SURPRISE
ARIZONA

Roseview

Amendment	Case Number	Approval Date	Approval Doc.	Page
Original PAD	PAD97-069	5/28/98	ORD98-09	2
Land Addition	PADA99-074	10/14/99	ORD99-17	497

ROSEVIEW

Vol. I Planned Area Development

City of Surprise, Arizona

Original Submittal: June 12, 1997
Second Submittal: November 25, 1997
Third Submittal: February 16, 1998

FINAL SUBMITTAL: APRIL 17, 1998

CITY OF SURPRISE
PLANNING AND ZONING DEPARTMENT
APPROVED
Case No.: PAD97-069
P&Z Comm. Approval:
City Council Approval: 5/28/1998
B.O.A. Approval:
Stipulations:

Submitted by
Surprise 320 L.L.C.
3200 North Central Avenue, suite 2100
Phoenix, Arizona 85012
(602) 954-6300

RECEIVED
MAY 7 1998
CITY OF SURPRISE

DMJM

Daniel, Mann, Johnson, & Mendenhall
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

CITY OF SURPRISE
COUNCIL AGENDA ACTION FORM

XX Regular Meeting
___ Special Meeting
___ Workshop

MEETING SCHEDULED
Time: 7:00 p.m.
Date: May 28th, 1998

Agenda Item - ~~#3~~ 4 - NEW BUSINESS

___ Consent
XX Regular

Title: Consideration and action to **approve Ordinance No. 98-09**; An Ordinance **changing the zoning** of a property bounded generally by Greenway Road on the North, Dysart Road on the East, Waddell Road on the South, and the Mid-Section of Section 10 on the West, located in Section 10, Township 3 North, Range 1 West, of the Gila and Salt River Base and Meridian, Maricopa County, Arizona, from R1-43 to Planned Area Development (PAD) with preliminary Development Plan. **(Requested by Surprise 320, L.L.C. & Lennar Communities Development)**. **FINAL READING**.

Requested By: **Community Development Dept.**

Action Requested: **Action to approve Ordinance No. 98-09**

Attached: **Ordinance No. 98-09**
Narrative & Staff Report

Fiscal Impact: ___ Budgeted ___ Not Budgeted

Finance Director Initial: _____
City Manager's Recommendation:____ Approve ___ Disapprove ___ None

Council Action:

Motion/ Second	Councillor's Name	Vote
	Shafer	
	Villanueva	
2nd	Broich	
M	Johnson	
	Montoya	
	Anderson	
	Reafleng	

Results:
For 6 Against 0
Abstained
Passed X
Failed
Absent Reafleng

Legend: Motion-M, Second-S, Yes-Y, No-N, Abstain-A, Absent-X

CC- Shelley Johnson
Sharon Flack

file.

Rev to LPC + DNS

ORDINANCE NO. 98-09

AN ORDINANCE CHANGING THE ZONING OF A PROPERTY BOUNDED GENERALLY BY GREENWAY ROAD ON THE NORTH, DYSART ROAD ON THE EAST, WADDELL ROAD ON THE SOUTH, AND THE MID-SECTION OF SECTION 10 ON THE WEST, LOCATED IN SECTION 10, TOWNSHIP 3 NORTH, RANGE 1 WEST, OF THE GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY, ARIZONA, FROM R1-43 TO PLANNED AREA DEVELOPMENT (PAD) WITH PRELIMINARY DEVELOPMENT PLAN.

WHEREAS, this Ordinance has been properly noticed for public hearing and the necessary hearings have been completed; and

WHEREAS, changes have occurred in the vicinity of Geenway Road on the north, Dysart Road on the east, Waddell Road on the south, and the Mid-section of Section 10 on the west, located in Section 10, Township 3 North, Range 1 West, of the Gila and Salt River Base and Meridian, Maricopa County, Arizona, which require that the zoning of the parcel of land in that area be changed; and

WHEREAS, rezoning of the subject property will enhance the health, safety, and welfare of the community, will not cause traffic congestion or depreciate surrounding property values and, at the same time is in harmony with the purposes and intent of the zoning ordinance, the plan for the area, and the Comprehensive Development Guide; and

WHEREAS, the Planning and Zoning Commission has recommended approval of this rezoning;

NOW THEREFORE BE IT ORDAINED, by the City Council of the City of Surprise, Arizona, that:

Section 1. This Ordinance is not of a general and permanent nature and shall not be codified.

Section 2. The property described in Exhibit "A" is rezoned from R1-43 to Planned Area Development ("PAD") with Preliminary Development Plan.

Section 3. The Preliminary Development Plan for the property described on Exhibit "A", entitled "Roseview Planned Area Development", dated April, 1998, as Application No. PAD97-69, a copy of which is on file in the Community Development Department, is approved.

Section 4. All present and future owners of the property described on Exhibit "A" shall develop the property only as provided in the approved Preliminary Development Plan and in compliance with Stipulations contained in Exhibit"B".

PASSED AND ADOPTED this 28th day of May, 1998.

Joan H. Shafer
Joan H. Shafer
Mayor, City of Surprise

ATTEST:

Sherry Ann Aguilar
Sherry A. Aguilar, City Clerk

APPROVED AS TO FORM

David Ward, Assistant City Attorney

Yeas: Mayor Shafer, Vice-Mayor Villanueva, Councilmembers Broich, Anderson, Johnson & Montoya.
Reafleng was absent.

Nays:

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Section I - Project Overview

