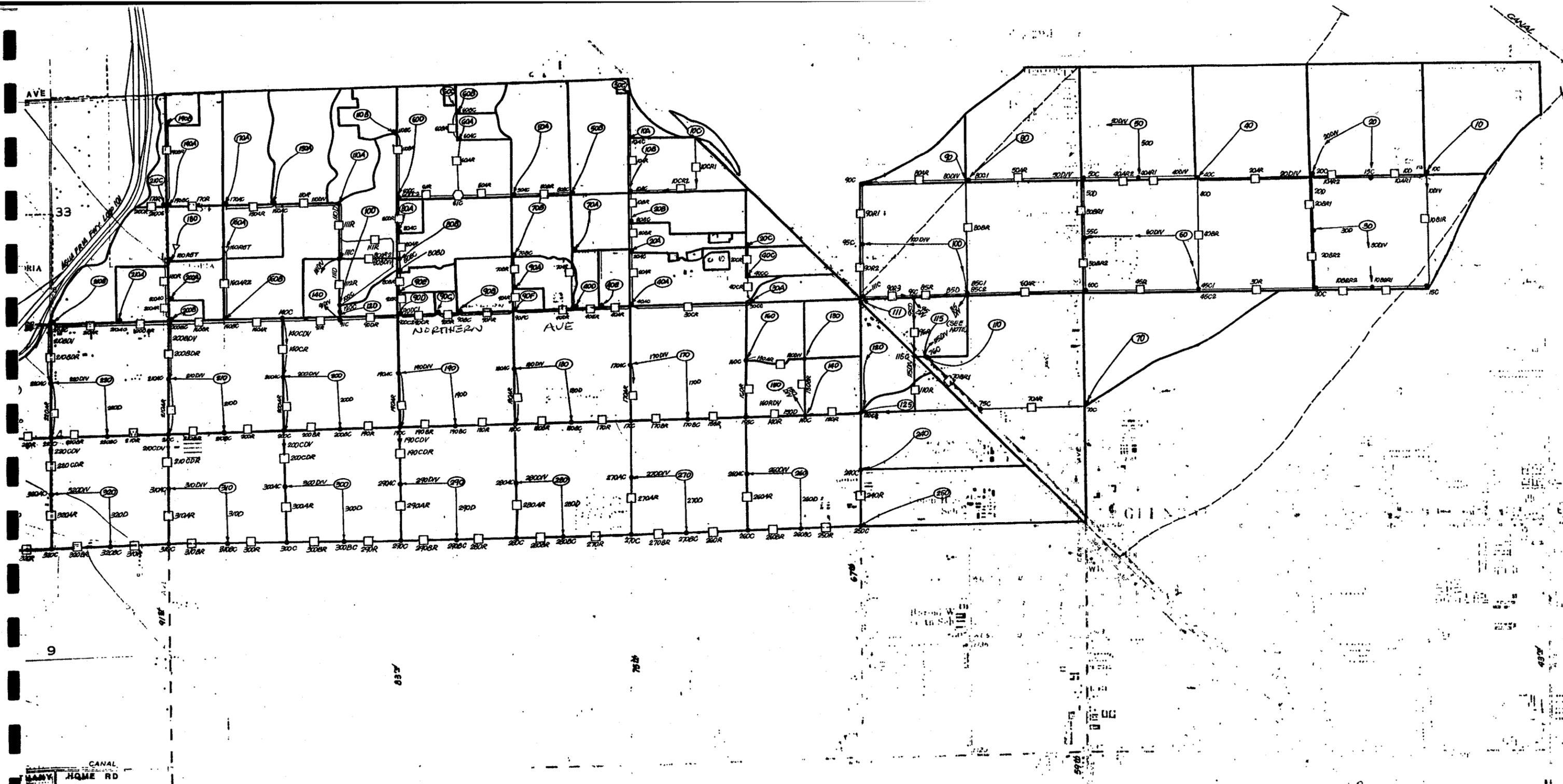
### SELECTED ALIGNMENTS

BUTLER AVENUE, NORTHERN AVENUE AND  
GLENDALE AVENUE ALIGNMENTS

Wood, Patel & Associates, Inc.

PLATE II-3A

UPDATED: 6/14/96



NOTE: HEC-1 OPERATIONS 95DIV, 85DIV  
 & 115 DIV APPLY ONLY TO  
 MODEL 6LFUNUKN.DAT

RECEIVED  
 MAR 25 1997  
 STANLEY CONSULTANTS



- LEGEND**
- SUB-BASIN BOUNDARY
  - SUB-BASIN
  - CHANNEL OR PIPE ROUTE
  - COMBINE HYDROGRAPHS
  - DIVERSION HYDROGRAPH
  - DIVERTED HYDROGRAPH
  - - - EXISTING CONDITION
  - SUB-BASIN BOUNDARY

Revised 11/2/95

**NORTHERN-ORANGEWOOD  
 STORM DRAIN PROJECT**  
 HEC-1 SCHEMATIC DIAGRAM

WOOD/PATEL ASSOCIATES Civil Engineers Hydrologists Lead Surveyors (602) 234-1344	SCALE 1"=1000'	Exhibit A
	DATE 2/96	JOB NO. 94153
	DESIGN AUR	CHECK ACP
	DATE 11/2/95	FILE

\*\*\* OUTPUT DATA \*\*\*

REVISED JUNE 1988 TO UPDATE COMPUTATION OF SHORT-DURATION VALUES

PRECIPITATION FREQUENCY VALUES FOR NORTHERN AVE 13459PRE

PRIMARY ZONE NUMBER= 7

SHORT-DURATION ZONE NUMBER= 8

LATITUDE 33.50N LONGITUDE 112.20W ELEVATION 1100 FEET

POINT VALUES

DURATION	RETURN PERIOD							
	2-YR	5-YR	10-YR	25-YR	50-YR	100-YR	500-YR	
5-MIN	.33	.41	.47	.55	.62	.68	.84	5-MIN
10-MIN	.49	.62	.71	.85	.95	1.05	1.29	10-MIN
15-MIN	.59	.78	.90	1.07	1.21	1.35	1.66	15-MIN
30-MIN	.79	1.04	1.21	1.45	1.64	1.83	2.26	30-MIN
1-HR	.96	1.28	1.50	1.81	2.05	2.28	2.83	1-HR
2-HR	1.04	1.40	1.65	2.00	2.26	2.53	3.14	2-HR
3-HR	1.10	1.49	1.75	2.12	2.41	2.69	3.35	3-HR
6-HR	1.20	1.64	1.94	2.36	2.68	3.00	3.74	6-HR
12-HR	1.30	1.82	2.17	2.66	3.03	3.40	4.26	12-HR
24-HR	1.40	2.00	2.40	2.95	3.38	3.80	4.78	24-HR

\* IF YOUR SITE IS IN ARIZONA OR NEW MEXICO, PLEASE CONSULT THE FOLLOWING PAPER FOR REVISED DEPTH-AREA VALUES:

DEPTH-AREA RATIOS IN THE SEMI-ARID SOUTHWEST UNITED STATES

NOAA TECHNICAL MEMORANDUM NWS HYDRO-40

ZEHR AND MYERS

AUGUST 1984

INPUT DATA

PROJECT NAME=NORTHERN AVE 13459PRE

ZONE= 7 SHORT-DURATION ZONE= 8

LATITUDE= 33.50 LONGITUDE= 112.20 ELEVATION= 1100

2-YR, 6-HR PCPN= 1.20 100-YR, 6-HR PCPN= 3.00

2-YR, 24-HR PCPN= 1.40 100-YR, 24-HR PCPN= 3.80

Flood Control District of Maricopa County  
Hydrologic Design Manual Rational Method

Computed by: STANLEY CONSULTANTS

Date: 05-06-97

LOCATION DATA

±400m (1320') OF TYPICAL 1/2 WIDTH R/W

Location: NORTHERN AVE

Project Name: NORTHERN AVE Subarea id: TYP ROAD

Drainage Area Cover: RIGHT-OF-WAY

DESIGN DATA

Drainage Area 1.67 acres ← 1/2 WIDTH  $\frac{55' \times 1320'}{43560}$

Watercourse Length 1320.0 feet

Top Elevation 103.6 feet

Bottom Elevation 100.0 feet

Slope .00273 feet/feet ← OVERALL AVG.

Roughness Coefficient (Kb) .04000

10-Year, 6-Hour Rainfall 1.94 inches ← PREFRE D-D-F

Hydrological Summary Table

Parameter	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs)	2	3	4	5	7	8
C	0.680	0.680	0.680	0.748	0.816	0.850
Tc (min)	22.1	19.4	18.1	16.4	15.5	14.6
i (in/hr)	1.9	2.7	3.2	4.1	4.8	5.6

10-YR = 4 CFS  
= 0.12 m<sup>3</sup>/s ±

72% @ 0.30 (ROAD, SW)

28% @ 0.35 (LANDSCAPE)

Flood Control District of Maricopa County  
Hydrologic Design Manual Rational Method

Computed by: STANLEY CONSULTANTS

Date: 05-10-97

LOCATION DATA TOTAL R/W CONTRIBUTING TO 85TH AVE + NORTHERN

Location: PEORIA BASIN

Project Name: NORTHERN AVE Subarea id: R/W

Drainage Area Cover: RIGHT-OF-WAY

DESIGN DATA

Drainage Area 40.00 acres  
Watercourse Length 9240.0 feet  
Top Elevation 1132.0 feet  
Bottom Elevation 1098.0 feet  
Slope .00368 feet/feet  
Roughness Coefficient (Kb) .04000  
10-Year, 6-Hour Rainfall 1.94 inches

[NORTHERN (1.75 mi) + 75TH AVE (1.00 mi)  
+ 83RD AVE (0.25 mi)] x 5280' x 110'  
= 1,742,400 Ft<sup>2</sup> = 40 AC  
NORTHERN - 85TH AVE TO 71ST AVE

Hydrological Summary Table

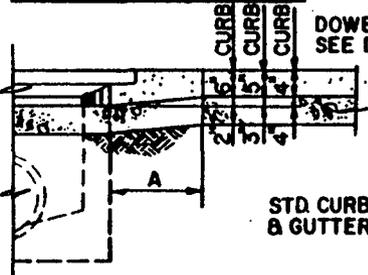
Parameter	2-Yr	5-Yr	10-Yr	25-Yr	50-Yr	100-Yr
Q (cfs)	13	28	42	61	77	94
C	0.680	0.680	0.680	0.748	0.816	0.850
Tc (min)	90.0	67.0	57.3	51.6	48.8	46.0
i (in/hr)	0.5	1.0	1.5	2.0	2.4	2.8

← 10-YR = 42 CFS  
= 1.2 m<sup>3</sup>/s

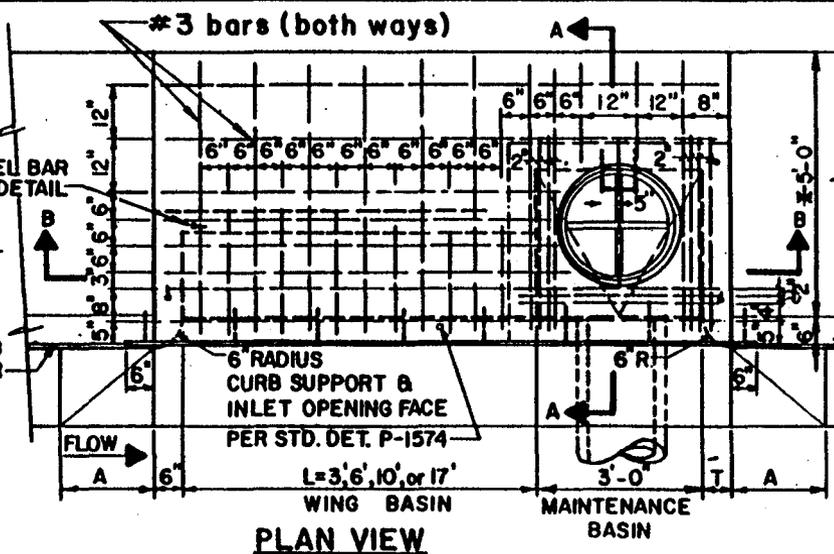
NOTE: WOOD/PATEL  
2-YR, 6-HR Q @  
THIS LOCATION  
= 281 CFS  
(7.94 m<sup>3</sup>/s)



GUTTER TRANSITION	
CURB HEIGHT	DIM. 'A'
4"	3'-3"
5"	2'-6"
6"	1'-9"



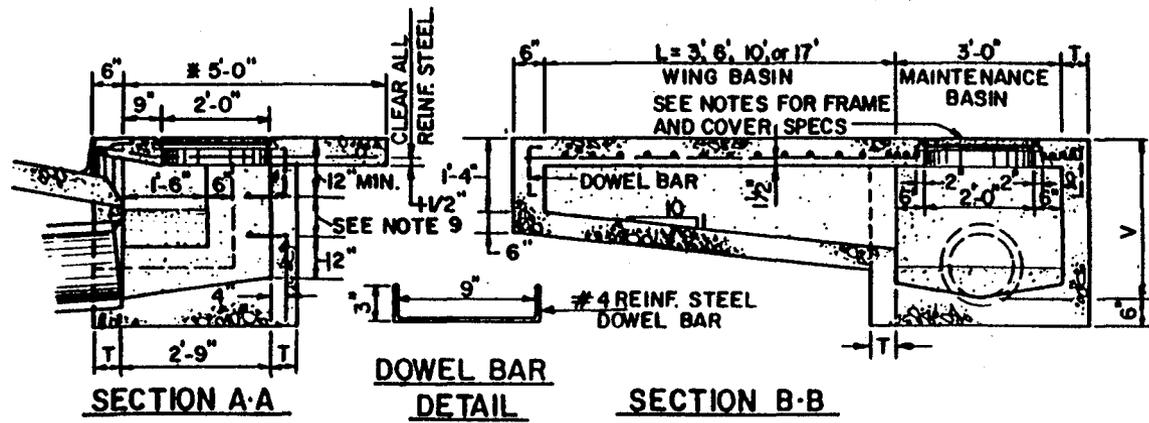
**DEPRESSED GUTTER TRANSITION (BOTH SIDES)**



**PLAN VIEW**

**NOTES**

1. TYPES ARE DESIGNATED AS FOLLOWS: 'M'-NO WING, 'M-1'-ONE WING, 'M-2'-TWO WINGS.
2. ALL CONCRETE SHALL BE CLASS 'A'.
3. ALL REINFORCING STEEL SHALL BE DEFORMED BARS AND SHALL CONFORM TO A.S.T.M. SPECIFICATION 615.
4. CONNECTOR PIPES SHALL BE PLACED IN THE APPROPRIATE WALL OF THE MAINTENANCE BASIN.
5. FLOOR OF BASIN SHALL BE TROWELLED TO A HARD, SMOOTH SURFACE AND SHALL SLOPE FROM ALL DIRECTIONS TO OUTLET.
6. CONSTRUCTION DRAINS SHALL BE INSTALLED IN ALL INLETS BUILT WITH PAVING PROJECTS. (SEE DET. P-1575.)
7. LOCATE WING BASIN ON UPSTREAM SIDE OF MAINTENANCE BASIN FOR TYPE M-1. WING BASINS FOR TYPE M-2 SHALL BE BOTH SIDES OF MAINTENANCE BASIN.
8. STEPS (M.A.G. DET. 428 POLYPROPYLENE) - V=3' (INCL.), PLACE ONE STEP 12" ABOVE THE FLOOR OF THE BASIN. V OVER 3', PLACE STEPS AT 12" INTERVALS FROM THE FLOOR OF THE BASIN WITH THE TOP STEP AT 12" (MIN.) BELOW THE TOP OF THE GRATE.
9. ACCESS FRAME AND COVER PER DET. P-1561



**SECTION A-A**

**DOWEL BAR DETAIL**

**SECTION B-B**

CATCH BASIN WALL THICKNESS
T=6" IF V=4' OR LESS
T=8" IF V=4' TO 8'
(IF V EXCEEDS 8', SPECIAL DESIGN IS REQUIRED.)
L=0 UNLESS SPECIFIED ON THE PLANS
V=3'-6" MIN. WHEN L=0:3' OR 6'
V=4'-0" MIN WHEN L=10' OR 17'

#4'-0" IN LOCATIONS WHERE 4' SIDEWALK IS REQ'D.

DETAIL NO.  
P-1569

CITY OF PHOENIX  
STANDARD DETAIL

CATCH BASIN TYPE 'M'

APPROVED  
*[Signature]*  
CITY ENGINEER

4/18/81  
DATE

DETAIL NO.  
P-1569

**APPENDIX C**

**PUBLIC INVOLVEMENT**



## Northern Avenue Design Concept Report

Northern Avenue - Loop 101 to 67<sup>th</sup> Avenue

MCDOT Work Order No. 68915

### Public Open House Meeting

### Summary of Comment Sheets

On Thursday, June 19, 1997, 32 people attended a public open house meeting to discuss and participate in the roadway improvement alternatives to Northern Avenue from 67<sup>th</sup> Avenue to Loop 101.