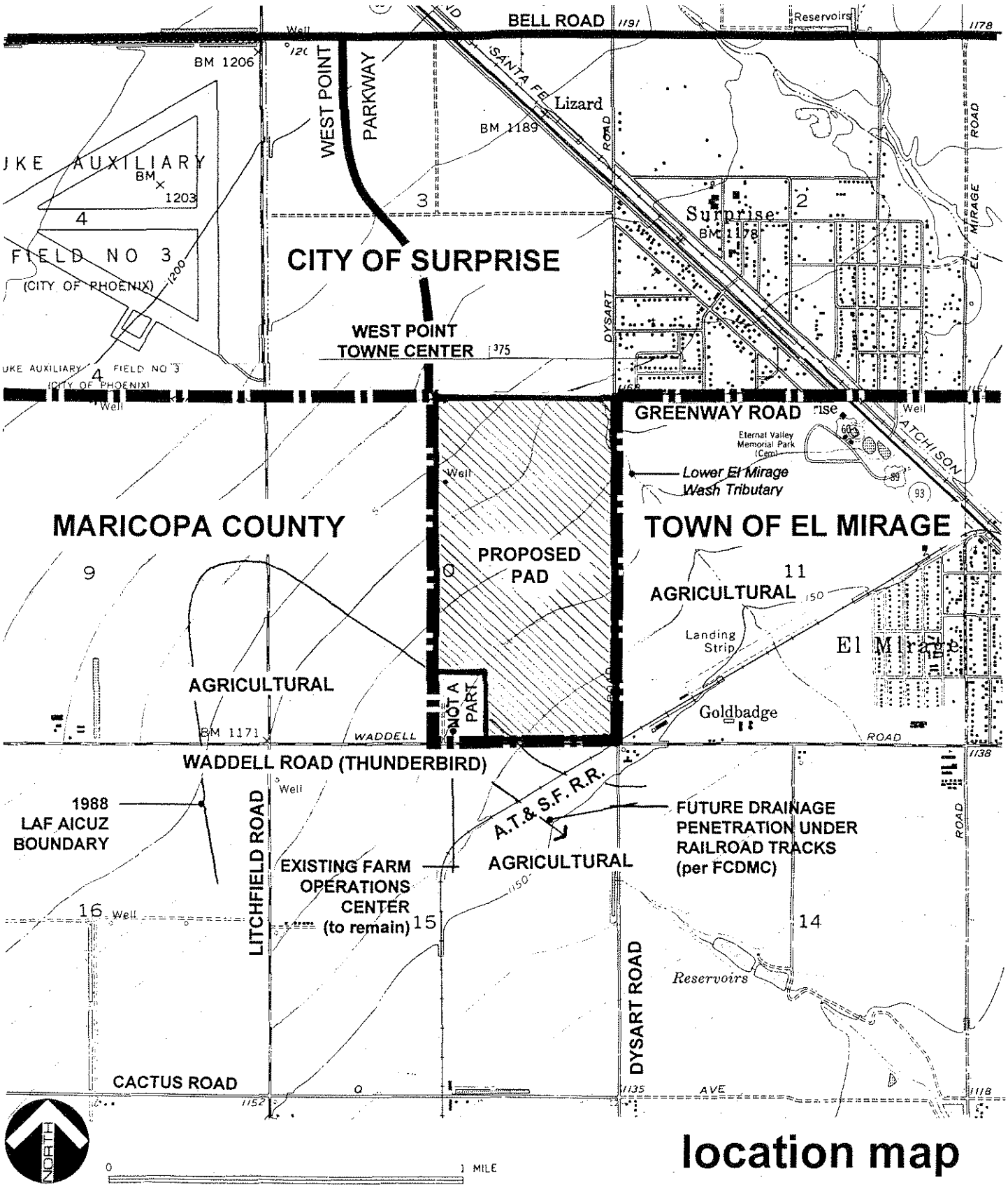
A. Introduction

This application and narrative describes a proposed residential development project: ROSEVIEW Planned Area Development (previously submitted as the Arena PAD) located within the City of Surprise. The project was annexed into the City in December of 1996 (Ord. No. 96-21), effective January of 1997. The project site consists of an approximate half-section of land, located west of Dysart Road between Greenway Road and Waddell Road. A 10.4 acre parcel, located in the southwest corner of the half-section, is excluded from the PAD. This excluded parcel will remain as a farm operations center for continuing agricultural uses to the south and south-east of the project site. The area of the portion of the half-section included in this PAD totals approximately 307 acres. (See Figure 1. Location Map.)

The owner and developer is Surprise 320 LLC, located at 3200 North Central Avenue, suite 2100, Phoenix, Arizona 85012 (attention Mr. Brent Hickey), 602-954-6300; and Lennar Communities Development, Inc. located at 9201 North 25th. Avenue, suite 170, Phoenix, Arizona 85021 (attention Patricia Sneed). This application has been prepared for Surprise 320 LLC. by Daniel, Mann, Johnson, & Mendenhall (DMJM), 300 West Clarendon Avenue, Suite 400, Phoenix Arizona 85013 (attention: Mr. G. Robert Eubanks, AICP; Mr. Jeff Sargent, ASLA; or Mr. C. Bradford Collins, PE, at 602-264-0217).

B. Legal Description

The project is described as Maricopa County Assessor's Parcel Nos' 501-15-1D, 1H, and 2E, located in the east half of Section 10, Range 1 West, Township 3 North. See the May, 1996 A.L.T.A. (Exhibit A) for full metes and bounds descriptions. This PAD includes A.L.T.A. parcels 1, 2 and 3; exception parcels are noted on the May, 1996 A.L.T.A.



location map

DMJM

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FIGURE 1

C. Nature of Applicant's Interest in Development of Property

The applicant is in the business of residential subdivision and planned community development in the State of Arizona. Necessary infrastructure, employment, retail, schools, and hospitals are within close proximity to the site, and the site is suitable and appropriate for residential development. This property is located north of an existing railroad spur line and on the outer fringe of the 1988 Luke Air Force Base Air Installation Compatible Use Zone (AICUZ) noise contour map. The property is outside the revised 1995 AICUZ noise contour map, but until the 1995 contours are officially adopted, the 1988 contours apply (see Section H for discussion of the AICUZ noise contour map). The City of Surprise is emphasizing industrial development south of Waddell Road due to the proximity of railroad spur lines, the AICUZ boundary, and the availability of water. (See Figure 1. Location Map).

The developer has master planned the site with the intent to accommodate multiple residential product types (each product type having several models -- which in turn provide flexibility and diversity to insure quality growth). The site is being planned for eight phases of development. The master planning and phasing of this site is critical to ensure orderly lot absorption, maintenance of agricultural operations and phased offsite infrastructure development. The Master Plan provides for a fully integrated community at build-out, with common deed restrictions, design standards, landscaping, etc.

The developer intends to construct the necessary water facilities onsite to provide for the ultimate demand of this project (see Exhibit C, and the Development Agreement). This project will be developed so as not to place a financial burden on the City of Surprise. A detailed Development Agreement between Surprise 320 LLC and the City of Surprise addressing the development plans, infrastructure, assurances, dedication of infrastructure, and public services is incorporated herein. At the time of this re-submittal, Lennar Communities Development, Inc. has purchased the first two phases of the development. Negotiations with other builders are underway.

Preliminary Plat submittal. Product types, colors, and materials will be supplied for review by City Staff at the time of

II - Existing Site Conditions

A. Existing Topography and Drainage

The site slopes very gently at approximately 0.5% from northwest to southeast with an approximate 25-foot difference in elevation over the entire site. Existing drainage ditches convey off-site stormwater runoff that enters the site from the north around the perimeter of the site, continuing southward to Waddell Road. Runoff from the Roseview property concentrates at the southeast corner, backs up and then drains across Dysart Road into the El Mirage Tributary Wash.