As of July 9, 1997, MCDOT received comments from eleven (11) citizens. The meeting was attended by property owners, interested citizens, and an official of the city of Peoria.

#### Corridor Study Survey Question

Which Northern Avenue Design Concept Alternative do you prefer?

Alternative	Number of Respondents
Alternative 1 - Enhanced Maintenance	2
Alternative 2 - Improved Section	5
Alternative 3 - Improved Section with 83 <sup>rd</sup> Avenue Adjustment	2

The following is a summary of the respondents' comments received.

- 1) Improve future traffic.
- 2) Improve traffic flow east and west on Northern Avenue. Improve ingress and egress along Northern Avenue. Improve turning and safety by using a turn lane off of Northern Avenue.



- 3) Safer driving conditions for property owners living along Northern Avenue. Eventually widening of Northern Avenue will have to be done.
- 4) Who is requesting the widening of Northern Avenue? I am concerned for agriculture in the area. Safe access to farm land, homes, farms etc., plus their loss of easement and beautification. Changes need to come, however we need to leave that which serves a positive purpose alone and upgrade Glendale Avenue. Encourage rural agriculture. Slower moving traffic on Northern to remain. Leave a good thing good. Continue to improve Glendale to the 101. Extend Loop 101 and 303.
- 5) I do not like alternative 2 or 3 because the right-of-way comes entirely to close to my house.
- 6) It seems to be the least "radical" of the three (3) plans. Another concern of ours is the quality of the work done. The last "improvement" to Northern Avenue mainly tore up a previous "improvement." Water valves and manhole covers were left either to high above final grade or too low. Residents along Northern Avenue are lucky to get a reasonable nights sleep because of dump trucks and banging tailgates. After the contractor left, the grader driver for the County Maintenance Department promptly tore up the blacktop apron in the driveway.
- 7) See Attached Comment Sheet and Letter - Ronald N. Rovey
- 8) See Attached Comment Sheet and Letter - Paul Rovey
- 9) See Attached Comment Sheet and Letter - Larry Rovey

Question Asked

None recorded

Comments About the Project

None recorded

Off-topic Comments

None recorded



## Meeting Survey

There were nine (9) comment sheets submitted

<u>Comments</u>	<u>Number of Respondents</u>
Staff very knowledgeable	10
Staff somewhat knowledgeable	0
Staff not very knowledgeable	0

<u>Comments Cont.</u>	<u>Number of Respondents Cont.</u>
Staff very helpful	5
Staff somewhat helpful	2
Staff not very helpful	0

Project information presented in an understandable manner

Yes	9
No	0

Questions answered:

Yes	8
No	2

Comments of those answered no:

1) Who/what company initiated the need to widen Northern Avenue! I would very much like to know your origin of this project. It certainly does not seem to be those who live along Northern Avenue or like me who commute daily on Northern.

2) Funding aspect of the project whether compensation rates for property will match or exceed the exorbitant tax evaluation rates levied over the last decade.

Wanting more information on MCDOT projects

Yes	9
No	1

# CITIZEN COMMENTS

①

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

*Please print.*

Name LARRY MANE Phone 938-7968  
Address 4710 W DAVIS RD  
GLENDALE AZ 85306

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? IMPROVE FUTURE TRAFFIC

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If none, why?

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(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Very knowledgeable | <input type="checkbox"/> Very helpful     |
| <input type="checkbox"/> Somewhat knowledgeable        | <input type="checkbox"/> Somewhat helpful |
| <input type="checkbox"/> Not very knowledgeable        | <input type="checkbox"/> Not very helpful |

Was all the project information presented in an understandable manner?    Yes     No

Did staff answer all of your questions?    Yes     No   
If not, what didn't they answer? \_\_\_\_\_

Do you want more information about MCDOT projects?    Yes     No   
If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: \_\_\_\_\_

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# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name FRED BRANDT Phone 602-277-1212  
Address LOT #1 S.W.C. 70TH AVE. + NORTHERN  
EAST OF NORTHERN AVE. INDUSTRIAL PARK  
GLENDALE AZ 85303

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? IMPROVE TRAFFIC FLOWED EAST + WEST ON NORTHERN AVE.  
IMPROVE INGRESS + EGRESS ALONG NORTHERN AVE.  
IMPROVE TURNING AND SAFETY USING A TURN LANE  
OFF OF NORTHERN AVE.

If none, why? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(continued on back)

# Northern Avenue Design Concept Report

## Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- Very knowledgeable
- Somewhat knowledgeable
- Not very knowledgeable

- Very helpful
- Somewhat helpful
- Not very helpful

Was all the project information presented in an understandable manner?      Yes       No

Did staff answer all of your questions?      Yes       No

If not, what didn't they answer?

*SAID WE NEEDED TO WORK WITH  
CITY OF GLENDALE ENGINEERING DEPT - FROM 71 STAVE.  
TO GRAND.*

Do you want more information about MCDOT projects?      Yes       No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions:

*EATON INVESTMENTS INC.  
3200 W. CENTRAL AVENUE 2170  
PHOENIX AZ 85023  
TELEPHONE 602-277-1212*

Thank you.

# CITIZEN COMMENTS

5

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name William + Aenes Birdsong Phone 937-5454  
Address 5013 W. Palo Verde Ave  
Glendale, Ariz. 85302

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? Safer driving conditions for property owners living along  
Northern Avenue. Eventually will have to be done

If none, why?

(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- |  |  |
|--|--|
| <input checked="" type="checkbox"/> Very knowledgeable | <input checked="" type="checkbox"/> Very helpful |
| <input type="checkbox"/> Somewhat knowledgeable        | <input type="checkbox"/> Somewhat helpful        |
| <input type="checkbox"/> Not very knowledgeable        | <input type="checkbox"/> Not very helpful        |

Was all the project information presented in an understandable manner?    Yes     No

Did staff answer all of your questions?    Yes     No

If not, what didn't they answer? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Do you want more information about MCDOT projects?    Yes     No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: \_\_\_\_\_  
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Thank you.

4

# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

*Please print.*

Name Tom TRAW - TRAW + ASSOC. REALTY Phone 872-9300

Address 6024 N. 83rd Ave

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If none, why? \_\_\_\_\_

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(continued on back)



5

# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation  
Project Manager: Kent McLain Phone: 602 - 506 - 8623  
Project Number: 68915  
June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name Mrs. Ann TRAW Phone 872-1252  
Address 6024 N. 83rd Ave  
Glendale, AZ 85303

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If none, why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Very knowledgeable | <input type="checkbox"/> Very helpful     |
| <input type="checkbox"/> Somewhat knowledgeable        | <input type="checkbox"/> Somewhat helpful |
| <input type="checkbox"/> Not very knowledgeable        | <input type="checkbox"/> Not very helpful |

Was all the project information presented in an understandable manner?    Yes     No

Did staff answer all of your questions?    Yes     No

If not, what didn't they answer? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Do you want more information about MCDOT projects?    Yes     No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: \_\_\_\_\_  
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Thank you.

# CITIZEN COMMENTS

6

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name W. K. Forest Phone 878-1868  
Address 8539 W. Diana Ave  
Peoria AZ 85345

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? \_\_\_\_\_  
\_\_\_\_\_  
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If none, why? Exist at all no one knows who/what company requested this project. Besides, I am concerned for agriculture in the area. Only address the farm land, remove farms etc, Plus their loss of investment and beautification. Changes need to come however, we need to leave that which serves a positive purpose, alone and upgrade, Glendale Ave. Encourage the rural agriculture.

(continued on back)

slower moving traffic of Northern to remain. Leave a good thing good. Continue to

# Northern Avenue Design Concept Report

## Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- Very knowledgeable
- Somewhat knowledgeable
- Not very knowledgeable

- Very helpful
- Somewhat helpful
- Not very helpful

Was all the project information presented in an understandable manner?

Yes  No

Did staff answer all of your questions?

Yes  No

If not, what didn't they answer?

Who/what company initiated the meets to widen  
Northern.

I very much would like to know the origin of  
this project. It certainly does not seem to be those who  
along Northern or like some commute daily on Northern.

Do you want more information about MCDOT projects? Yes  No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions:

Improve bike route to the 101, extend  
the 101 & 303.

Thank you.

# CITIZEN COMMENTS

RECEIVED  
JUN 24 1997

(7)



## Northern Avenue Design Concept Report Loop 101 to 67th Avenue

Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name HARVEY L. SHARP Phone 602-979-3292  
Address 7540 W. NORTHERN AV.  
GLENDALE, AZ 85303

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? I do not like alternative 2 or 3 because the right of way comes entirely to close to my house.

If none, why?

(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- Very knowledgeable
- Somewhat knowledgeable
- Not very knowledgeable

- Very helpful
- Somewhat helpful
- Not very helpful

Was all the project information presented in an understandable manner?    Yes     No

Did staff answer all of your questions?    Yes     No

If not, what didn't they answer? \_\_\_\_\_  
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Do you want more information about MCDOT projects?    Yes     No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: \_\_\_\_\_  
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Thank you.

# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation  
Project Manager: Kent McLain Phone: 602 - 506 - 8623  
Project Number: 68915  
June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name JAMES EIKI COX BARBARA J. COX Phone 937-2962  
Address 8015 W. NORTHERN AVE  
GLENDALE, AZ 85303-1003

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? IT SEEMS TO BE THE LEAST "RADICAL" OF THE CSJ  
PLANS. ANOTHER CONCERN OF OURS IS THE QUALITY OF WORK  
DONE. THE LAST "IMPROVEMENT" TO NORTHERN AVE MAINLY  
TORE UP A PREVIOUS "IMPROVEMENT. WATER VALVES & MANHOLE  
COVERS WERE LEFT EITHER TOO HIGH ABOVE FINAL GRADE  
OR TOO LOW. RESIDENTS ALONG NORTHERN AVE ARE LUCKY TO GET  
A REASONABLE NIGHT'S SLEEP BECAUSE OF DUMP TRUCKS & BANGING  
TAILGATES. AFTER THE CONTRACTOR LEFT THE GRADER DRIVER  
FOR THE COUNTY MAINT. DEPT. PROMPTLY TORE UP THE BLACKTOP APRON IN THE  
DRIVEWAY

(continued on back)



# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation  
Project Manager: Kent McLain Phone: 602 - 506 - 8623  
Project Number: 68915  
June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

*Please print.*

Name Ronald N. Rovey Phone (520) 282-1155  
Address Attorney at Law  
1785 W. Highway 89A  
Sedona, AZ 86336

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? Unless a) acceptable traffic control and a traffic signal, or special crossing structure are installed at 7700 West Northern Avenue (quarter mile point) to avoid the five lane road becoming an unreasonable barrier and hazard for the Rovey Farm's trucks, tractors, equipment machinery that cross between the North and South sides of Northern at that point; and b) s and consultants meet with our family members to reach acceptable agreements regarding the location of the right-of-way and taking of property on both sides of Northern Avenue. Pro the foregoing are accomplished, then Alternative 2 giving priority to the Northern Avenue alignment would be preferred. Also, based upon the land ownership, established uses and if none, why? activities, and potential development patterns in the future, the proposed signalization improvements at 79th and Northern (half mile point) are unnecessary and far critical than at 77th and Northern (quarter mile point), which already is heavily used and extremely dangerous crossing due to the size, speeds and nature of farm equipment in contr to the urban motor vehicle traffic on Northern.

(continued on back)

# Northern Avenue Design Concept Report

## Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- Very knowledgeable
- Somewhat knowledgeable
- Not very knowledgeable

- Very helpful
- Somewhat helpful
- Not very helpful

Was all the project information presented in an understandable manner? Yes  No   
but the staff should have made a general overall presentation of the proposed project at the beginning of the meeting.

Did staff answer all of your questions? Yes  No   
If not, what didn't they answer? \_\_\_\_\_

Do you want more information about MCDOT projects? Yes  No   
If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: \_\_\_\_\_  
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## RONALD N. ROVEY

ATTORNEY AT LAW  
140 NORTHVIEW ROAD  
SEDONA, ARIZONA 86336  
[502] 282-1155

July 7, 1997

Mr. Steve Wilcox  
Stanley Consultants, Inc.  
2929 E. Camelback Rd., Ste. 130  
Phoenix, AZ 85016

Mr. Kent McLain  
MCDOT  
2901 West Durango St.  
Phoenix, AZ 85009

Re: Northern Avenue from Loop 101 to 67th  
Project No. 68915

Dear Mr. Wilcox and Mr. McLain:

In 1943, Dad purchased the farm and started dairying at the home place (7700 West Northern Avenue). At that time, Northern Avenue was a dirt road with only a few vehicles occasionally passing by. For many years we drove the dairy cows and livestock across Northern to and from the pastures and dairy facilities located on both sides of the road. As Northern Avenue became more improved and the traffic increased, that eventually precluded driving livestock across the road so they are now hauled in trucks and trailers. There are also a significant number of farm tractors, trucks, machinery and heavy equipment (many of which are very large and slow moving) that must cross Northern at that point each day. With the amount of traffic and speeds that the vehicles on Northern travel, even the two lane roadway has become a significant barrier, danger and safety hazard to crossing. We have had some very serious accidents there due to the incompatibility of urban and farm vehicles. A five lane road will vastly increase those hazards and dangers and will make Northern an insurmountable barrier and obstacle for the farm equipment and vehicles to cross. It will significantly impact our long established farming operations and effectively be a major severance of our property and the farm and dairy operations and facilities on both sides of Northern Avenue in contrast to the roadway as it currently exists. Unless satisfactory resolutions to those problems are made, widening Northern Avenue would constitute impermissible takings. Another alternative would be to keep it as a two lane road and restrict the speed to 35 miles per hour.

Mr. Steve Wilcox  
Mr. Kent McLain  
July 7, 1997  
Page 2

Per our discussions with Kent McLain and Don Wiltshire at the June 19th public meeting, it is our understanding that the MCDOT staff and consultants will hold further meetings with our family to develop acceptable solutions to the crossing problem and also to coordinate and determine the right-of-way lines and taking of family property on both sides of the road.

We are also enclosing a completed Citizen Comments form and ask that those comments and this letter be included with the information and data that you are gathering on this project study.

Sincerely,



Ronald N. Rovey

RNR:lo  
Enclosure

# CITIZEN COMMENTS

JUL 09 1997

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name PAUL ROVEY Phone 939-2045  
Address 7711 W. NORTHERN AVE.  
GLENDALE AZ 85303

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? SEE ATTACHED

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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If none, why? \_\_\_\_\_  
\_\_\_\_\_  
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(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- |  |   |
|--|---|
| <input checked="" type="checkbox"/> Very knowledgeable | <input type="checkbox"/> Very helpful     |
| <input type="checkbox"/> Somewhat knowledgeable        | <input type="checkbox"/> Somewhat helpful |
| <input type="checkbox"/> Not very knowledgeable        | <input type="checkbox"/> Not very helpful |

Was all the project information presented in an understandable manner?      Yes       No

Did staff answer all of your questions?      Yes       No

If not, what didn't they answer? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Do you want more information about MCDOT projects?      Yes       No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: SEE ATTACHED  
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July 7, 1997

Kent McLain, Project Manager  
MCDOT  
Phoenix, Arizona

Mr. McLain,

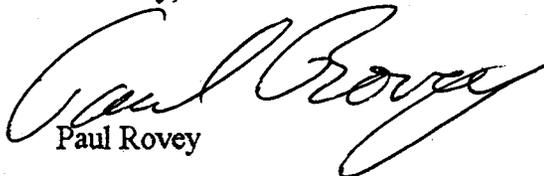
Although I prefer the enhanced maintenance alternative, I understand that we cannot stand in the way of progress. In lieu of this, I would prefer Alternative #2 - Improved Section.

We need to have a personal meeting prior to the plans being made for the right-of-way and center line alignment as we own property on both sides of Northern Avenue from 67<sup>th</sup> to 83<sup>rd</sup> Avenues that will be seriously impacted by this project.

There will be a wider stretch of road to cross at the 77<sup>th</sup> Avenue intersection, and at this present time that intersection is very busy with high volumes of traffic coming and going to and from the farm as well as slower vehicles, crossing and turning at the 77<sup>th</sup> Avenue intersection. Because of this, I would request a traffic control light be erected at the intersection to improve safety to both farm related vehicles as well as the many commuters (their volume increasing with the new widened road) who pass by our farm on a daily basis. As an example of this, I would like to reference the traffic control light erected at the 61<sup>st</sup> Avenue and Northern intersection. This traffic control light was erected in order to accommodate the hospital that used to be at that site, as it was placed there in order to assist the heavier volume of traffic at that location.

Looking forward to personally meeting with you.

Sincerely,



Paul Rovey

JUL 09 1997

# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

Please print.

Name LARRY ROVEY Phone 842-4580  
Address 7711 W NORTHERN AVE.  
GLENDALE AZ 85303

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? SEE ATTACHED

If none, why? SEE ATTACHED

(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- Very knowledgeable
- Somewhat knowledgeable
- Not very knowledgeable

- Very helpful
- Somewhat helpful
- Not very helpful

Was all the project information presented in an understandable manner?    Yes     No

Did staff answer all of your questions?    Yes     No

If not, what didn't they answer? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Do you want more information about MCDOT projects?    Yes     No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: SEE ATTACHED  
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Thank you.