Low flow in the ditches from small storms sheet flows over Dysart Road into the Lower El Mirage Wash Tributary at a dip in Dysart Road south of the intersection of Greenway and Dysart Road. A box culvert, built as part of the West Point Towne Center improvements to Greenway Road conveys metered stormwater flows from retention basins north of Greenway Road under Greenway Road to Dysart Road.

A network of paved irrigation channels convey pumped well water over the entire 307 acre site. Two existing wells are used for this purpose. The wells will remain active for agriculture throughout the duration of construction of this PAD and beyond, whereas the paved irrigation channels will be systematically eliminated as part of the phased construction. (The phasing of the project is described in Section III-F of this report.)

B. Existing Soils and Vegetation

According to the *1972 Soil Survey for Central Maricopa County, Arizona*, published by the U.S. Department of Agriculture Soil Conservation Service, the site is primarily comprised of Gilman-Estrella-Avondale Association soils. These soils are nearly level loams and clay loams that occur on valley plains and low stream terraces. There are minor intrusions of Mohall-Laveen Association Soils -- nearly level loams and clay loams on old alluvial fans and valley plains.

Antho sandy loam, Estrella loam, Gilman loam (subgroups of the Gilman-Estrella-Avondale Association), interspersed with Laveen loam and Mohall loam (subgroups of the Mohall-Laveen Association) are the predominant site soil groups. Erosion hazard is slight for Antho sandy loam, Estrella loam, and Mohall loam. Erosion hazard is slight-to-moderate for Laveen loam; and is moderate for Gilman loam.

The south half of the property is currently under cultivation. A crop of commercial roses has been planted with planned harvests in 1998. No other trees or shrubs exist on the property.

A Phase I Environmental Site Assessment performed by Speedie and Associates in May of 1996 indicated that soils tested conformed with allowable limits of pesticides and herbicide residues commonly associated with raising agricultural crops. See Volume II, Appendix A (Environmental Site Analysis).

A Phase II Environmental Assessment performed by MSE Environmental in December of 1996 reconfirmed that soils tested conformed with allowable limits of pesticides and herbicide residues commonly associated with raising agricultural crops. See Volume II, Appendix A (Environmental Site Analysis).

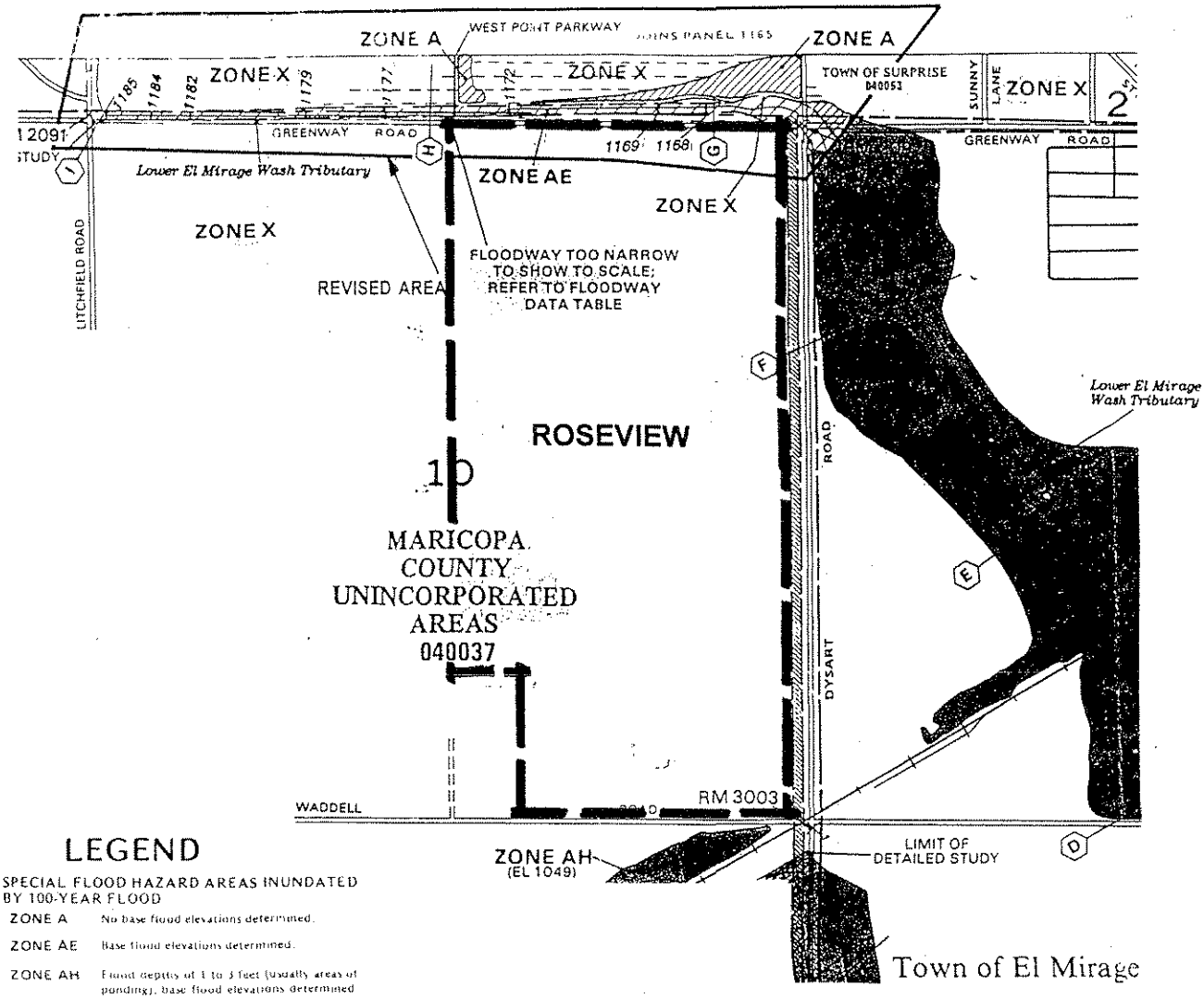
C. Existing Streams and Ponding Areas

The Federal Emergency Management Agency (FEMA) Flood Zone "A" borders the parcel to the north, co-incident with a newly constructed drainage channel located along the southern edge of West Point Towne Center. This new construction has resulted in the issuance of a LOMR (Letter of Map Revision) by FEMA (October, 1997), and is included as Figure 2 – Flood Map. Prior to the channel, the average flood elevation was 1170 – it is now below that elevation. "A" zones are defined as special flood hazard areas typically inundated by a 100-year storm event. This "A" zone is also a floodway: a portion of the Lower El Mirage Wash Tributary, as identified by FEMA on the 1995 Flood Insurance Rate Map (FIRM), Panel No. 1605 for Maricopa County (see Figure 2. Flood Map). At build out, large multiple CMP's will carry stormwater under Greenway Road from the north, diagonally to the southeast, near the intersection with Dysart Road. Flows will continue southward along the west edge of Dysart Road to a point approximately 800 feet south of the intersection, where historic flows break-out across Dysart Road to the east to re-connect with the Lower El Mirage Wash Tributary. A portion of the CMP system is now in place as a result of West Point Towne Center construction.