July 7, 1997

Kent McLain, Project Manager  
MCDOT  
Phoenix, Arizona

Mr. McLain,

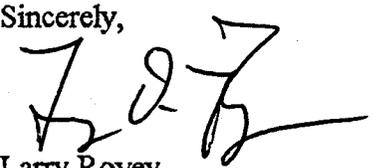
Although I prefer that nothing happen, I understand that alternative number 2 or 3 will be approved. I have a concern with my continued ability to function with the widening of Northern Avenue.

We need to have a personal meeting prior to the plans being made for the right-of-way and center line alignment as we own property on both sides of Northern Avenue from 67<sup>th</sup> to 83<sup>rd</sup> Avenues that will be seriously impacted by this project.

I have a concern with multiple lanes of traffic as much of the equipment my farm uses is much wider than a single lane made for traffic. Also, there will be a wider stretch of road to cross at the 77<sup>th</sup> Avenue intersection, and at this present time that intersection is very busy, 24 hours a day. We have high volumes of traffic coming and going to and from both sides of the farm, as well as slower vehicles, crossing and turning at the 77<sup>th</sup> Avenue intersection. I would request a traffic control light be erected at the intersection to improve safety to both farm related vehicles as well as the many commuters who pass by our farm on a daily basis. As an example of this, I would like to reference the traffic control light erected at the 61<sup>st</sup> Avenue and Northern intersection. This traffic control light was erected in order to accommodate the hospital that used to be at that site, as it was placed there in order to assist the heavier volume of traffic at that location.

Looking forward to personally meeting with you.

Sincerely,

  
Larry Rovey

# SIGN-IN SHEET



## Northern Avenue Design Concept Report Loop 101 to 67th Avenue

Maricopa County Department of Transportation  
Project Number: 68915  
June 19, 1997

Name	Address	Phone
1 DONNA OgLE	7835 W. NORTHERN	930-7704
2 August Lindberg	5013 W. Palo Verde Ave	937-5454
3 Bill Birdsong	5013 W. Palo Verde Ave.	937-5454
4 Hawey L. Sharp	7540 W. Northern Ave.	979-3292
5 Aileen L. Robertson	8107 W. Olive Ave	979-3777
6 (Betty Palmer)		
7 Emil ROVEY	7702 W Northern	979-374
8 Ron ROVEY	140 Northview Rd. Sedona Az 86336	(520) 282-1155
9 Dand Moody	8570 E Warner Ave	412-7212
10 FRED BRANDT	14437 N. 17th AVE. Phoenix AZ 85023	
11 LARRY MANE	4710 W DAVIS RD CLANDAIR AZ 85306	938-7968
12 Robert Baker	8450 West Desert Jewel	822665
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# SIGN-IN SHEET



Northern Avenue Design Concept Report  
Loop 101 to 67th Avenue

Maricopa County Department of Transportation  
Project Number: 68915  
June 19, 1997

Name	Address	Phone
1 Lan Nissen	City of Peoria	412-7210
2 Ralph Eaton	Eaton Investments Inc	277-1212
3 Joe Labere	8401 W. Maricopa	977-9595
4 Sandra H. Forest	8539 W. Diana Ave	878-1868
5 Ann Traw	6024 N. 83rd Ave	872-1252
6 Tom Traw	6024 N. 83rd Ave	872-9300
7 Joseph Boyer	8550 W Desert Jewel	872-3837
8 Michael Boyer	" " "	" " "
9 Jeremy Malysz	8550 W. Seldon Lane	878-9444
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# SIGN-IN SHEET



Northern Avenue Design Concept Report  
Loop 101 to 67th Avenue

Maricopa County Department of Transportation  
Project Number: 68915  
June 19, 1997

Name	Address	Phone
1 Bobbi Antmucci	8939 W. Echo lane Peoria	872-1730
2 Barbara Cox	8015 W. Northern Ave.	937-2762
3 James E. L. Cox	"	"
4 Melvin W Thompson	7534 W. Northern Ave	979-3736
5 PAUL BOCKM	7711 W. NORTHERN AVE	939-2045
6 EDD M. CLESTER, JR.	9135 West Northern Ave	872-1136
7 MIKE HUNZIKER	114 E. MONTE CRESTO	912-6500
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# SIGN-IN SHEET



Northern Avenue Design Concept Report  
Loop 101 to 67th Avenue

Maricopa County Department of Transportation  
Project Number: 68915  
June 19, 1997

Name	Address	Phone
1 Suzanne Gordon	9015W Butler Dr Phoenix AZ 85345 N/P	
2 J Williams	6330 N 240th Ave	6223175
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# SIGN-IN SHEET



## Northern Avenue Design Concept Report *Loop 101 to 67th Avenue*

Maricopa County Department of Transportation

Project Number: 68915

June 19, 1997

Name	Address	Phone
1 Tim & Bobbi	8939 W. Echo Lane PEORIA	872-1735
2 Greg Zernich	Glendale St	842-6000
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# SIGN-IN SHEET



Northern Avenue Design Concept Report  
*Loop 101 to 67th Avenue*

Maricopa County Department of Transportation

Project Number: 68915

June 19, 1997

Name

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# SIGN-IN SHEET



Northern Avenue Design Concept Report  
*Loop 101 to 67th Avenue*

Maricopa County Department of Transportation  
Project Number: 68915  
June 19, 1997

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# Maricopa County

Department of Transportation

## Open House Public Meeting

**Northern Avenue Design Concept Report**  
Northern Avenue - Loop 101 to 67th Avenue

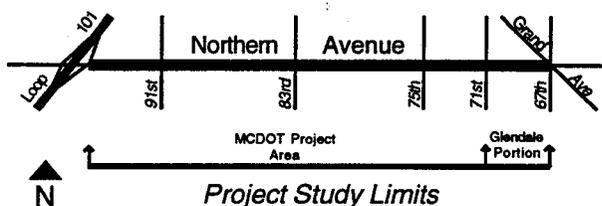
**Thursday, June 19, 1997**

**6:00 pm - 8:00 pm**

**Cotton Boll Elementary School**

**8540 West Butler Drive**

**Peoria, Arizona 85345**



The Maricopa County Department of Transportation will conduct an Open House Public Meeting for the Northern Avenue (Loop 101 to 67th Avenue) Design Concept Report. The meeting will be held on Thursday, June 19, from 6:00 p.m. to 8:00 p.m.

The intent of the study is to improve traffic capacity, control drainage, and enhance the safety of Northern Avenue. An environmental overview will be prepared as part of the study. The public is invited to attend and participate in the meeting. The purpose of the meeting is to obtain public input regarding issues and concerns associated with proposed roadway improvement alternatives to Northern Avenue.

In conformance with the Americans with Disabilities Act, requests for special needs will be addressed. For additional information or to submit comments on this project, please contact: Mr. Kent McLain, Project Manager, Maricopa County Department of Transportation, 2901 W. Durango St., Phoenix, AZ 85009, or call: 602-506-8623.



## PUBLIC MEETING PROPERTY OWNERS MAILING LIST

Rovey Investments  
7711 W. Northern Ave  
Glendale AZ 85301  
143-23-022C

Rovey Investments  
7711 W. Northern Ave  
Glendale AZ 85301  
143-23-023G  
143-23-023H  
143-23-023K

Alliance Wholesale Lumber, Inc.  
6770 W. Northern Ave  
Glendale AZ 85303  
143-23-037A  
143-23-037C

Virginia M. Ottosen  
6826 N. 24th Place  
Phoenix AZ 85016  
143-24-001D

Virginia M. Ottosen  
6244 N. 19th Street  
Phoenix AZ 85016  
143-24-001F

Eaton Northern Ave Industrial Park L L  
3200 N. Central Ave  
Phoenix AZ 85012  
143-24-004G

Eaton Northern Ave Industrial Park L L  
3200 N. Central Ave  
Phoenix AZ 85012  
143-24-004H

Jerome F. / Debra Meyers  
6849 W. Northern  
Glendale AZ 85303  
143-24-004J

Jerome F. / Debra Meyers  
6849 W. Northern  
Glendale AZ 85303  
143-24-004K

Sharon V. Doerfler  
3160 Escoba Drive  
Palm Springs CA 92264  
143-24-010

Gilbert I. & Susan K. Carlson  
6319 W. Oregon  
Glendale AZ 85301  
143-24-011

7916-68th Avenue Partnership  
7916 N. 68th Ave  
Glendale AZ 85303  
143-24-036

State of Arizona  
Grand Avenue Glendale  
143-24-061

Chester A. / Dorothy L. Russell  
7548 N. 20th Street  
Phoenix AZ 85020  
143-24-062

Eaton Northern Ave Industrial Park L L  
3200 N. Central Ave  
Phoenix AZ 85012  
143-24-063

Pete Marshall Family Trust  
5134 N. Central Ave  
Phoenix AZ 85011  
143-24-064

Chickasha Cotton Oil Co.  
P.O. Box 15004  
Casa Grande AZ 85230  
142-22-002A

Chickasha Cotton Oil Co.  
P.O. Box 15004  
Casa Grande AZ 85230  
142-22-002D

Chickasha Cotton Oil Co.  
P.O. Box 15004  
Casa Grande AZ 85230  
142-22-002E

## PUBLIC MEETING PROPERTY OWNERS MAILING LIST

Chickasha Cotton Oil Co.  
P.O. Box 15004  
Casa Grande AZ 85230  
142-22-002F

Chickasha Cotton Oil Co.  
P.O. Box 15004  
Casa Grande AZ 85230  
142-22-002G

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
142-22-013A

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
142-22-013C

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
142-22-013D

Melvin W. & Lynn R. Thompson  
7534 W. Northern Ave  
Glendale AZ 85303  
142-23-002C

Melvin W. & Lynn R. Thompson  
7534 W. Northern Ave  
Glendale AZ 85303  
142-23-002D

Melvin W. & Lynn R. Thompson  
7534 W. Northern Ave  
Glendale AZ 85303  
142-23-002E

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
142-23-007F

Emil M./Ruth M. Rovey  
7702 W. Northern Ave  
Glendale AZ 85303  
142-23-007G

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
142-23-007H

Albert E. Rovey Trust  
7711 W. Northern Ave  
Glendale AZ 85303  
142-23-007J

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
142-23-007K

Albert E. Rovey Trustee  
7711 W. Northern Ave  
Glendale AZ 85303  
142-23-007L

Harvey L. & Bertha E. Sharp  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-008A

Harvey L. & Bertha E. Sharp  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-008B

Harvey L. & Bertha E. Sharp  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-008C

Melvin W. & Lynn R. Thompson  
7534 W. Northern Ave  
Glendale AZ 85303  
142-23-011A

Melvin W. & Lynn R. Thompson  
7534 W. Northern Ave  
Glendale AZ 85303  
142-23-011B

Melvin W. & Lynn R. Thompson  
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## PUBLIC MEETING PROPERTY OWNERS MAILING LIST

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Daryl G./Elizabeth A. Strickler  
10652 W. Rancho Drive  
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142-23-013V

Daryl G./Elizabeth A. Strickler  
10652 W. Rancho Drive  
Glendale AZ 85307  
142-23-013W

Harvey L. & Bertha E. Sharp  
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Glendale AZ 85303  
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Harvey L. & Bertha E. Sharp  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-013Y

Harvey L. & Bertha E. Sharp  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-013Z

Charlene McCoy  
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Charlene McCoy  
3502 E. Monte Vista Road  
Peoria AZ 85008  
142-23-014B

Charlene McCoy  
3502 E. Monte Vista Road  
Peoria AZ 85008  
142-23-014C

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7540 W. Northern Ave  
Glendale AZ 85303  
142-23-025

Claude H. & Claudney L. Stevens  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-026

Claude H. & Claudney L. Stevens  
7540 W. Northern Ave  
Glendale AZ 85303  
142-23-027

Steve E./Donna J. Ogle  
7835 W. Northern Ave  
Glendale AZ 85303  
142-24-011C

Steve E./Donna J. Ogle  
7835 W. Northern Ave  
Glendale AZ 85303  
142-24-011D

Larry D. & Linda L. Rovey  
7511 W. Northern Ave  
Glendale AZ 85303  
142-24-011E

Larry D. & Linda L. Rovey  
7511 W. Northern Ave  
Glendale AZ 85303  
142-24-011F

Larry Rovey Farms  
7711 W. Northern Ave  
Glendale AZ 85303  
142-24-021A

Larry Rovey Farms  
7711 W. Northern Ave  
Glendale AZ 85303  
142-24-021B

Glendale One Limited Partnership  
Butler Zieser & Company, Inc.  
4227 E. Cambridge Ave  
Phoenix AZ 85009  
142-25-007F

**PUBLIC MEETING PROPERTY OWNERS MAILING LIST**

Glendale One Limited Partnership  
Butler Zieser & Company, Inc.  
4227 E. Cambridge Ave  
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Donna M. Ollson Trustee  
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Glendale AZ 85302  
142-25-007H

Donna M. Ollson Trustee  
8602 N. 50th Lane  
Glendale AZ 85302  
142-25-007J

Louis Michael Ollson  
Route 1 Box 152  
Glendale AZ 85301  
142-25-007K

Louis Michael Ollson  
Route 1 Box 152  
Glendale AZ 85301  
142-25-007L

Robert Blay  
8233 W. Northern Ave  
Glendale AZ 85303  
142-25-007M

Robert Blay  
8233 W. Northern Ave  
Glendale AZ 85303  
142-25-007N

Federal Home Loan Mortgage Corp  
205 Park Club Lane  
Buffalo NY 14231  
142-25-008R

Federal Home Loan Mortgage Corp  
205 Park Club Lane  
Buffalo NY 14231  
142-25-008S

Federal Home Loan Mortgage Corp  
205 Park Club Lane  
Buffalo NY 14231  
142-25-008T

Federal Home Loan Mortgage Corp  
205 Park Club Lane  
Buffalo NY 14231  
142-25-008U

Roderick D./Adams W. E./  
Endicott T. Logan Trust  
10720 W. Indian School Rd  
Phoenix AZ 85037  
142-25-008V

James E. L. & Barbara J. Cox  
8015 W. Northern Ave  
Glendale AZ 85303  
142-25-008X

James E. L. & Barbara J. Cox  
8015 W. Northern Ave  
Glendale AZ 85303  
142-25-008Y

Stanley B. & Emily Novak  
P. O. Box 5805  
Carefree AZ 85377  
142-25-008Z

Stanley B. & Emily Novak  
P. O. Box 5805  
Carefree AZ 85377  
142-25-009

Stanley B. & Emily Novak  
P. O. Box 5805  
Carefree AZ 85377  
142-25-010

Stanley B. & Emily Novak  
P. O. Box 5805  
Carefree AZ 85377  
142-25-011

Stanley B. & Emily Novak  
P. O. Box 5805  
Carefree AZ 85377  
142-25-012

Stanley B. & Emily Novak  
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Carefree AZ 85377  
142-25-013

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Robert R. & Peggy J. Raney  
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Glendale AZ 85311  
142-25-015

Robert R. & Peggy J. Raney  
P. O. Box 446  
Glendale AZ 85311  
142-25-016

Robert R. & Peggy J. Raney  
P. O. Box 446  
Glendale AZ 85311  
142-25-017

Roderick D./Adams W. E./  
Endicott T. Logan Trust  
10720 W. Indian School Rd  
Phoenix AZ 85037  
142-25-023

Lakin Cattle Company  
4456 S. Dysart  
Avondale AZ 85323  
142-30-001A

Lakin Cattle Company  
4456 S. Dysart  
Avondale AZ 85323  
142-30-001F

SLHC Holdings, Inc.  
2626 S. 7th Street  
Phoenix AZ 85034  
142-30-002A

SLHC Holdings, Inc.  
2626 S. 7th Street  
Phoenix AZ 85034  
142-30-002D

Cecil Roc Quaintance  
4236 N. 27th Ave  
Phoenix AZ 85017  
142-31-002P

Cecil Roc Quaintance  
4236 N. 27th Ave  
Phoenix AZ 85017  
142-31-002Q

Larry & Lurrene Horne  
5041 W. Northern Ave Glendale AZ  
85301  
142-31-002R

Larry & Lurrene Horne  
5041 W. Northern Ave  
Glendale AZ 85301  
142-31-002S

Janet L. Jordan  
8337 W. Northern Ave  
Glendale AZ 85305  
142-31-002T

Janet L. Jordan  
8337 W. Northern Ave  
Glendale AZ 85305  
142-31-002U

Kalwara Family Trust  
7336 N. 12th Ave  
Phoenix AZ 85021  
142-31-002V

Sanford Kalwara & Roselee Bethel  
7336 N. 12th Ave  
Phoenix AZ 85021  
142-31-002W

Jon R. & Margaret L. Hershberger  
8902 W. Calle Lejus  
Peoria AZ 85345  
142-31-003Q