Flood Zone "X" are areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood. This designation covers the remainder of the Roseview parcel.

Flood Zone "AH" is located off-site to the southeast, parallel with the north side of the A.T.& S.F. railroad alignment. AH zones are typically associated with ponding. According to the FIRM Map, the ponding that occurs in this area does not cross the centerline of Waddell Road, and does not contact the Roseview parcel. (See Figure 2, Flood Map)

The proposed development is a part of the White Tank ADMS study currently being conducted by the Flood Control District of Maricopa County. The White Tank ADMS will provide HEC 1 models for the watershed and HEC 2 models for the existing conditions.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A	No base flood elevations determined.
ZONE AE	Base flood elevations determined.
ZONE AH	Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.
ZONE AO	Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
ZONE A99	To be protected from 100-year flood by Federal flood protection system under construction; no base elevations determined.
ZONE V	Coastal flood with velocity hazard (wave action); no base flood elevations determined.
ZONE VE	Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X	Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X	Areas determined to be outside 500-year flood plain.
ZONE D	Areas in which flood hazards are undetermined.

MAP NUMBER
04013C1605 G

REVISED TO REFLECT LOMR DATED OCT 20 1997

FIRM
FLOOD INSURANCE RATE MAP

MARICOPA COUNTY, ARIZONA AND INCORPORATED AREAS

APPROXIMATE SCALE IN FEET
1000 0 1000

PANEL 1605 OF 4350

flood map

FIGURE 2

DMJM
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D. Existing Area Drainage Pattern

The proposed project will be required to detain the 100-year 2 hour storm event and discharge the storage over a 36 hour period in accordance with the Flood Control District of Maricopa County's (FCDMC) Design manual for Maricopa County – Vol. I. The discharge point for the detention must be at the same historical point of discharge and at the same historical volume. Historically, storm water runoff drains from the northwest corner of the property toward the southeast corner where it eventually outfalls to the Lower El Mirage Wash which begins south of the intersection of Waddell Road and Dysart Road, on the southern side of the A.T.& S.F. railroad alignment. The railroad alignment has truncated the wash from the area north of the intersection, creating an "AH" Zone of ponding as a result. The railroad bed is raised and there is no piping system under it, storm water ponds between the southern edge of pavement along Waddell and gradually discharges across the intersection with Dysart to the El Mirage Wash. On January 20, 1998, during a public hearing on the proposed Maricopa County Department of Transportation (MCDOT) *Dysart Road - Northern Avenue to Greenway Road Corridor Study*, Amir Motamedi of the FCDMC stated that the long range plans of the FCDMC include penetrating the railroad alignment with a culvert somewhere about the mid-point of the segment of track between the Waddell/Dysart intersection and the point where the tracks curve to the south. (See Figure 1 - Location Map.)

Dysart Road intersects the Lower El Mirage Wash Tributary located at the northeast corner of the property. West Point Towne Center (located to the north of the Roseview property) has constructed a channel and retention area along the north side of Greenway Road to capture most of the historical storm water runoff that previously flowed across the property into the Lower El Mirage Wash Tributary. As a result of the channel work completed by West Point Towne Center, a LOMR (Letter of Map Revision) has been issued by FEMA (October, 1997), and is included as Figure 2 – Flood Map. Figure 2 shows the channel improvements north of the Roseview property, the Lower El Mirage Wash Tributary, and the ponding situation between Waddell Road and the A.T. & S.F. railroad.

E. Existing Utilities

The City recently become a water service provider and is developing a water delivery system. The City of Surprise will be the water provider for Roseview. Citizens Utilities is under contract with the City to operate the municipal water system within the City and to provide preliminary water system master planning services. Citizens Utilities is the provider for water services to West Point Towne Center north of the Roseview property. The agreement between the City and Citizens Utilities requires water line cross-connection between service areas for emergency back-up of either distribution system.

The City owns wells in Mountain Vista Ranch to the west. The City intends to use these wells, and a proposed new well in Roseview for the development of the municipal water system. The City of Surprise also has entered into an agreement with the McMicken Irrigation District for the assignment of Central Arizona Project (CAP) water. The CAP allocation will be used for ground water recharge, enabling the City to continue to withdraw water from the wells.

Sanitary sewer will connect to the existing City of Surprise sewer system. There is an existing 24-inch trunk line in the west portion of Dysart Road that is 12 feet deep (plus/minus) at the Greenway and Waddell intersections. This trunk line extends southward to the wastewater treatment facility located between Litchfield and Dysart Roads, 1/2 mile south of Cactus Road. Phase II of the wastewater facility will add a new 2.4 million gallon per day (MGD) module to the plant. This addition is currently under construction and should be completed by July 1, 1998. The expansion will bring total plant capacity to 3.2 MGD and both the line and the plant capacity should be more than able to handle this project.

Arizona Public Service (APS) provides electric services to the immediate area. High voltage overhead power lines currently visible along Dysart Road and Waddell Road will require relocation prior to or during construction. There are overhead power lines located west of the property on Greenway Road that extend south to the two well site locations and provide power for the existing pumps. These too, will require relocation/undergrounding during the development of Roseview. Telephone service is available through US West. Presently US West has overhead telephone service lines shared with APS's overhead service along Dysart and Waddell Roads. Cable television (Cox Cable), and natural gas (Southwest Gas) are also available in the general vicinity and can be made available to the development.

F. Existing Groundwater & Geology

Roseview lies within the Arizona Department of Water Resources (ADWR) designated West Salt River Valley Sub-Basin (WSRV) in the Phoenix Active Management Area (AMA). The following paragraphs (gleaned from various ADWR reports and data, and from a December 1996 hydrology study conducted by Brown and Caldwell for the Roseview property) describe the groundwater and geology in the sub-basin and within the immediate vicinity of the Roseview Parcel.

Alluvium -- Depth to bedrock in the WSRV ranges from 100 feet near the basin margins to over 10,000 feet in the Luke Air Force Base area west of Glendale. There are three recognizable hydrogeologic units within the basin including: an upper sand and gravel unit, a middle silt and clay unit, and a low conglomerate unit. The upper unit primarily consists of sand and gravel with some interbedded silt and clay and ranges in thickness from 100 feet near the basin margins to 500 feet in the Luke area. The middle unit consists mainly of silt and clay with some interbedded sand and gravel and ranges in thickness from 100 feet near the basin margins to over 1,300 feet southwest of Glendale. The lower unit mainly consists of course-grained conglomerate near the basin margins, becoming finer-grained toward the center of the basin and ranges in thickness from 100 to 10,000 feet.

Groundwater Flow & Volume -- Groundwater enters the WSRV as underflow from the Lake Pleasant sub-basin, the northern Hassayampa sub-basin, and the Maricopa-Stanfield sub-basin. The direction of groundwater flow is generally from the Lake Pleasant sub-basin into the WSRV and out of the WSRV into the East Salt River Valley Sub-Basin. However, development within the WSRV has created a cone of depression in the area of agricultural and municipal activity which groundwater within the WSRV also flows into. The volume of groundwater in storage within the basin is estimated at 59,000,000 acre-feet to a depth of 1,200 feet.

Depth To Groundwater -- The depth to the groundwater over the entire basin varies from 50 feet to over 500 feet. The groundwater level in wells in the Roseview area is approximately 400 feet.

General Groundwater Quality -- Groundwater quality in the WSRV varies considerably, however, it is satisfactory in most parts of the sub-basin. For example, total dissolved solids (salinity) levels for the wells in the area are slightly above the recommended secondary drinking water standard of 500 mg/l. However,

the fluoride concentration, which ranges from 0.2 to 5.5 within the sub-basin, is below the 4.0 mg/l maximum contaminant level.

On-Site Wells -- Two irrigation wells exist in the northwest quadrant of the PAD adjacent to the west boundary (ADWR Well Nos'. 617644 and 617645). These wells are registered to Arena Investments and are leased to Santa Lucia farms. The irrigation water is diverted for off-site agricultural uses, and the wells are committed to agricultural use for the foreseeable future. (See the Development Agreement for further information.)

G. Existing and Future Circulation

According to the City of Surprise's General Plan, Dysart and Waddell Roads are major arterial roadways. Greenway Road is a minor arterial (See Figure 3 - Circulation). The ultimate full street right-of-way width (ROW) for major arterials is 130-feet (65-foot half-ROW). The ultimate full street ROW width for minor arterials is 110-feet (55-foot half-ROW). The current dedicated half-ROW for Waddell Road is 33-feet. Since the ultimate half-ROW is 65-feet, an additional 32-feet must be dedicated by Roseview. According to the A.L.T.A. (May, 1996) provided by Land Survey Services (Thomas L. Rope, RLS) a half-ROW of 65-feet has already been dedicated for Dysart Road (Dkt. 2300, PG 539, and BK. 11 of Road Maps, Page 88) and no further dedication is necessary. Dedication of 55-feet for the south half of Greenway Road has been recorded (October 1997).

Newly constructed West Point Parkway, within West Point Towne Center, terminates at Greenway Road. The existing well on the Roseview property is directly in line with a southern extension of West Point Parkway. Discussions with City Engineering staff resulted in the elimination of West Point Parkway continuing southerly across Greenway Road (meeting held October 28, 1997 and memorialized in a DMJM memo dated November 6, 1997). Traffic volumes on this southern extension would be very light and will be easily absorbed by other collector streets such as the north-south collector through Roseview. By agreement with the City Engineer, and the City's Engineering Department Staff, Roseview will provide a secondary access point along Greenway Road, and a mid-section collector will be stubbed-out to the west for future access to and through future development to the west.

The 1985 ADT for Dysart Road is 3800; the projected ADT for 2005 is 13000. The 1985 ADT for Waddell Road is 1600; the projected ADT for 2005 is 5000. Interchanges off Loop 303 are currently planned at Bell, Peoria, and Waddell Roads. The proposed Roseview PAD can be supported by the existing roadway network provided the mitigations recommended are implemented. Due to the relatively close proximity to US 60, this development is expected to generate and attract the majority of its users from the Southeast (Phoenix). It is expected to generate a total of 12,500 daily trips of which 844 will occur during the AM peak hour and 1,242 will occur during the PM peak hour. The warrant analysis for year 2002 without the project indicated that the proposed P.A.D. has little effect on the intersections in question

and it also indicated that signals are warranted at the analyzed intersections. It is noted that the traffic signal requirements at the intersections of Dysart/Greenway Road, Dysart/Waddell Road and Greenway Road/West Point Parkway are not required entirely by the proposed Roseview P.A.D., but rather by a combination of this site and the rapid growth expected in the surrounding areas.

Roadway improvements to arterials and construction of collector roads and local roadways will be made according to standards set forth by the *City of Surprise Comprehensive Development Guidelines* and modified to reflect existing or proposed conditions and connections, or current City engineering standards. All modifications from the *Guidelines* must be approved by the City Engineer and the City Council. See Figures 4 through 7 for typical road cross-sections. For further information, see the Final Traffic Impact Study, included in Volume II, Appendix C. Recommended Roadway Improvements:

- Dysart Road

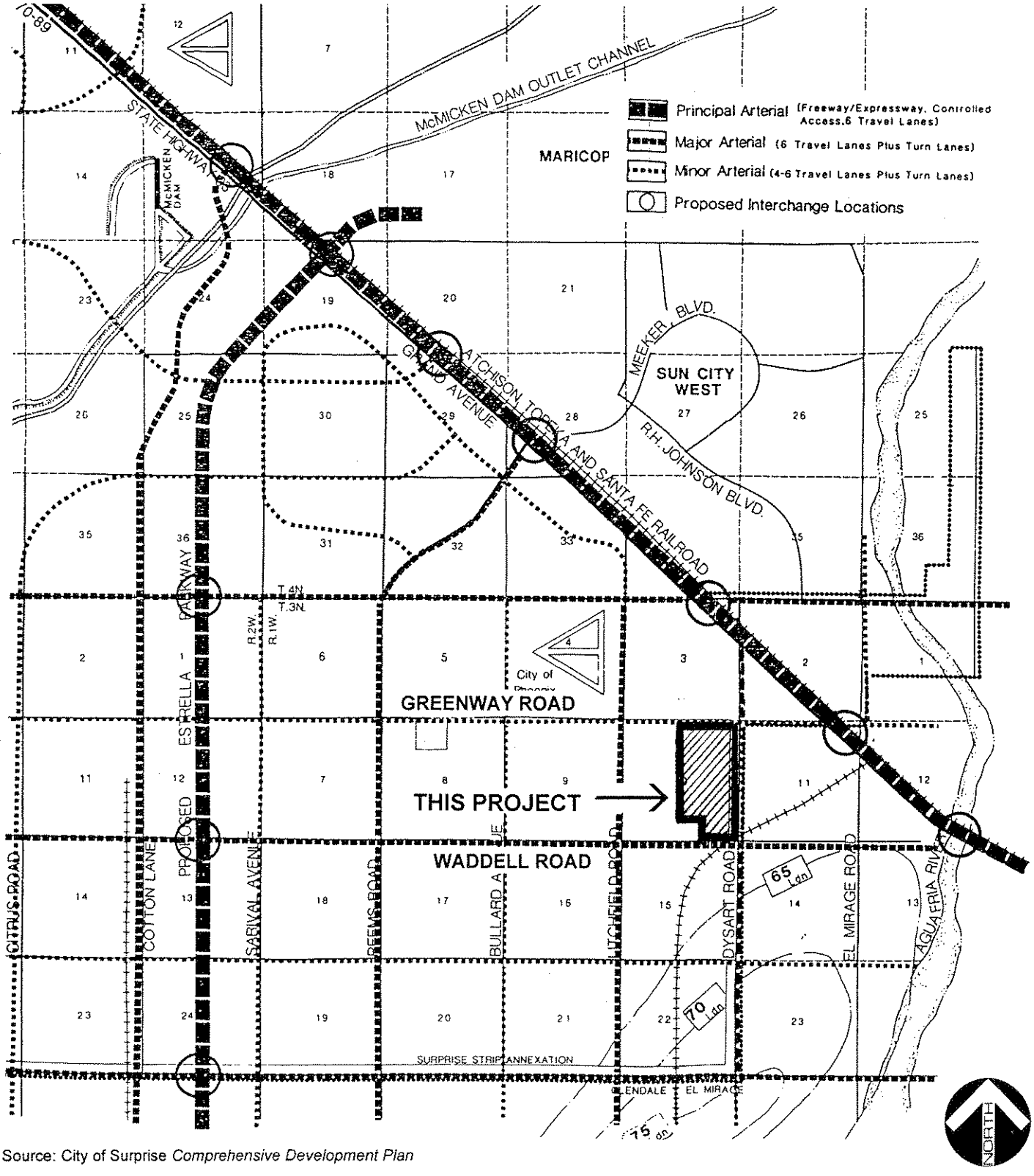
  At the present time, Maricopa County Department of Transportation (MCDOT) is studying alternatives for Dysart Road and Waddell Road. A Pre-Final Corridor Improvement Report prepared by HNTB has been issued and public hearings have been held to discuss the alternatives. The proposed reconstruction of Dysart Road as a major divided arterial will be more than adequate for the forecasted traffic. The north bound and south bound approaches at the intersections of Greenway and Waddell Road will require a flared section to provide an exclusive left turn lane.

- Greenway Road

  Greenway Road is planned as a five lane minor arterial. This will adequately handle anticipated future traffic. The east bound approach at the intersection of Dysart requires a flared section to provide an exclusive left turn lane. To provide a better level-of-service at the intersection of Dysart, it is recommended that a three through lanes with a right turn should be provided at both east bound and west bound approaches.

- Waddell Road

  Waddell Road is planned as a major divided arterial. The proposed reconstruction will be adequate to handle the forecasted traffic volumes. The east bound and west bound approaches at the intersection of Dysart Road will require a flared section to provide an exclusive left turn lane.



Source: City of Surprise *Comprehensive Development Plan*

0 Mi. .5 1.0 1.5

circulation

FIGURE 3

DMJM

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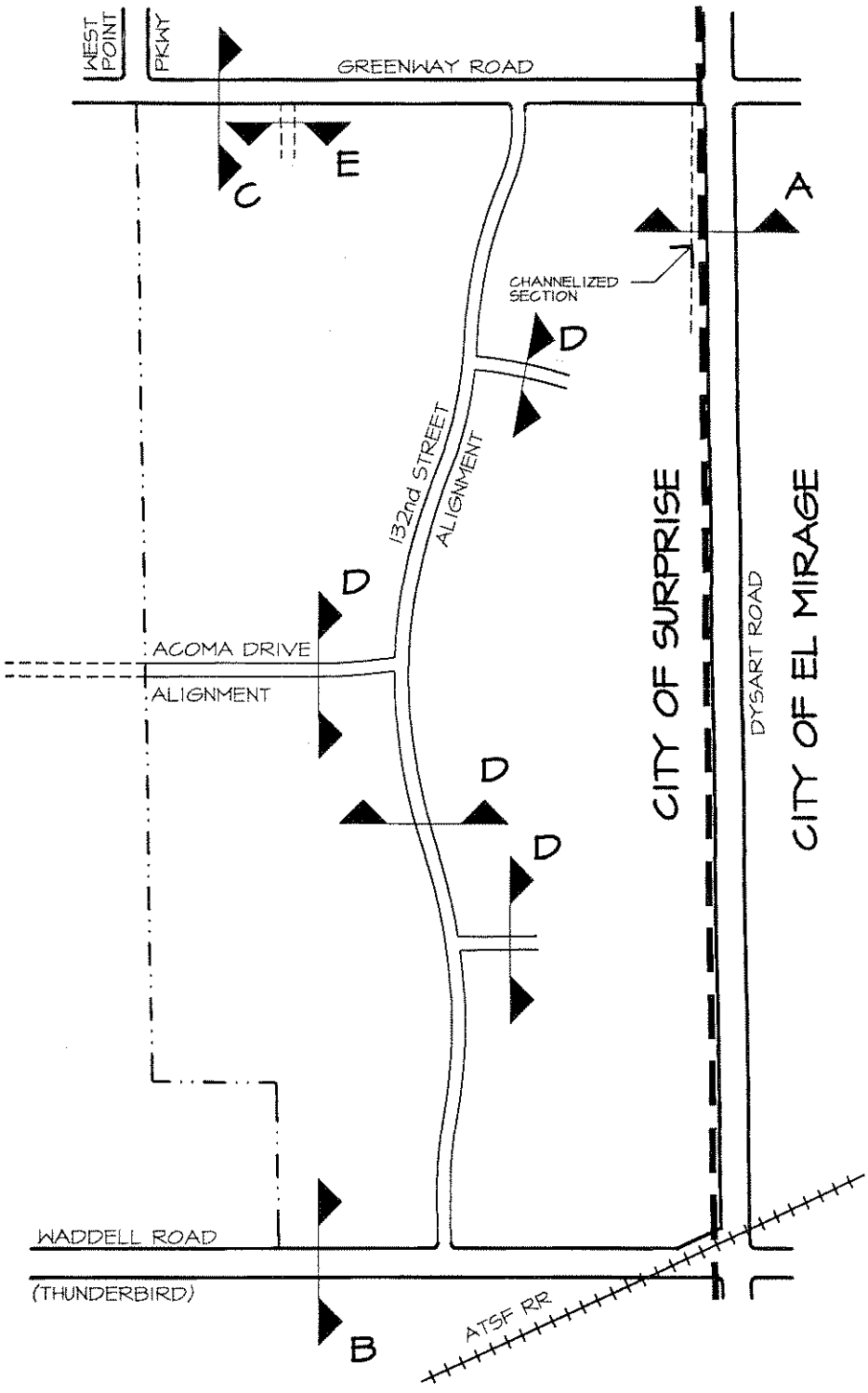
Telephone: 602/264-0217
Fax: 602/285-1984