Jon R. & Margaret L. Hershberger  
8902 W. Calle Lejus  
Peoria AZ 85345  
142-31-003R

Jon R. & Margaret L. Hershberger  
8902 W. Calle Lejus  
Peoria AZ 85345  
142-31-003S

## PUBLIC MEETING PROPERTY OWNERS MAILING LIST

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Peoria AZ 85345  
142-31-003T

Clarence & Virginia L. Van Der Hart  
8525 W. Northern Ave  
Glendale AZ 85305  
142-31-003U

Glenda Pecina  
8501 W. Northern Ave  
Glendale AZ 85305  
142-31-003W

Juanita Pecina  
8505 W. Northern Ave  
Glendale AZ 85305  
142-31-003Z

Robert J. Nordtome  
8707 W. Northern Ave  
Glendale AZ 85305  
142-31-012

Ralph McRae  
8709 W. Northern Ave  
Glendale AZ 85305  
142-31-013

Robert J. Nordtome  
8707 W. Northern Ave  
Glendale AZ 85305  
142-31-014

Ralph McRae  
8709 W. Northern Ave  
Glendale AZ 85305  
142-31-015

Clarence & Virginia L. Van Der Hart  
8525 W. Northern Ave  
Glendale AZ 85305  
142-31-017

James E./Valerie Lathen  
8605 W. Northern Ave  
Glendale AZ 85302  
142-31-018

Steve M./Sandy L. Vanlandingham  
8615 W. Northern Ave  
Glendale AZ 85302  
142-31-019C

James E./Valerie Lathen  
8605 W. Northern Ave  
Glendale AZ 85302  
142-31-022

Northwest Farm Corporation Etal  
1116 W. Royal Palm Rd  
Phoenix AZ 85021  
142-32-001D

John E./Mary Maynarich/  
George Kasper Trust  
4710 W. Davis Rd  
Glendale AZ 85306  
142-32-004M

Meadowood Homeowners Associates  
P. O. Box 1082  
Peoria AZ 85345  
142-32-237

Marion O. McLeskey  
9135 W. Northern Ave  
Glendale AZ 85305  
142-33-001C

Marion O. McLeskey  
9135 W. Northern Ave  
Glendale AZ 85305  
142-33-001E

Marion O. McLeskey  
9135 W. Northern Ave  
Glendale AZ 85305  
142-33-001F

G & B Smith Properties  
4006 E. Roundhill Drive  
Phoenix AZ 85028  
142-33-002C

Glenn L. & Bernice V. Smith Etal  
4006 E. Roundhill Drive  
Phoenix AZ 85028  
142-33-002D

## PUBLIC MEETING PROPERTY OWNERS MAILING LIST

City of Peoria  
8355 W. Peoria  
Peoria AZ 85345  
142-33-004A

City of Peoria  
8355 W. Peoria  
Peoria AZ 85345  
142-33-004B

Walter W. & Betty Sue Bartol  
8120 N. 83rd Ave  
Peoria AZ 85345  
142-33-005J

Walter W. & Betty Sue Bartol  
8120 N. 83rd Ave  
Peoria AZ 85345  
142-33-005K

Walter W. & Betty Sue Bartol  
8120 N. 83rd Ave  
Peoria AZ 85345  
142-33-005L

District Council of Arizona  
6235 N. 16th Drive  
Phoenix AZ 85015  
142-33-005M

District Council of Arizona  
6235 N. 16th Drive  
Phoenix AZ 85015  
142-33-005N

District Council of Arizona  
6235 N. 16th Drive  
Phoenix AZ 85015  
142-33-005P

Maricopa County Flood Control District  
2801 W. Durango Street  
Phoenix AZ 85009  
142-33-006U

William S. & Agnes M. Birdsong Trust  
5013 W. Palo Verde Ave  
Glendale AZ 85302  
142-33-006V

Frank X./Joan C. Gordon Etal  
321 E. Marlette  
Phoenix AZ 85012  
142-33-006W

Westside Development Group Ltd  
6006 N. 83rd Ave  
Glendale AZ 85303  
142-33-006X

Brighton Development Company  
Laco Corporation  
11022 N. 28th Dr Ste 160  
Phoenix AZ 85029  
142-55-002G

Northern Loop Properties Ltd  
Partnership  
1028 E. Clinton Street  
Phoenix AZ 85020  
142-55-002J

Arizona Land Associates Ltd  
Partnership  
601 S. Figueroa Street  
Los Angeles CA 90017  
142-55-002K

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-003G

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-003H

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-003K

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-003M

**PUBLIC MEETING PROPERTY OWNERS MAILING LIST**

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-003N

Manuel J. & Angela Y. Silva  
9433 W. Northern Ave  
Glendale AZ 85305  
142-56-001D

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-003P

Larwill K & Carol L. Biddle  
9431 W. Northern  
Glendale AZ 85305  
142-56-001G

Begaje Limited Partnership  
27 Bullmoose Circle  
Chandler AZ 85224  
142-55-003R

Arizona State Dept. of Transportation  
205 S. 17th Ave  
Phoenix AZ 85007  
Glendale  
142-56-001H

Silva Nine Nine Ave Limited Partnership  
9433 W. Northern Ave  
Glendale AZ 85305  
142-55-009D

Larwill A./Lois S. Biddle Trust  
8931 N. 95th Ave  
Peoria AZ 85345  
142-56-001J

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-017A

Freeway Northern Partners  
2198 E. Camelback Rd #345  
Phoenix AZ 85016  
142-56-001K

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-017C

Rudolph Jr. & Mary Eileen Johnson  
9702 W. Glendale Ave  
Glendale AZ 85305  
142-56-002B

S R P A I & P D  
1521 Project Drive  
Tempe AZ 85281  
142-55-017E

Freeway Northern Partners  
2198 E. Camelback Rd #345  
Phoenix AZ 85016  
142-56-003C

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-168

Hickman Land Company L L C  
9135 W. Northern Ave  
Glendale AZ 85305  
142-56-003D

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-169

Freeway Northern Partners  
2198 E. Camelback Rd #345  
Phoenix AZ 85016  
142-56-003E

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
142-55-170

Marion O. McCleskey Trust  
9135 W. Northern Ave  
Glendale AZ 85305  
142-56-003F

**PUBLIC MEETING PROPERTY OWNERS MAILING LIST**

Clancy L. McClure  
9135 W. Northern Ave  
Glendale AZ 85305  
142-56-011B

Edd & Marion O. McCleskey  
9135 W. Northern Ave  
Glendale AZ 85305  
142-56-018A

Edd & Marion O. McCleskey  
9135 W. Northern Ave  
Glendale AZ 85305  
142-56-018B

S R P A I & P D  
P. O. Box 1980  
Phoenix AZ 85001  
143-22-001

S R P A I & P D  
P. O. Box 1980  
Phoenix AZ 85001  
143-22-007

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85072  
143-22-003A

S R P A I & P D  
P. O. Box 52025  
Phoenix AZ 85073  
143-22-004A

Northern & 72nd Ave Ltd Partnership  
3200 N. Central Ave #2050  
Phoenix AZ 85012  
143-25-008C

Eaton Investments Inc.  
3200 N. Central Ave  
Phoenix AZ 85012  
143-25-008D

Larry Rovey Farms  
1785 W. Hwy 89A  
Sedona AZ 86336  
143-25-011D

# PUBLIC INFORMATION MEETING



## Northern Avenue Design Concept Report *Loop 101 to 67th Avenue*

Maricopa County Department of Transportation

June 19, 1997

### Welcome

The purpose of this meeting is to obtain public input regarding issues and concerns associated with the proposed roadway improvement alternatives for Northern Avenue from Loop 101 to 67<sup>th</sup> Avenue. You are encouraged to direct questions and comments to one of the members of the consultant staff or Maricopa County Department of Transportation (MCDOT), as indicated by their identification badges. Written comments are also welcomed and will receive equal consideration in the study process. A comment sheet is attached to this handout for your convenience.

### Project Description

The proposed Maricopa County Department of Transportation Project will reconstruct and upgrade Northern Avenue to a five-lane urban minor arterial roadway from Loop 101 east to 71<sup>st</sup> Avenue. An Inter-Governmental Agreement is being formalized, between Maricopa County and the City of Glendale, to extend these Northern Avenue improvements further east to 67<sup>th</sup> Avenue. This will fully improve Northern Avenue for the entire length between Loop 101 and Grand Avenue (U.S. 60). The length of the combined project is approximately 5.89 kilometers (3.66 miles). This project is partially located within jurisdictions of Maricopa County, the City of Glendale and the City of Peoria. Storm Drainage facilities will be constructed along with this project in conjunction with Flood Control District of Maricopa County and the City of Peoria.

### Schedule

This project is currently scheduled for construction in the MCDOT 5-year Capitol Improvement Program for fiscal year 2000. This project may be accelerated dependant upon funding availability.

### Project Objectives

The purpose of this roadway project is to improve traffic capacity, control drainage, and enhance safety of Northern Avenue. Alternatives have been developed with the goal of providing an alignment which meets the goals of the project yet minimize utility relocations and impacts to adjacent properties and the environment.

### Alternative 1 - Enhanced Maintenance

Improvements proposed under the Enhanced Maintenance alternative are limited to restorative maintenance of the existing roadway surface with an overlay, providing new pavement markings, shoulder grading and minor drainage/safety improvements. This alternative does not address improving traffic capacity which will result in increased traffic congestion along Northern Avenue as future development causes increased traffic volumes in the future.

### Alternative 2 - Improved Section

The Improved Section alternative involves construction of a five-lane roadway section which will provide two traffic lanes in each direction with continuous two-way left turn lane. Construction of this roadway section will require minor adjustments to the existing roadway centerline to avoid existing major public utility improvements and existing water well sites at 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue. The majority of the proposed alignment follows the existing roadway centerline and/or section line, with slight alignment shifts in the southerly direction at 91<sup>st</sup> Avenue and 83<sup>rd</sup> Avenue.

Northern Avenue will match the Loop 101 improvements at the west end of the project. At this

(over)

(Alternative 2 cont.)

location the alignment of Northern Avenue will follow the section line. The Northern Avenue alignment at the 91<sup>st</sup> Avenue intersection will shift southerly by 3.200 meters (10.49 feet) to avoid a Salt River Project well site. This alignment will match the existing curb returns at this intersection. East of the 91<sup>st</sup> Avenue intersection, the Northern Avenue centerline will shift back to the section line. As the alignment approaches 83<sup>rd</sup> Avenue, the roadway will be shifted southerly by 4.312 meters (14.15 feet) to avoid the City of Peoria well site at the northwest corner of that intersection. This shift in Northern Avenue, in conjunction with an easterly shift of the 83<sup>rd</sup> Avenue alignment by 6.500 meters (21.32 feet), is necessary to avoid impacting the well site. East of the 83<sup>rd</sup> Avenue intersection, the alignment will shift back to the existing section line. The Northern Avenue alignment will remain on the section line through the 75<sup>th</sup> Avenue and 71<sup>st</sup> Avenue intersections. Between 71<sup>st</sup> Avenue and 67<sup>th</sup> Avenue, the alignments will shift from the section line to allow the new roadway section to match the existing curb and gutter along the north side of Northern Avenue.

Provisions to maintain access to existing driveways including use of the continuous two-way left turn lane will be included in the proposed design.

### Alternative 3 - Improved Section with 83rd Avenue Adjustment

This alternative is a combination of Alternative 2- Improved Section, with slight modification at the 83<sup>rd</sup> Avenue intersection. The offset of Northern Avenue at the 83<sup>rd</sup> Avenue intersection is modified from 4.00 meters (13.12 feet) for Alternative 2 to 8.68 meters (28.48 feet). This additional offset of Northern Avenue will allow the slight shift at 83<sup>rd</sup> Avenue to be reduced from 6.50 meters (21.32 feet) to 2.60 meters (8.53 feet). This option will provide adequate clearance from the existing City of Peoria well site, yet minimize the impacts to existing residential properties along the east side of 83<sup>rd</sup> Avenue.

Provisions to maintain access to existing driveways including use of the continuous two-way left turn lane will be included in the proposed design.

### How Can You Help?

We would like to know your opinion on the various roadway concepts presented here tonight. By providing us with your comments, you will be taking part in determining the future improvements to this portion of Northern Avenue. Please take the time to make your written comments on the attached Comment Sheet.

### What Happens Next?

Following this meeting, the project team will be reviewing the comments received from the public and other governmental agencies. Based on these comments and the information gathered to date, a preferred roadway concept will be selected. This corridor study will then evaluate the future needs of Northern Avenue, recommend alignment and configuration solutions, and identify a prioritization for the implementation of the improvements. The recommendations from this study will serve as a roadmap from which Maricopa County can program funding the future design concept studies and design projects along this corridor. The tentative schedule for the completion of the study is by 09/19/97. If you are interested in reading the study results, copies of the final study will be available at MCDOT, City of Glendale, and City of Peoria.

### Who Do You Contact?

For additional information about the project, please contact either:

Mr. Kent McLain  
Project Manager,  
MCDOT  
2901 West Durango St.  
Phoenix, Az 85009  
602 - 506 - 8623

Mr. Steve Wilcox  
Project Manager,  
Stanley Consultants, Inc.  
2929 E Camelback Rd, Ste. 130  
Phoenix, Az 85016  
602 - 912 - 6500

# CITIZEN COMMENTS

## Northern Avenue Design Concept Report Loop 101 to 67th Avenue



Maricopa County Department of Transportation

Project Manager: Kent McLain Phone: 602 - 506 - 8623

Project Number: 68915

June 19, 1997

Please complete and submit this card to a staff member before leaving or mail to: Steve Wilcox, Stanley Consultants, Inc., 2929 E Camelback Rd, Ste 130, Phoenix, AZ 85016. Include your name and mailing address so we can respond to your questions.

*Please print.*

Name \_\_\_\_\_ Phone \_\_\_\_\_  
Address \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

### Corridor Study Survey

Which Northern Avenue Design Concept Alternative do you prefer?

- Alternative 1 - Enhanced Maintenance
- Alternative 2 - Improved Section
- Alternative 3 - Improved Section with 83rd Avenue Adjustment

Why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

If none, why? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

(continued on back)

# Meeting Survey

How would you rate the knowledge and helpfulness of staff members who assisted you?

- |   |   |
|---|---|
| <input type="checkbox"/> Very knowledgeable     | <input type="checkbox"/> Very helpful     |
| <input type="checkbox"/> Somewhat knowledgeable | <input type="checkbox"/> Somewhat helpful |
| <input type="checkbox"/> Not very knowledgeable | <input type="checkbox"/> Not very helpful |

Was all the project information presented in an understandable manner?    Yes     No

Did staff answer all of your questions?    Yes     No

If not, what didn't they answer? \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Do you want more information about MCDOT projects?    Yes     No

If yes, please make sure your name and address are filled in so we can add you to our mailing list.

Additional comments or questions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
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\_\_\_\_\_

APPENDIX D

AGENCY COMMENTS

## AGENCY MAILING LIST

Mr. Joe Albo  
Director  
Arizona Department of Public Safety  
P.O. Box 6638  
Phoenix, Arizona 85005

Mr. Larry Flatau  
U.S. Army Corps of Engineers  
Arizona Area Office  
3636 North Central Avenue  
Suite 760  
Phoenix, Arizona 85012-1936

Mr. Grant Anderson  
Engineering Director  
City of Glendale  
5850 West Glendale Avenue  
Glendale, AZ 85301

Mr. John Hauskins  
District Engineer  
Arizona Department of Transportation  
Phoenix Maintenance District  
2140 West Hilton  
Phoenix, Arizona 85009

Mr. Jim Book  
Transportation Director  
City of Glendale  
5850 West Glendale Avenue  
Glendale, Arizona 85301

Mr. Kevin Kadlec  
Utilities Director  
City of Peoria  
8401 West Monroe Street  
Peoria, Arizona 85345

Mr. Jay Das  
Arizona Department of Environmental Quality  
Water Quality Division  
3033 North Central Avenue, 5th Floor  
Phoenix, Arizona 85012

Mr. Ken Martin  
Public Works Deputy  
City of Glendale  
5850 West Glendale Avenue  
Glendale, AZ 85301

Mr. Richard Duarte  
Environmental Planning Section  
Arizona Department of Transportation  
205 South 17th Avenue  
Phoenix, Arizona 85007-3212

Mr. Bill Mattingly  
City of Peoria  
8401 West Monroe Street  
Peoria, Arizona 85345

## AGENCY MAILING LIST

Ms. Sheila McCafferty  
Manager of Right-of-Way  
Arizona State Land Department  
1616 West Adams  
Phoenix, Arizona 85007

Mr. R. W. Shobe  
Flood Control District of Maricopa County  
2801 West Durango Street  
Phoenix, Arizona 85009

Mr. Dave Moody, P.E.  
Public Works Director / City Engineer  
City of Peoria  
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Peoria, Arizona 85345

Mr. Sam Spiller  
Field Supervisor  
U.S. Fish & Wildlife Service  
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Mr. Dan Nissen  
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Mr. Steve Thomas  
Environmental Coordinator  
Federal Highway Administration  
234 North Central Avenue  
Suite 330  
Phoenix, Arizona 85004

Mr. Duane Shroufe  
Director  
Arizona Game & Fish Department  
2221 West Greenway Road  
Phoenix, Arizona 85023

Ms. Julie Trunk  
Federal Highway Administration  
234 North Central Avenue  
Suite 330  
Phoenix, Arizona 85004

Ms. Marylynn Speares  
Acting Area Manager  
Phoenix District Office  
Bureau of Land Management  
2015 West Deer Valley Road  
Phoenix, Arizona 85027-2099

# ARIZONA DEPARTMENT OF TRANSPORTATION ENVIRONMENTAL PLANNING SECTION

## FAX COVER SHEET



DATE 5/12/97

# OF PAGES (+ COVER) \_\_\_\_\_

TO: Mickey J. Tomaszek (Logan Simpson/Dye)  
PHONE: \_\_\_\_\_  
FAX: 966-9232

FROM: ROLAND TANG  
205 S. 17th AVE., RM 213E, MAIL DROP 619E  
PHOENIX, AZ 85007-3213 FAX: (602) 407-3066  
(602) 255- 1762

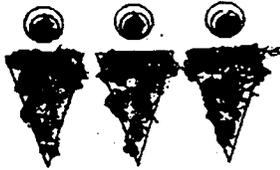
### COMMENTS:

RE: Northern Ave - Loop 101 to 67th Ave DCR  
Maricopa Co. Dept. of Transportation

The Environmental Planning Section has reviewed  
your request relating to the proposed corridor  
for any environmental issues.

We have none at this time.

Roland Tang



Logan Simpson & Dye

Logan Simpson & Dye LLC  
398 S. Mill Avenue, Suite 200  
Tempe, Arizona 85281  
602-967-1343  
602-966-9232 FAX

April 28, 1997

Mr. Richard Duarte  
Environmental Planning Section  
Arizona Department of Transportation  
205 South 17th Avenue  
Phoenix, Arizona 85007-3212

RE: Northern Avenue - Loop 101 to 67th Avenue Design Concept Report  
Maricopa County Department of Transportation  
MCDOT Work Order No. 68915

Dear Mr. Duarte:

The consulting firm of Logan Simpson & Dye has been retained by the Maricopa County Department of Transportation (MCDOT) to prepare the environmental overview for the Northern Avenue - Loop 101 to 67th Avenue Design Concept Report. The purpose of the project is to improve safety and operational characteristics of Northern Avenue. A map of the project area is enclosed.

We are requesting any written comments or concerns that you may have on environmental issues related to the corridor and would appreciate your response by May 19, 1997. Please call me if you have any questions.

With regards,

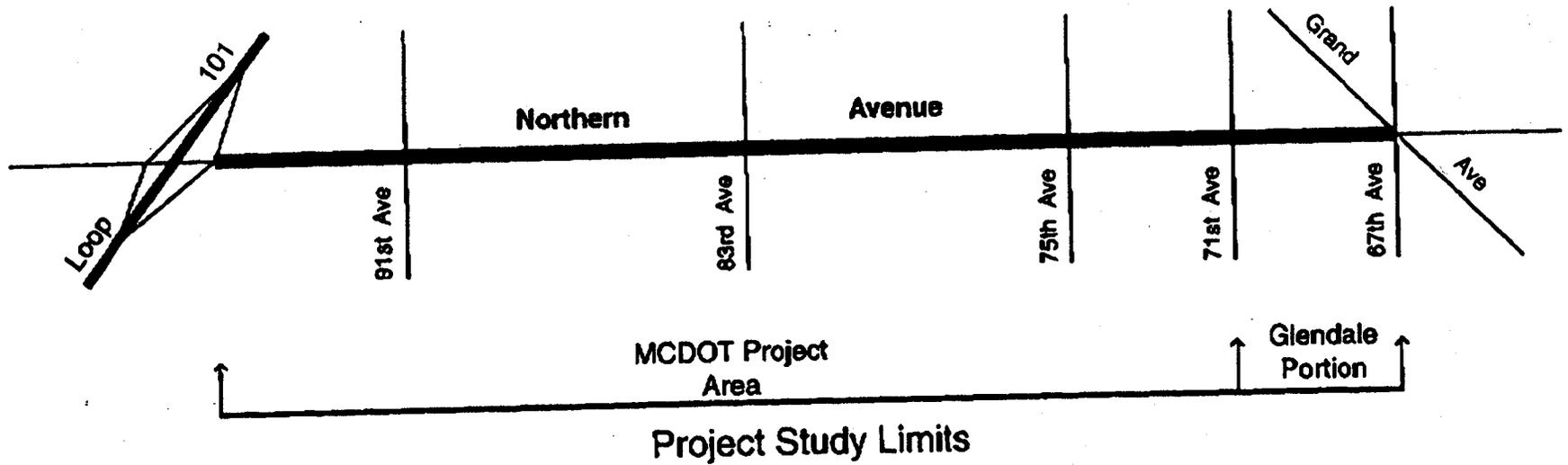
Mickey J. Tomalczyk  
Project Environmental Planner

Enclosures

Landscape Architecture  
Park and Recreation Design  
Environmental Planning

Printed on recycled paper

# Project Location Map



Northern Avenue - Loop 101 to 67th Avenue Design Concept Report  
Maricopa County Department of Transportation  
MCDOT Work Order No. 68915



THE STATE



OF ARIZONA

## GAME & FISH DEPARTMENT

2221 West Greenway Road, Phoenix, Arizona 85023-4399 (602) 942-3000

*Governor*  
Fife Symington

*Commissioners:*  
Chairman, Nonie Johnson, Snowflake  
Michael M. Golightly, Flagstaff  
Herb Guenther, Tacna  
Fred Belman, Tucson  
M. Jean Hassell, Scottsdale

*Director*  
Duane L. Shroufe

*Deputy Director*  
Thomas W. Spalding

May 6, 1997

Mr. Mickey J. Tomalczyk  
Environmental Planner  
Logan Simpson & Dye LLC  
398 South Mill Avenue, Suite 200  
Tempe, Arizona 85281

Re: Special Status Species Information Request; Northern Avenue from Loop 101 to 67<sup>th</sup> Avenue Design Concept Report for Maricopa County Department of Transportation; T3N, R1E, Sections 34-36 and T2N, R1E, Sections 1-3

Dear Mr. Tomalczyk:

The Arizona Game and Fish Department (Department) has reviewed the materials provided on the above-referenced subject from your letter dated April 28, 1997, and we provide the following comments for your consideration.

The Department's Heritage Data Management System has been accessed and current records show that the **black-bellied whistling-duck** (*Dendrocygna autumnalis*) has been documented as occurring in the project vicinity. This species is classified as **Wildlife of Special Concern in Arizona**. Wildlife of special concern are those species whose occurrence in Arizona is or may be in jeopardy, or with known or perceived threats or population declines, as described by the Department's listing of **Wildlife of Special Concern in Arizona** (WSCA, in prep.). Species included in WSCA are currently the same as those in **Threatened Native Wildlife in Arizona** (1988). In addition, the black-bellied whistling-duck is also classified as "**sensitive**" by the Regional Forester when occurring on lands managed by the U.S.D.A. Forest Service.

This correspondence does not represent the Department's evaluation of impacts to wildlife or wildlife habitat associated with activities occurring in the subject area. The Department would appreciate the opportunity to provide such an evaluation when specific details become available. Please contact Russell Haughey,

Mr. Mickey J. Tomalczyk

May 6, 1997

2

Regional Habitat Program Manager, at 981-9309 extension 222 if this type of evaluation applies to your project.

Thank you for the opportunity to provide this information. If you have any further questions, please do not hesitate to contact me at 789-3611.

Sincerely,

*Barbara Heslin*

Barbara Heslin  
Project Evaluation Specialist  
Habitat Branch

cc: Kelly Neal, Supervisor, Region VI

BSH:bsh

AGFD# 5-01-97(08)



United States Department of the Interior  
Fish and Wildlife Service

Arizona Ecological Services Field Office  
2321 W. Royal Palm Road, Suite 103  
Phoenix, Arizona 85021-4951  
(602) 640-2720 Fax (602) 640-2730



In Reply Refer To:

AESO/SE  
2-21-94-I-596  
CCN 97-0478

May 1, 1997

Mr. Mickey J. Tomalczyk  
Environmental Planner  
Logan Simpson & Dye  
398 South Mill Avenue, Suite 200  
Tempe, Arizona 85281

RE: Northern Avenue-Loop 101 to 67th Avenue Design Concept Report (WO# 68915)

Dear Mr. Tomalczyk:

This letter responds to your April 28, 1997, request for an inventory of threatened or endangered species, or those that are proposed to be listed as such under the Endangered Species Act of 1973, as amended (Act), which may potentially occur in your project area (Maricopa County). The attached list may include candidate species as well. In the past, the U.S. Fish and Wildlife Service has provided project-specific species lists and information. However, staff reductions no longer permit us to provide this detailed level of assistance. We regret any inconvenience this may cause you and hope the enclosed county list of species will be helpful. In future communications regarding this project, please refer to consultation number 2-21-95-I-596.

The enclosed list of the endangered, threatened, proposed, and candidate species includes all those potentially occurring anywhere in the county, or counties, where your project occurs. Please note that your project area may not necessarily include all or any of these species. The information provided includes general descriptions, habitat requirements, and other information for each species on the list. Also on the enclosed list is the Code of Federal Regulations (CFR) citation for each listed or proposed species. Additional information can be found in the CFR and is available at most public libraries. This information should assist you in determining which species may or may not occur within your project area. Site-specific surveys could also be helpful and may be needed to verify the presence or absence of a species or its habitat as required for the evaluation of proposed project-related impacts.

Endangered and threatened species are protected by Federal law and must be considered prior to project development. If the action agency determines that listed species or critical habitat may be adversely affected by a federally funded, permitted, or authorized activity, the action agency must request formal consultation with the Service. If the action agency determines that the planned action may jeopardize a proposed species or destroy or adversely modify proposed critical habitat, the action agency must enter into a section 7 conference with the Service.

Candidate species are those which are being considered for addition to the list of threatened or endangered species. Candidate species are those for which there is sufficient information to support a proposal for listing. Although candidate species have no legal protection under the Act, we recommend that they be considered in the planning process in the event that they become listed or proposed for listing prior to project completion.

If any proposed action occurs in or near areas with trees and shrubs growing along watercourses, known as riparian habitat, the Service recommends the protection of these areas. Riparian areas are critical to biological community diversity and provide linear corridors important to migratory species. In addition, if the project will result in the deposition of dredged or fill materials into waterways or excavation in waterways, we recommend you contact the Army Corps of Engineers which regulates these activities under Section 404 of the Clean Water Act.

The State of Arizona protects some plant and animal species not protected by Federal law. We recommend you contact the Arizona Game and Fish Department and the Arizona Department of Agriculture for State-listed or sensitive species in your project area.

The Service appreciates your efforts to identify and avoid impacts to listed and sensitive species in your project area. If we may be of further assistance, please contact Tom Gatz.

Sincerely,



Sam F. Spiller  
Field Supervisor

Enclosure

cc: Director, Arizona Game and Fish Department, Phoenix, AZ

4/2/97

LISTED TOTAL= 14

NAME: ARIZONA AGAVE

*AGAVE ARIZONICA*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: No CFR: 49 FR 21055, 05-18-1984

DESCRIPTION: HAS ATTRACTIVE ROSETTES OF BRIGHT GREEN LEAVES WITH DARK MAHOGANY MARGINS. FLOWER: BORNE ON SUB-UMBELLATE INFLORESCENCES.

ELEVATION  
RANGE: 3000-6000 FT.

COUNTIES: GILA, YAVAPAI, MARICOPA

HABITAT: TRANSITION ZONE BETWEEN OAK-JUNIPER WOODLAND &amp; MOUNTAIN MAHOGANY-OAK SCRUB

SCATTERED CLONES IN NEW RIVER MOUNTAINS AND SIERRA ANCHA. USUALLY FOUND ON STEEP, ROCKY SLOPES. POSSIBLY MAZATAL MOUNTAINS. SHOULD BE LOOKED FOR WHEREVER THE RANGES OF *Agave toumeyana* var. *bella* AND *Agave chrystantha* OVERLAP.

NAME: ARIZONA CLIFFROSE

*PURSHIA SUBINTEGRA*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 49 FR 22326 5-29-84

DESCRIPTION: EVERGREEN SHRUB OF THE ROSE FAMILY (ROSEACEAE). BARK PALE SHREDDY. YOUNG TWIGS WITH DENSE HAIRS. LEAVES 1-5 LOBES AND EDGES CURL DOWNWARD (REVOLUTE). FLOWERS: 5 WHITE OR YELLOW PETALS &lt;0.5 INCH LONG.

ELEVATION  
RANGE: <4000 FT.

COUNTIES: GRAHAM YAVAPAI MARICOPA MOHAVE

HABITAT: CHARACTERISTIC WHITE SOILS OF TERTIARY LIMESTONE LAKEBED DEPOSITS.

WHITE SOILS OF TERTIARY LIMESTONE LAKEBED DEPOSITS CAN BE SEEN FROM A DISTANCE.

NAME: ARIZONA HEDGEHOG CACTUS

*ECHINOCEREUS TRIGLOCHIDIATUS ARIZONICUS*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: No CFR: 44 FR 61556, 10-15-1979

DESCRIPTION: DARK GREEN CYLINDROID 2.5-12 INCHES TALL, 2-10 INCHES IN DIAMETER, SINGLE OR IN CLUSTERS. 1-3 GRAY OR PINKISH CENTRAL SPINES LARGEST DEFLEXED AND 5-11 SHORTER RADIAL SPINES. FLOWER: BRILLIANT RED, SIDE OF STEM IN APRIL- MAY

ELEVATION  
RANGE: 3700-5200 FT.

COUNTIES: MARICOPA, GILA, PINAL

HABITAT: ECOTONE BETWEEN INTERIOR CHAPPARAL AND MADREAN EVERGREEN WOODLAND

OPEN SLOPES, IN NARROW CRACKS BETWEEN BOULDERS, AND IN UNDERSTORY OF SHRUBS. THIS VARIETY IS BELIEVED TO INTERGRADE AT THE EDGES OF ITS DISTRIBUTION WITH VARIETIES *MELANCANTHUS* AND *NEOMEXICANUS* CAUSING SOME CONFUSION IN IDENTIFICATION.

4/2/97

NAME: LESSER LONG-NOSED BAT

*LEPTONYCTERIS CURASOAE YERBABUENAE*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 53 FR 38456, 09-30-88

DESCRIPTION: ELONGATED MUZZLE, SMALL LEAF NOSE, AND LONG TONGUE.  
YELLOWISH BROWN OR GRAY ABOVE AND CINNAMON BROWN BELOW.  
TAIL MINUTE AND APPEARS TO BE LACKING. EASILY DISTURBED.ELEVATION  
RANGE: <6000 FT.

COUNTIES: COCHISE, PIMA, SANTA CRUZ, GRAHAM, PINAL, MARICOPA

HABITAT: DESERT SCRUB HABITAT WITH AGAVE AND COLUMNAR CACTI PRESENT AS FOOD PLANTS

DAY ROOSTS IN CAVES AND ABANDONED TUNNELS. FORAGES AT NIGHT ON NECTAR, POLLEN, AND FRUIT OF PANICULATE AGAVES AND COLUMNAR CACTI. THIS SPECIES IS MIGRATORY AND IS PRESENT IN ARIZONA, USUALLY FROM APRIL TO SEPTMBER AND SOUTH OF THE BORDER THE REMAINDER OF THE YEAR.

NAME: SONORAN PRONGHORN

*ANTILOCAPRA AMERICANA SONORIENSIS*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-67

DESCRIPTION: BUFF ON BACK AND WHITE BELOW, HOOFED WITH SLIGHTLY CURVED  
BLACK HORNS HAVING A SINGLE PRONG. SMALLEST AND PALEST OF  
THE PRONGHORN SUBSPECIES.ELEVATION  
RANGE: 2000-4000 FT.

COUNTIES: PIMA, YUMA, MARICOPA

HABITAT: BROAD, INTERMOUNTAIN ALLUVIAL VALLEYS WITH CREOSOTE-BURSAGE &amp; PALO VERDE-MIXED CACTI ASSOCIATIONS

TYPICALLY, BAJADAS ARE USED AS FAWNING AREAS AND SANDY DUNE AREAS PROVIDE FOOD SEASONALLY. HISTORIC RANGE WAS PROBABLY LARGER THAN EXISTS TODAY. THIS SUBSPECIES ALSO OCCURS IN MEXICO.

NAME: DESERT PUPFISH

*CYPRINODON MACULARIUS*

STATUS: ENDANGERED CRITICAL HABITAT: Yes RECOVERY PLAN: Yes CFR: 51 FR 10842, 03-31-1986

DESCRIPTION: SMALL (2 INCHES) SMOOTHLY ROUNDED BODY SHAPE WITH NARROW  
VERTICAL BARS ON THE SIDES. BREEDING MALES BLUE ON HEAD AND  
SIDES WITH YELLOW ON TAIL. FEMALES & JUVENILES TAN TO OLIVE  
COLORED BACK AND SILVERY SIDES.ELEVATION  
RANGE: <5000 FT.