road cross-sections locations

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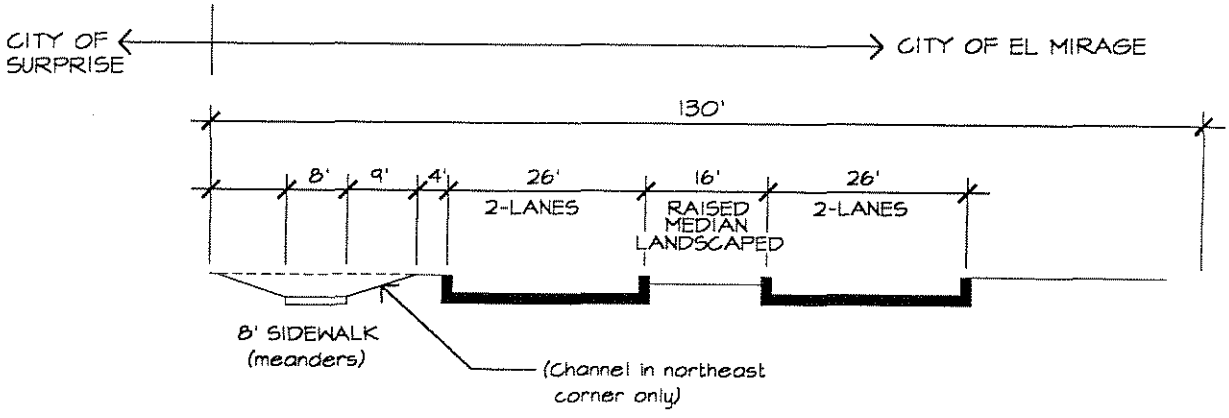
FIGURE 4

MAJOR ARTERIAL (MODIFIED) A

DYSART ROAD (looking north)

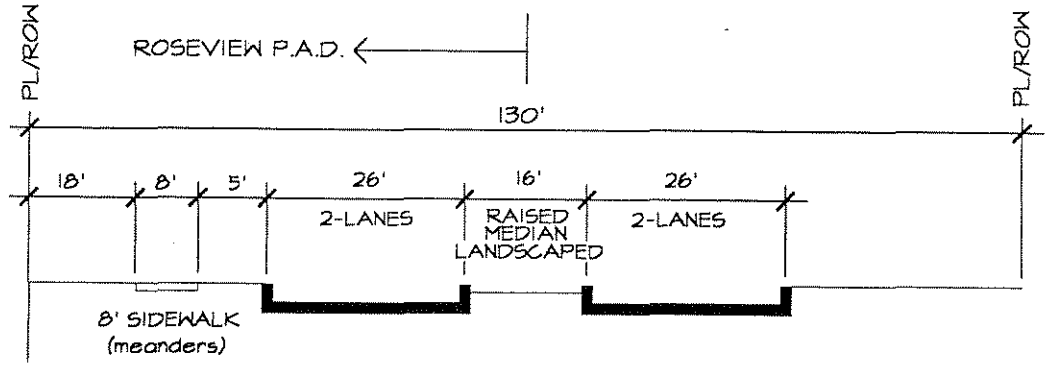
no scale



MAJOR ARTERIAL (MODIFIED) B

WADDELL (THUNDERBIRD) ROAD (looking east)

no scale



CROSS SECTIONS ARE CONCEPTUAL AND SHALL NOT BE CONSIDERED FINAL APPROVED DOCUMENTS

road cross-sections (a)

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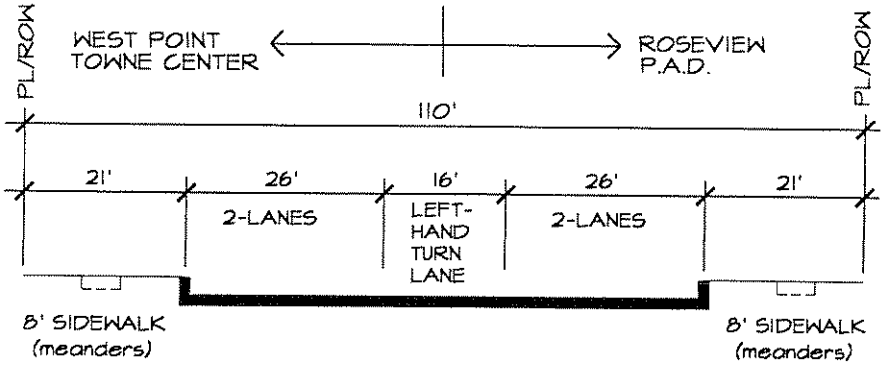
FIGURE 5

MINOR ARTERIAL (MODIFIED) C

GREENWAY ROAD (looking east)

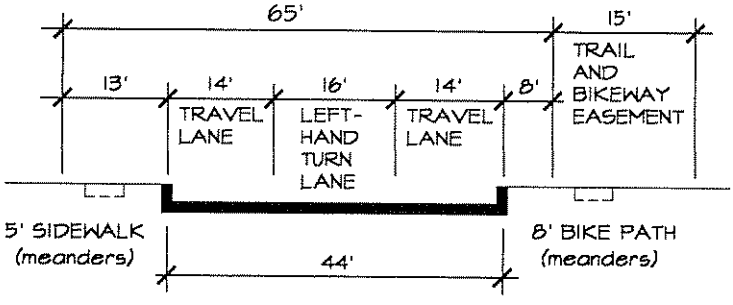
no scale



PRIMARY COLLECTOR (MODIFIED) D

(132th. Street Alignment -- looking north)

no scale



CROSS SECTIONS ARE CONCEPTUAL AND SHALL NOT BE CONSIDERED FINAL APPROVED DOCUMENTS

road cross-sections (b)