COUNTIES: LA PAZ, PIMA, GRAHAM, MARICOPA, PINAL, YAVAPAI, SANTA CRUZ

HABITAT: SHALLOW SPRINGS, SMALL STREAMS, AND MARSHES. TOLERATES SALINE &amp; WARM WATER

CRITICAL HABITAT INCLUDES QUITOBAQUITO SPRING, PIMA COUNTY, PORTIONS OF SAN FELIPE CREEK, CARRIZO WASH, AND FISH CREEK WASH, IMPERIAL COUNTY, CALIFORNIA. TWO SUBSPECIES ARE RECOGNIZED: DESERT PUPFISH (*C. m. macularis*) AND QUITOBAQUITO PUPFISH (*C. m. eremus*).

4/2/97

NAME: GILA TOPMINNOW

*POECILIOPSIS OCCIDENTALIS OCCIDENTALIS*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 32 FR 4001, 03-11-1967  
 DESCRIPTION: SMALL (2 INCHES), GUPPY-LIKE, LIVE BEARING, LACKS DARK SPOTS ON ITS FINS. BREEDING MALES ARE JET BLACK WITH YELLOW FINS.

ELEVATION  
 RANGE: <4500 FT.

COUNTIES: GILA, PINAL, GRAHAM, YAVAPAI, SANTA CRUZ, PIMA, MARICOPA, LA PAZ

HABITAT: SMALL STREAMS, SPRINGS, AND CIENEGAS VEGETATED SHALLOWS

NAME: RAZORBACK SUCKER

*XYRAUCHEN TEXANUS*

STATUS: ENDANGERED CRITICAL HABITAT: Yes RECOVERY PLAN: No CFR: 55 FR 21154, 05-22-1990;  
 DESCRIPTION: LARGE (UP TO 3 FEET AND UP TO 16 POUNDS) LONG, HIGH SHARP-  
 EDGED KEEL-LIKE HUMP BEHIND THE HEAD. HEAD FLATTENED ON TOP.  
 OLIVE-BROWN ABOVE TO YELLOWISH BELOW.

ELEVATION  
 RANGE: <6000 FT.

COUNTIES: GREENLEE, MOHAVE, PINAL, YAVAPAI, YUMA, LA PAZ, MARICOPA (REFUGIA), GILA, COCONINO, GRAHAM

HABITAT: RIVERINE &amp; LACUSTRINE AREAS, GENERALLY NOT IN FAST MOVING WATER AND MAY USE BACKWATERS

SPECIES IS ALSO FOUND IN HORSESHOE RESERVOIR (MARICOPA COUNTY).

NAME: AMERICAN PEREGRINE FALCON

*FALCO PEREGRINUS ANATUM*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 35 FR 16047, 10-13-70; 35  
 DESCRIPTION: A RECLUSIVE, CROW-SIZED FALCON SLATY BLUE ABOVE WHITISH  
 BELOW WITH FINE DARK BARRING. THE HEAD IS BLACK AND APPEARS  
 TO BE MASKED OR HELMETED. WINGS LONG AND POINTED. LOUD  
 WAILING CALLS ARE GIVEN DURING BREEDING PERIOD.

ELEVATION  
 RANGE: 3500-9000 FT.

COUNTIES: MOHAVE COCONINO NAVAJO APACHE SANTA CRUZ MARICOPA COCHISE YAVAPAI GILA PINAL PIMA  
 GREENLEE GRAHAM

HABITAT: CLIFFS AND STEEP TERRAIN USUALLY NEAR WATER OR WOODLANDS WITH ABUNDANT PREY

THIS IS A WIDE-RANGING MIGRATORY BIRD THAT USES A VARIETY OF HABITATS. BREEDING BIRDS ARE YEAR-  
 ROUND RESIDENTS. OTHER BIRDS WINTER AND MIGRATE THROUGH ARIZONA. SPECIES IS ENDANGERED FROM  
 REPRODUCTIVE FAILURE FROM PESTICIDES.

4/2/97

NAME: BALD EAGLE

*HALIAEETUS LEUCOCEPHALUS*

STATUS: THREATENED CRITICAL HABITAT: No RECOVERY PLAN: Yes CFR: 60 FR 35999, 07-12-95

DESCRIPTION: LARGE, ADULTS HAVE WHITE HEAD AND TAIL. HEIGHT 28 - 38";  
WINGSPAN 66 - 96". 1-4 YRS DARK WITH VARYING DEGREES OF  
MOTTLED BROWN PLUMAGE. FEET BARE OF FEATHERS.ELEVATION  
RANGE: VARIES FT.COUNTIES: YUMA, LA PAZ, MOHAVE, YAVAPAI, MARICOPA, PINAL, COCONINO, NAVAJO, APACHE, SANTA CRUZ, PIMA,  
GILA, GRAHAM

HABITAT: LARGE TREES OR CLIFFS NEAR WATER (RESERVOIRS, RIVERS AND STREAMS) WITH ABUNDANT PREY

SOME BIRDS ARE NESTING RESIDENTS WHILE A LARGER NUMBER WINTERS ALONG RIVERS AND RESERVOIRS. AN ESTIMATED 200 TO 300 BIRDS WINTER IN ARIZONA. ONCE ENDANGERED (32 FR 4001, 03-11-1967; 43 FR 6233, 02-14-78) BECAUSE OF REPRODUCTIVE FAILURES FROM PESTICIDE POISONING AND LOSS OF HABITAT, THIS SPECIES WAS DOWN LISTED TO THREATENED ON AUGUST 11, 1995. ILLEGAL SHOOTING, DISTURBANCE, LOSS OF HABITAT CONTINUES TO BE A PROBLEM.

NAME: CACTUS FERRUGINOUS PYGMY-OWL

*GLAUCIDIUM BRASILIANUM CACTORUM*

STATUS: ENDANGERED CRITICAL HABITAT: No RECOVERY PLAN: No CFR: 62 FR 10730, 3-10-97

DESCRIPTION: SMALL (APPROX. 7"), DIURNAL OWL REDDISH BROWN OVERALL WITH  
CREAM-COLORED BELLY STREAKED WITH REDDISH BROWN. SOME  
INDIVIDUALS ARE GRAYISH BROWNELEVATION  
RANGE: <4000 FT.

COUNTIES: MARICOPA, YUMA, SANTA CRUZ, GRAHAM, GREENLEE, PIMA, PINAL, GILA, YAVAPAI

HABITAT: MATURE COTTONWOOD/WILLOW, MESQUITE BOSQUES, AND SONORAN DESERTSCRUB

RANGE LIMIT IN ARIZONA IS FROM NEW RIVER (NORTH) TO GILA BOX (EAST) TO CABEZA PRIETA MOUNTAINS (WEST). ONLY A FEW DOCUMENTED SITES WHERE THIS SPECIES PERSISTS ARE KNOWN, ADDITIONAL SURVEYS ARE NEEDED. LISTING EFFECTIVE APRIL 9, 1997.

NAME: MEXICAN SPOTTED OWL

*STRIX OCCIDENTALIS LUCIDA*

STATUS: THREATENED CRITICAL HABITAT: Yes RECOVERY PLAN: Yes CFR: 56 FR 14678, 04-11-91

DESCRIPTION: MEDIUM SIZED WITH DARK EYES AND NO EAR TUFTS. BROWNISH AND  
HEAVILY SPOTTED WITH WHITE OR BEIGE.ELEVATION  
RANGE: 4100-9000 FT.COUNTIES: MOHAVE, COCONINO, NAVAJO, APACHE, YAVAPAI, GRAHAM, GREENLEE, COCHISE, SANTA CRUZ, PIMA,  
PINAL, GILA, MARICOPA

HABITAT: NESTS IN CANYONS AND DENSE FORESTS WITH MULTI-LAYERED FOLIAGE STRUCTURE

GENERALLY NESTS IN OLDER FORESTS OF MIXED CONIFER OR PONDERSA PINE/GAMBEL OAK TYPE, IN CANYONS, AND USE VARIETY OF HABITATS FOR FORAGING. SITES WITH COOL MICROCLIMATES APPEAR TO BE OF IMPORTANCE OR ARE PREFERRED.

4/2/97

NAME: SOUTHWESTERN WILLOW FLYCATCHER      *EMPIDONAX TRAILLII EXTIMUS*

STATUS: ENDANGERED      CRITICAL HABITAT: Yes      RECOVERY PLAN: No      CFR: 60 FR 10694, 02-27-95

DESCRIPTION: SMALL PASSERINE (ABOUT 6") GRAYISH-GREEN BACK AND WINGS,  
WHITISH THROAT, LIGHT OLIVE-GRAY BREAST AND PALE YELLOWISH  
BELLY. TWO WINGBARS VISIBLE. EYE-RING FAINT OR ABSENT.

ELEVATION  
RANGE: <8500      FT.

COUNTIES: YAVAPAI, GILA, MARICOPA, MOHAVE, COCONINO, NAVAJO, APACHE, PINAL, LA PAZ, GREENLEE, GRAHAM,  
YUMA, PIMA, COCHISE, SANTA CRUZ

HABITAT: COTTONWOOD/WILLOW & TAMARISK VEGETATION COMMUNITIES ALONG RIVERS & STREAMS

MIGRATORY RIPARIAN OBLIGATE SPECIES THAT OCCUPIES BREEDING HABITAT FROM LATE APRIL TO  
SEPTEMBER. DISTRIBUTION WITHIN ITS RANGE IS RESTRICTED TO RIPARIAN CORRIDORS. DIFFICULT TO  
DISTINGUISH FROM OTHER MEMBERS OF THE EMPIDONAX COMPLEX BY SIGHT ALONE. TRAINING SEMINAR  
REQUIRED FOR THOSE CONDUCTING FLYCATCHER SURVEYS.

NAME: YUMA CLAPPER RAIL      *RALLUS LONGIROSTRIS YUMANENSIS*

STATUS: ENDANGERED      CRITICAL HABITAT: No      RECOVERY PLAN: Yes      CFR: 32 FR 4001, 03-11-67; 48  
FR 34182, 07-27-83

DESCRIPTION: WATER BIRD WITH LONG LEGS AND SHORT TAIL. LONG SLENDER  
DECURVED BILL. MOTTLED BROWN ON GRAY ON ITS RUMP. FLANKS  
AND UNDERSIDES ARE DARK GRAY WITH NARROW VERTICAL STRIPES  
PRODUCING A BARRING EFFECT.

ELEVATION  
RANGE: <4500      FT.

COUNTIES: YUMA, LA PAZ, MARICOPA, PINAL, MOHAVE

HABITAT: FRESH WATER AND BRACKISH MARSHES

SPECIES IS ASSOCIATED WITH DENSE EMERGENT RIPARIAN VEGETATION. REQUIRES WET SUBSTRATE  
(MUDFLAT, SANDBAR) WITH DENSE HERBACEOUS OR WOODY VEGETATION FOR NESTING AND FORAGING.  
CHANNELIZATION AND MARSH DEVELOPMENT ARE PRIMARY SOURCES OF HABITAT LOSS.



# United States Department of the Interior

## BUREAU OF LAND MANAGEMENT

Phoenix Field Office  
2015 West Deer Valley Road  
Phoenix, AZ 85027-2099

In reply refer to:  
1000 (020)

May 5, 1997

Mr. Mickey J. Tomalczyk  
Project Environmental Planner  
Logan Simpson & Dye  
398 South Mill Avenue, Suite #200  
Tempe, Arizona 85281

Dear Mr. Tomalczyk:

This is in response to your April 28, 1997, letter regarding the Northern Avenue - Loop 101 to 67<sup>th</sup> Avenue Design Concept Report (MCDOT Work Order No. 68915).

The proposed Concept Report will have no impact on any public lands or programs that our agency is involved within the area.

We thank you for the opportunity to comment on this proposal.

If you have any questions, please call David Redmond at (602) 780-8090.

Sincerely,

David Redmond  
Realty Specialist

Rediscover Your Public Lands





May 28, 1997

**United States  
Department of  
Agriculture**

Natural  
Resources  
Conservation  
Service

3003 N. Central Ave.  
Suite 800  
Phoenix, AZ  
85012-2945

Mr. Mickey J. Tomalczyk  
Environmental Planner  
Logan, Simpson & Dye  
398 South Mill Avenue, Suite 200  
Tempe, Arizona 85281

Dear Mr. Tomalczyk:

This is in response to your letter dated May 16, 1997, regarding your request for a prime or unique farmland determination for Northern Avenue between Loop 101 and 67th Avenue between the cities of Glendale and Peoria.

The street improvements on Northern Avenue between Loop 101 and 67th Avenue, between the cities of Glendale and Peoria are exempt from requirements of the FPPA, as revised in 1994, excluding land which is already in or is committed to urban development, currently used as water storage, or land that is not prime or unique farmland.

Should your office or the cities of Glendale and/or Peoria require more specific on site information or technical assistance on erosion and sediment control, specific soils and their suitability's, and stormwater management, please feel free to contact our District Conservationist, Ron Alvarado in Phoenix at 602-379-3058 or our Community Assistance Coordinator, Jeff Schmidt in Phoenix at 602-280-8818.

Thank you for bringing this project to our attention and wish you success.

Sincerely,

MICHAEL SOMERVILLE  
State Conservationist

cc:

Jim Briggs, Assistant State Conservationist-Technology, NRCS, Phoenix, AZ  
Jeff Schmidt, Community Assistance Coordinator, NRCS, Phoenix, AZ  
Ron Alvarado, District Conservationist, NRCS, Phoenix, AZ



DEPARTMENT OF THE ARMY  
LOS ANGELES DISTRICT, CORPS OF ENGINEERS  
ARIZONA-NEVADA AREA OFFICE  
3636 NORTH CENTRAL AVENUE, SUITE 760  
PHOENIX, ARIZONA 85012-1936

REPLY TO  
ATTENTION OF:

May 13, 1997

Office of the Chief  
Regulatory Branch

Maricopa County Department of Transportation  
C/O Logan Simpson & Dye  
ATTN: Mr. Mickey J. Tomalczyk  
398 S. Mill Avenue, Suite 200  
Tempe, Arizona 85281

File Number: 974-0392-LSF

Dear Mr. Tomalczyk:

This is in response to your April 28, 1997 letter requesting our comments on environmental issues regarding Maricopa County Department of Transportation's plan to improve the safety and operational characteristics of Northern Avenue between Loop 101 and 67th Avenue at (Sections 33, 34, 35, & 36, T3N, R1E; and Sections 1, 2, 3, & 4, T2N, R1E), Peoria, Maricopa County, Arizona.

This activity may require a Department of the Army permit issued under Section 404 of the Clean Water Act. A Section 404 permit is required for the discharge of dredged or fill material into the "waters of the United States," including adjacent wetlands. Examples of activities requiring a permit are placing bank protection, temporary or permanent stockpiling of excavated material, grading roads, grading (including vegetative clearing operations) that involves the filling of low areas or leveling the land, constructing weirs or diversion dikes, constructing approach fills, and discharging dredged or fill material as part of any other activity.

Enclosed you will find a permit application form and a pamphlet that describes our regulatory program. If you have questions, please contact Larry S. Flatau at (602) 640-5385 x 225. Please refer to file number 974-0392-LSF in your reply.

Sincerely,

Cindy Lester  
Chief, Arizona Section  
Regulatory Branch

Enclosure(s)

**RIGHTS OF WAY SECTION**

**TO:** Mickey J. Tomalczyk  
**FROM:** Mark Keller *mk*  
**SUBJECT:** Northern Avenue MCDOT NO 68915  
**DATE:** May 8, 1997

The above referenced project:

- Will not impact State Trust Land (*NO FURTHER ACTION REQUIRED*)  
 Will impact State Trust Land (*FURTHER ACTION REQUIRED*)

Should the proposed project impact State Trust land, a Right of Way application is enclosed for your convenience. Please direct all questions and correspondence to:

*Mark Keller  
Rights of Way Administrator  
Arizona State Land Department  
1616 West Adams  
Phoenix, Az. 85007  
(602)542-2134*

Thank you for your attention to this matter.

ACTION.MEM

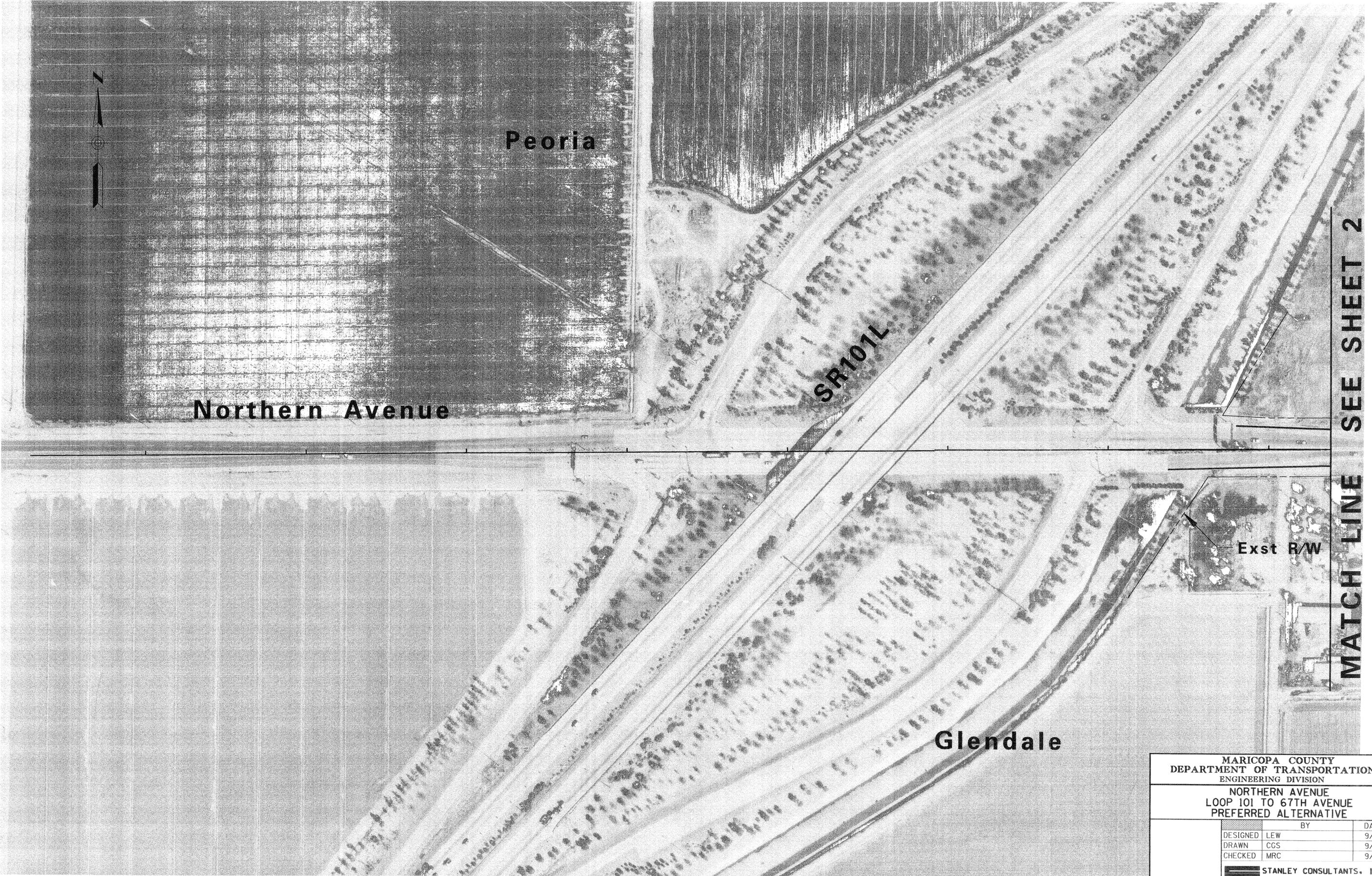
**RECEIVED**

MAY 13 1997

LOGAN SIMPSON & DYE

APPENDIX E

PLAN SHEETS - SELECTED ALTERNATIVE



MATCH LINE SEE SHEET 2

**Northern Avenue**

**Peoria**

**SR101L**

**Exst R/W**

**Glendale**

MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

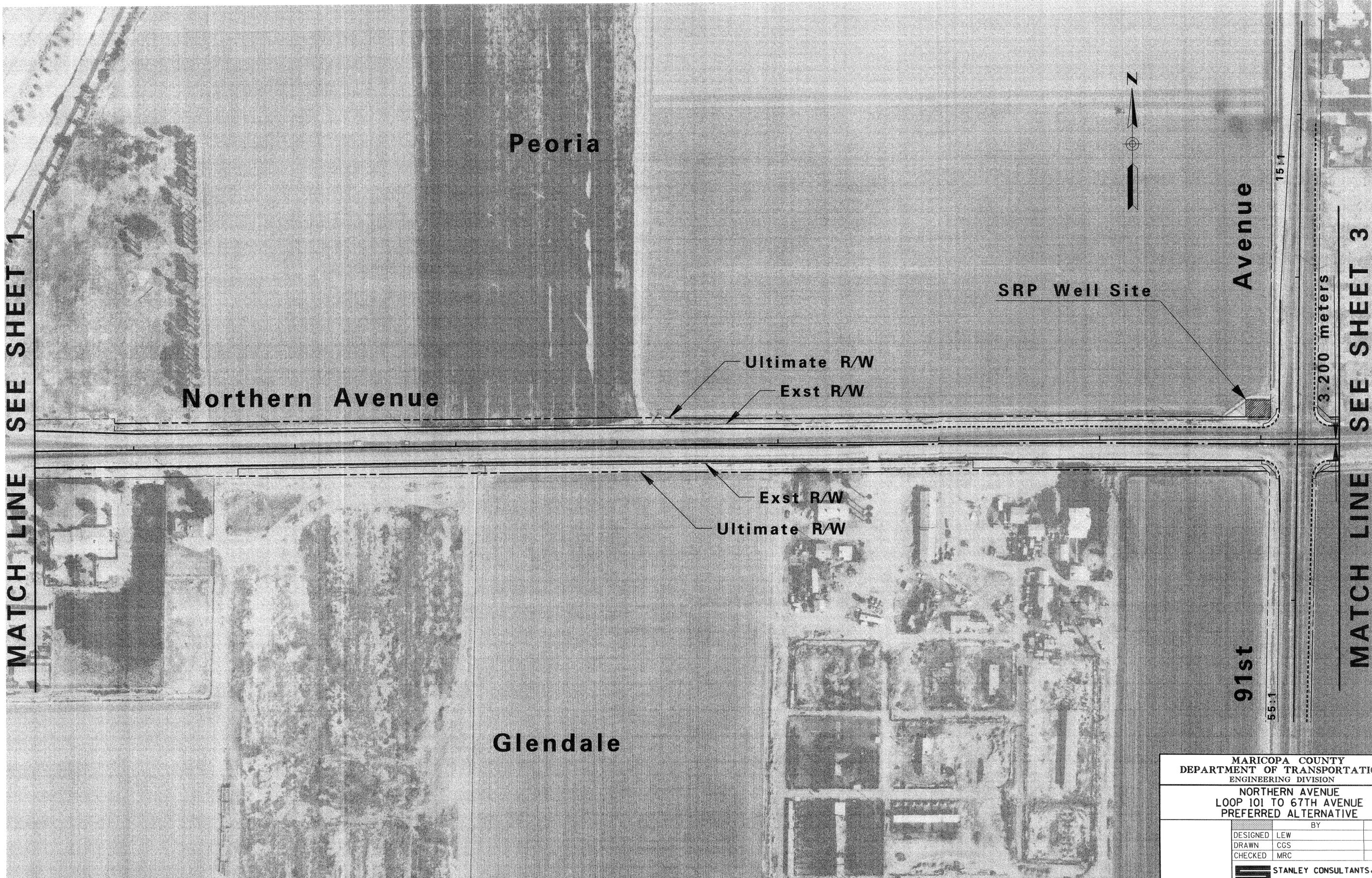
**NORTHERN AVENUE  
LOOP 101 TO 67TH AVENUE  
PREFERRED ALTERNATIVE**

	BY	DATE
DESIGNED	LEW	9/97
DRAWN	CGS	9/97
CHECKED	MRC	9/97

**STANLEY CONSULTANTS, INC.**  
2929 EAST CAMELBACK ROAD, SUITE 130  
PHOENIX, ARIZONA 85016 • (602) 912-6500

MATCH LINE SEE SHEET 1

MATCH LINE SEE SHEET 3



MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

NORTHERN AVENUE  
LOOP 101 TO 67TH AVENUE  
PREFERRED ALTERNATIVE

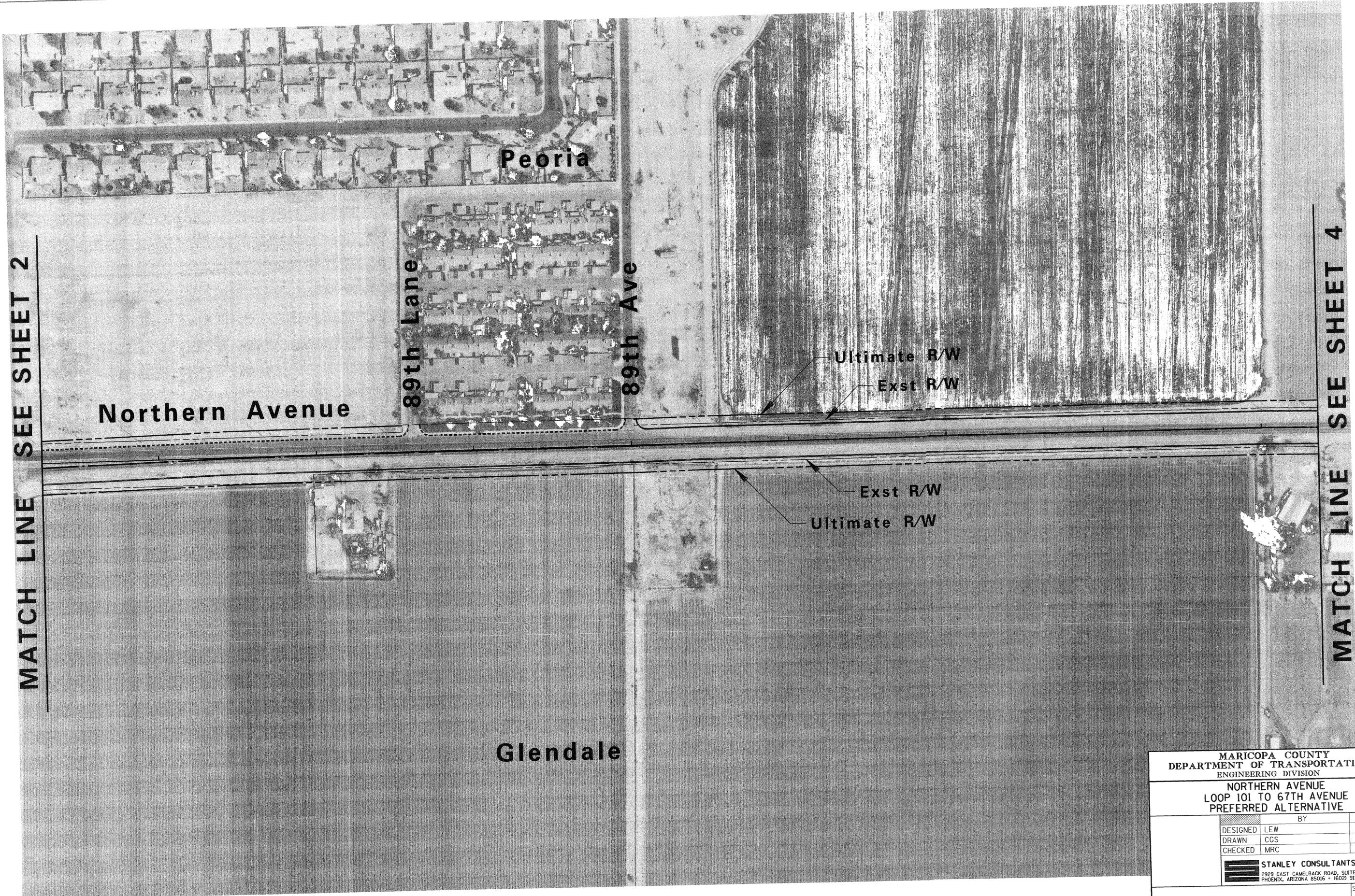
	BY	DATE
DESIGNED	LEW	9/97
DRAWN	CGS	9/97
CHECKED	MRC	9/97

**STANLEY CONSULTANTS, INC.**  
2929 EAST CAMELBACK ROAD, SUITE 130  
PHOENIX, ARIZONA 85016 • (602) 912-6500

SHEET OF  
2 8

MATCH LINE SEE SHEET 2

MATCH LINE SEE SHEET 4



Northern Avenue

Peoria

89th Lane

89th Ave

Glendale

Ultimate R/W

Exst R/W

Exst R/W

Ultimate R/W

MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

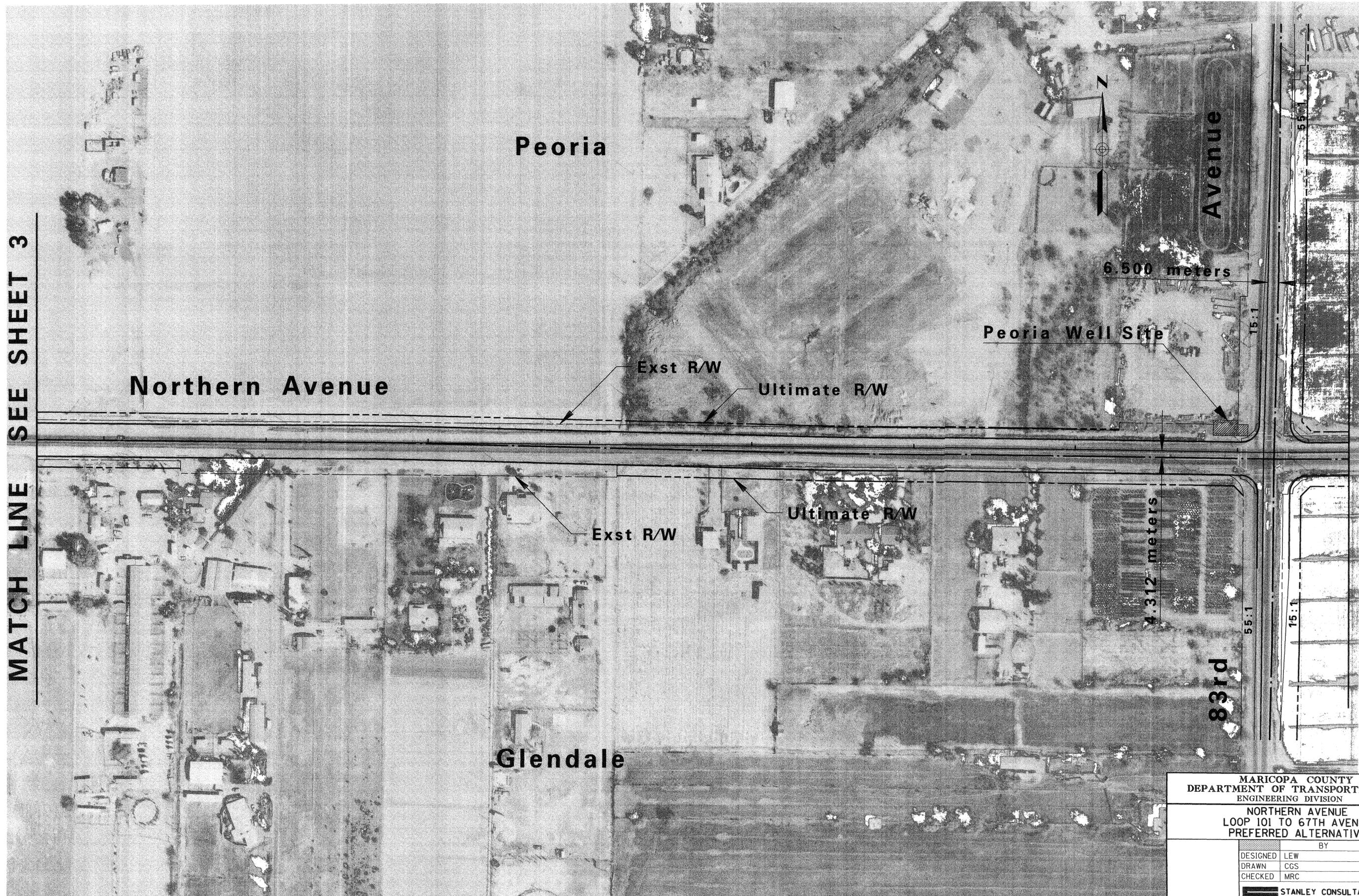
NORTHERN AVENUE  
LOOP 101 TO 67TH AVENUE  
PREFERRED ALTERNATIVE

	BY	DATE
DESIGNED	LEW	9/97
DRAWN	CCS	9/97
CHECKED	MRC	9/97

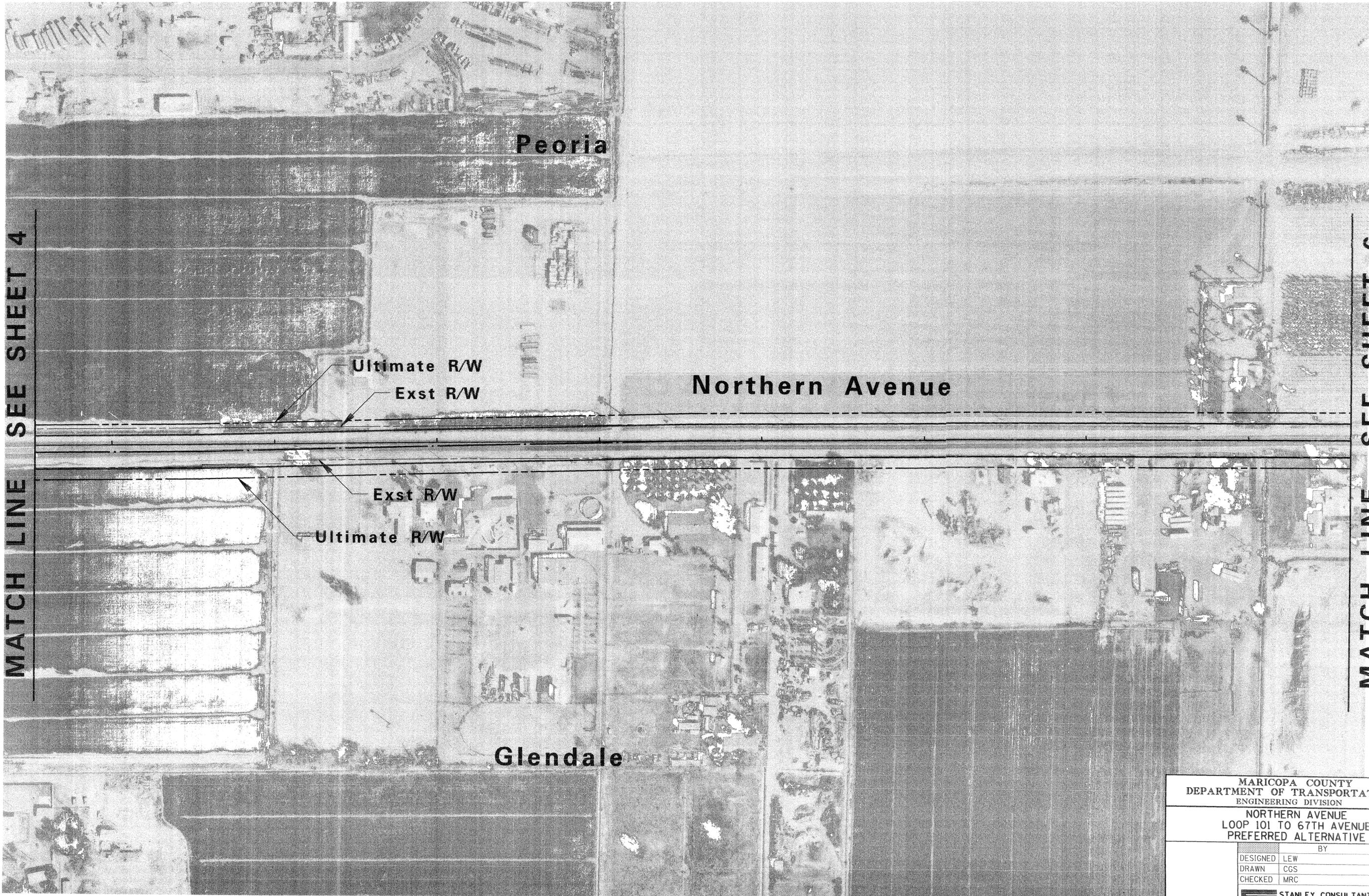
**STANLEY CONSULTANTS, INC.**  
2929 EAST CAMELBACK ROAD, SUITE 130  
PHOENIX, ARIZONA 85016 • (602) 912-6500

MATCH LINE SEE SHEET 3

MATCH LINE SEE SHEET 5



MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION ENGINEERING DIVISION		
NORTHERN AVENUE LOOP 101 TO 67TH AVENUE PREFERRED ALTERNATIVE		
	BY	DATE
DESIGNED	LEW	9/97
DRAWN	CGS	9/97
CHECKED	MRC	9/97
 <b>STANLEY CONSULTANTS, INC.</b> 2929 EAST CAMELBACK ROAD, SUITE 130 PHOENIX, ARIZONA 85016 • (602) 912-6500		
		SHEET OF
		4 8



MATCH LINE SEE SHEET 4

MATCH LINE SEE SHEET 6

Peoria

Northern Avenue

Ultimate R/W  
Exst R/W

Exst R/W  
Ultimate R/W

Glendale

MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

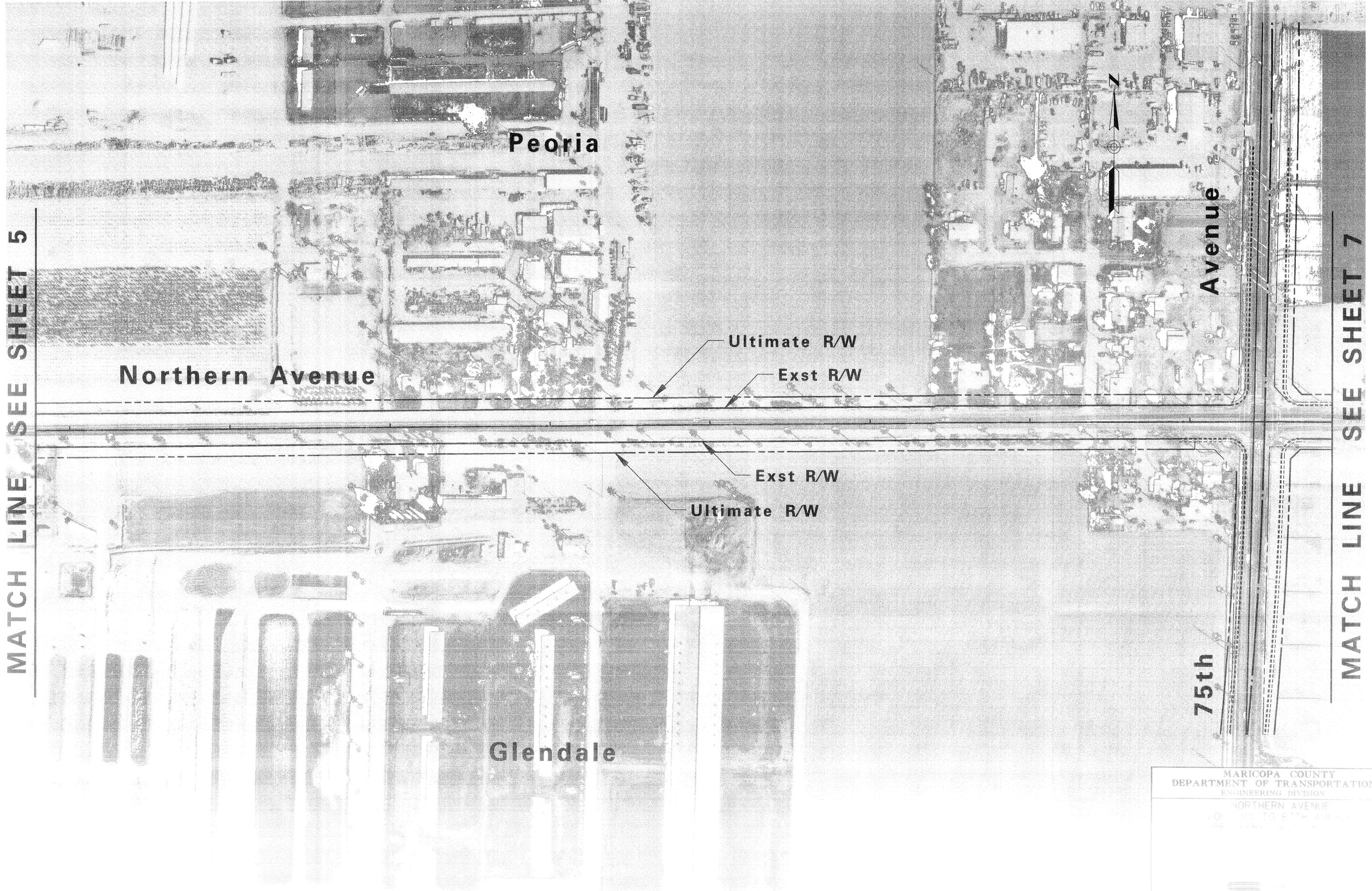
NORTHERN AVENUE  
LOOP 101 TO 67TH AVENUE  
PREFERRED ALTERNATIVE

	BY	DATE
DESIGNED	LEW	9/97
DRAWN	CGS	9/97
CHECKED	MRC	9/97

**STANLEY CONSULTANTS, INC.**  
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SHEET OF  
5 8

MATCH LINE SEE SHEET 5



Northern Avenue

Peoria

Avenue

75th

Glendale

Ultimate R/W

Exst R/W

Exst R/W

Ultimate R/W

MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

NORTHERN AVENUE

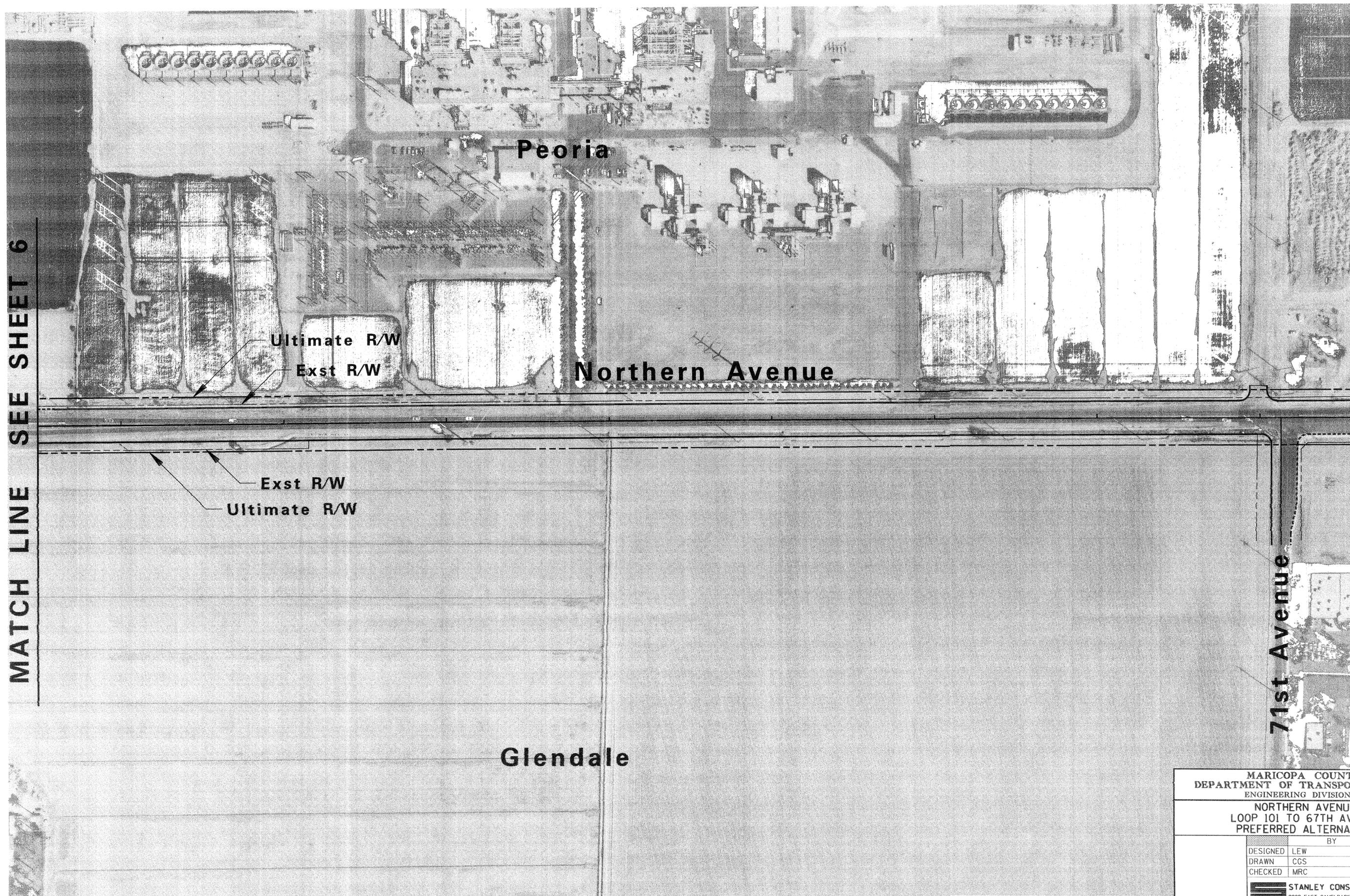
FROM 101 TO 67TH AVENUE

DATE: 01/15/06



MATCH LINE SEE SHEET 7

MATCH LINE SEE SHEET 6



MATCH LINE SEE SHEET 8

Glendale

71st Avenue

Ultimate R/W  
Exst R/W

Northern Avenue

Exst R/W  
Ultimate R/W

MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

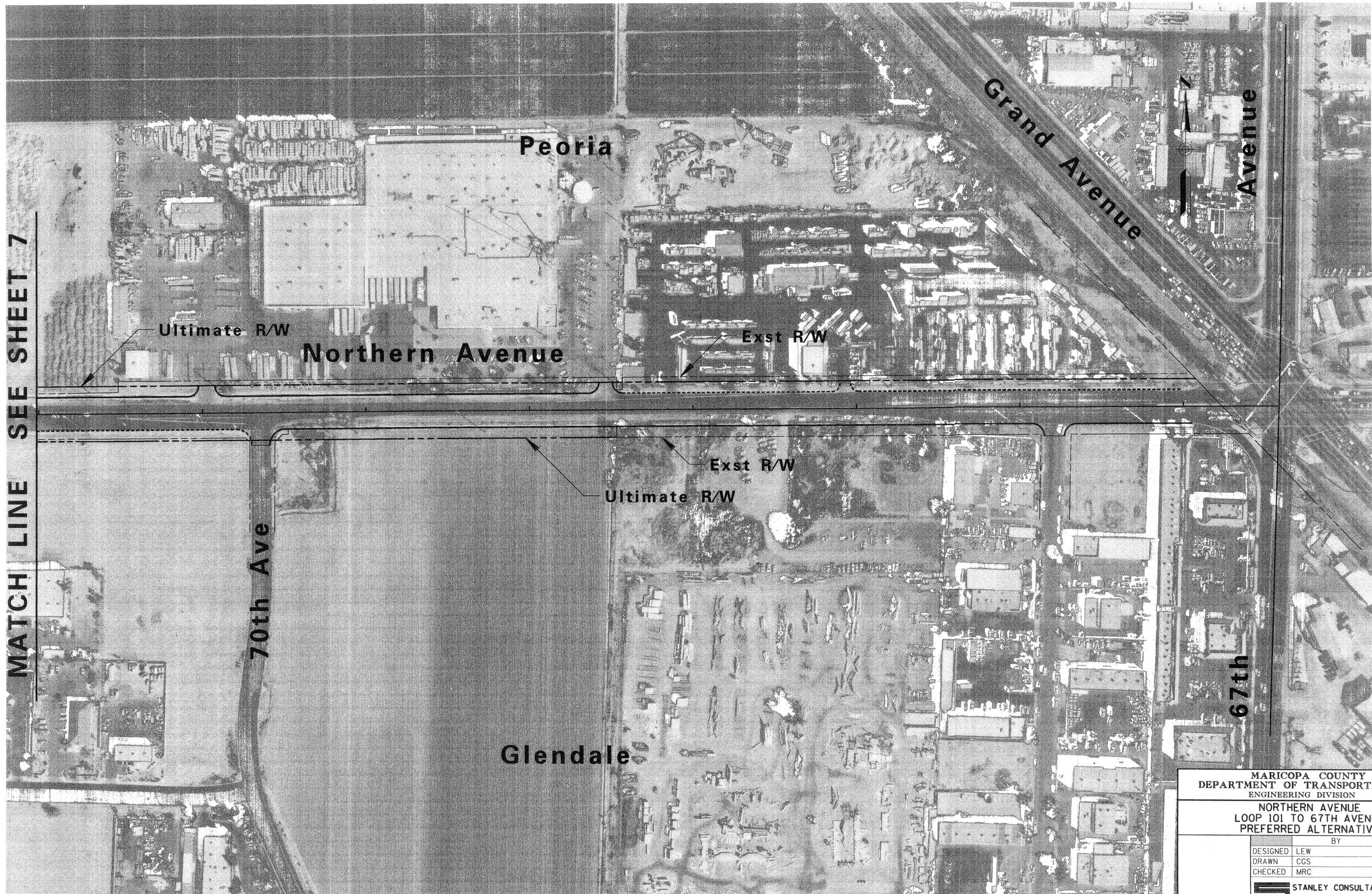
NORTHERN AVENUE  
LOOP 101 TO 67TH AVENUE  
PREFERRED ALTERNATIVE

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DESIGNED	LEW	9/97
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SHEET OF  
7 8

MATCH LINE SEE SHEET 7



MARICOPA COUNTY  
DEPARTMENT OF TRANSPORTATION  
ENGINEERING DIVISION

NORTHERN AVENUE  
LOOP 101 TO 67TH AVENUE  
PREFERRED ALTERNATIVE

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