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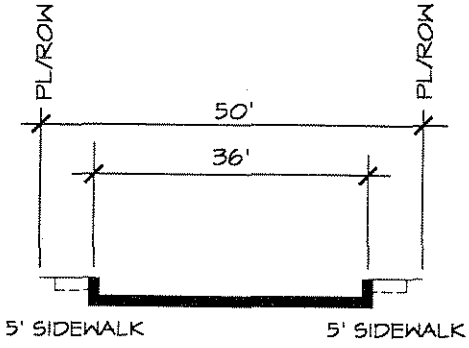
FIGURE 6

LOCAL ROADWAY

E

TYPICAL RESIDENTIAL STREET

no scale



CROSS SECTIONS ARE CONCEPTUAL
AND SHALL NOT BE CONSIDERED
FINAL APPROVED DOCUMENTS

road cross-sections (c)

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FIGURE 7

H. Existing Miscellaneous Jurisdictions

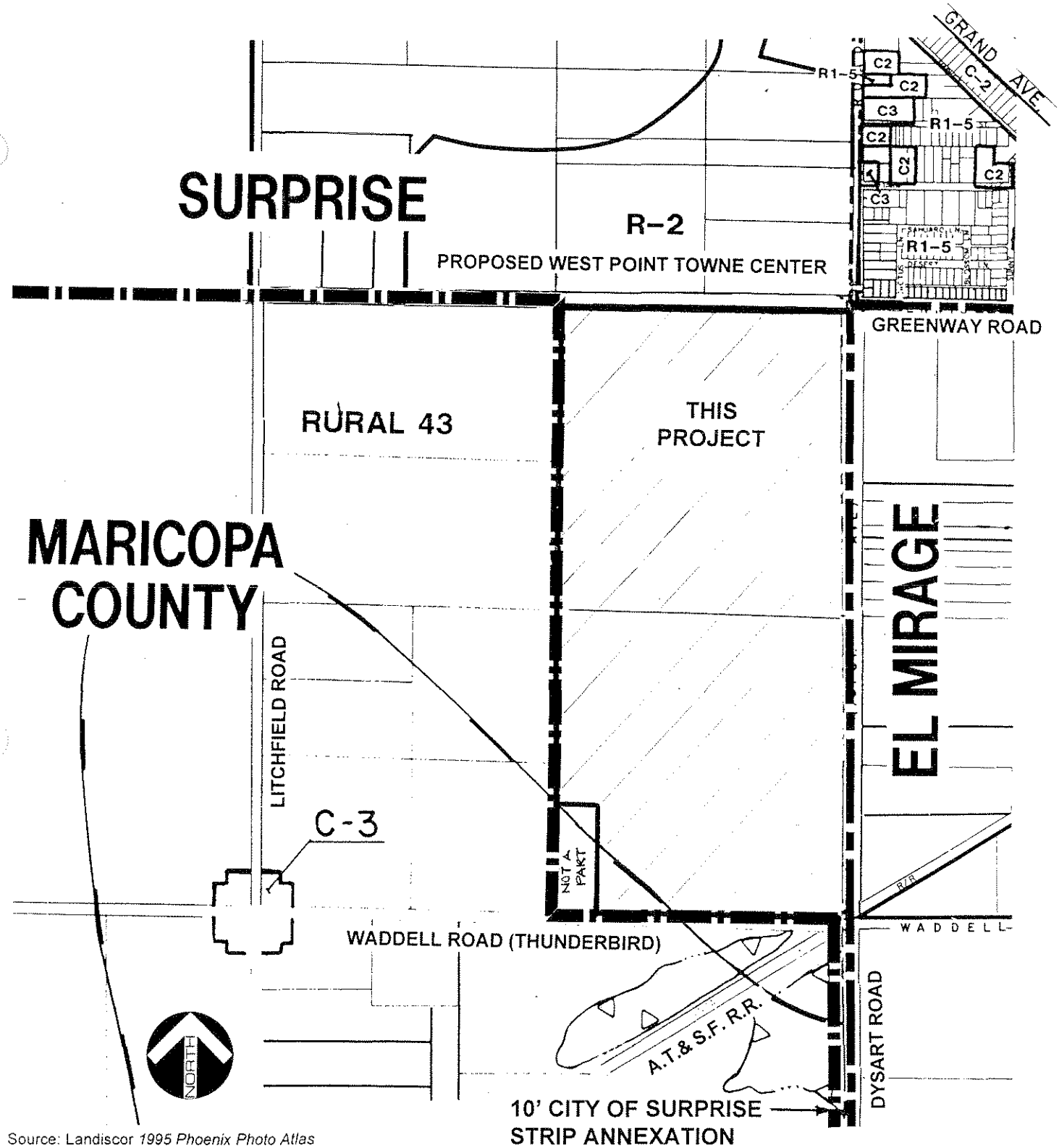
The annexation of the project area into the City of Surprise was adopted (Ord. No. 96-21) by the City Council in December of 1996 (effective January of 1997). A General Plan Amendment for the property was filed in November of 1996 and approved by the City Council in May of 1997.

The A.T. & S.F. (Santa Fe) railroad right-of-way cuts the southeast corner of the PAD from a point 125.71-feet north along the east section line of Section 10, 209.84 feet west along the south section line of Section 10, and connected by a diagonal line located in the extreme SE corner of the parcel. (See Figure 8 – Jurisdictions and Exhibit A – the A.L.T.A.).

The small corner of the property is located inside the outer contour of the 1988 Luke Air Force Base (LAFB) Air Installation Compatibility Use Zone (AICUZ) noise contour map. The 1988 AICUZ has been adopted by Maricopa County. All new development located within the lowest level 65 DNL contour (Day-Night average sound Level) or higher contour is subject to certain restrictions relating to sound attenuation. Construction techniques and materials that provide a 25db reduction would be required within a 65 DNL contour area.

The 1988 65 DNL contour crosses the Roseview property at a point approximately 1240-feet north of Waddell Road at the north-south half-section line of Section 10; and then again at a point approximately 1300-feet east along the property line from the north-south half-section line of Section 10. The area within the PAD impacted by the 65 DNL is approximately 10.8 acres (See Figure 8 -- Jurisdictions).

Luke Air Force Base revised the AICUZ noise contours in 1995, and the location of the 65 DNL contour no longer crosses the Roseview property. However, the 1995 AICUZ contour lines have not been adopted by Maricopa County, and until such time the 1988 contours will continue to be recognized and enforced. (See Figure 9 -- Revised Luke Air Force Base Noise Contour Map).



Source: Landiscor *1995 Phoenix Photo Atlas*

1" = 1200'

jurisdictions

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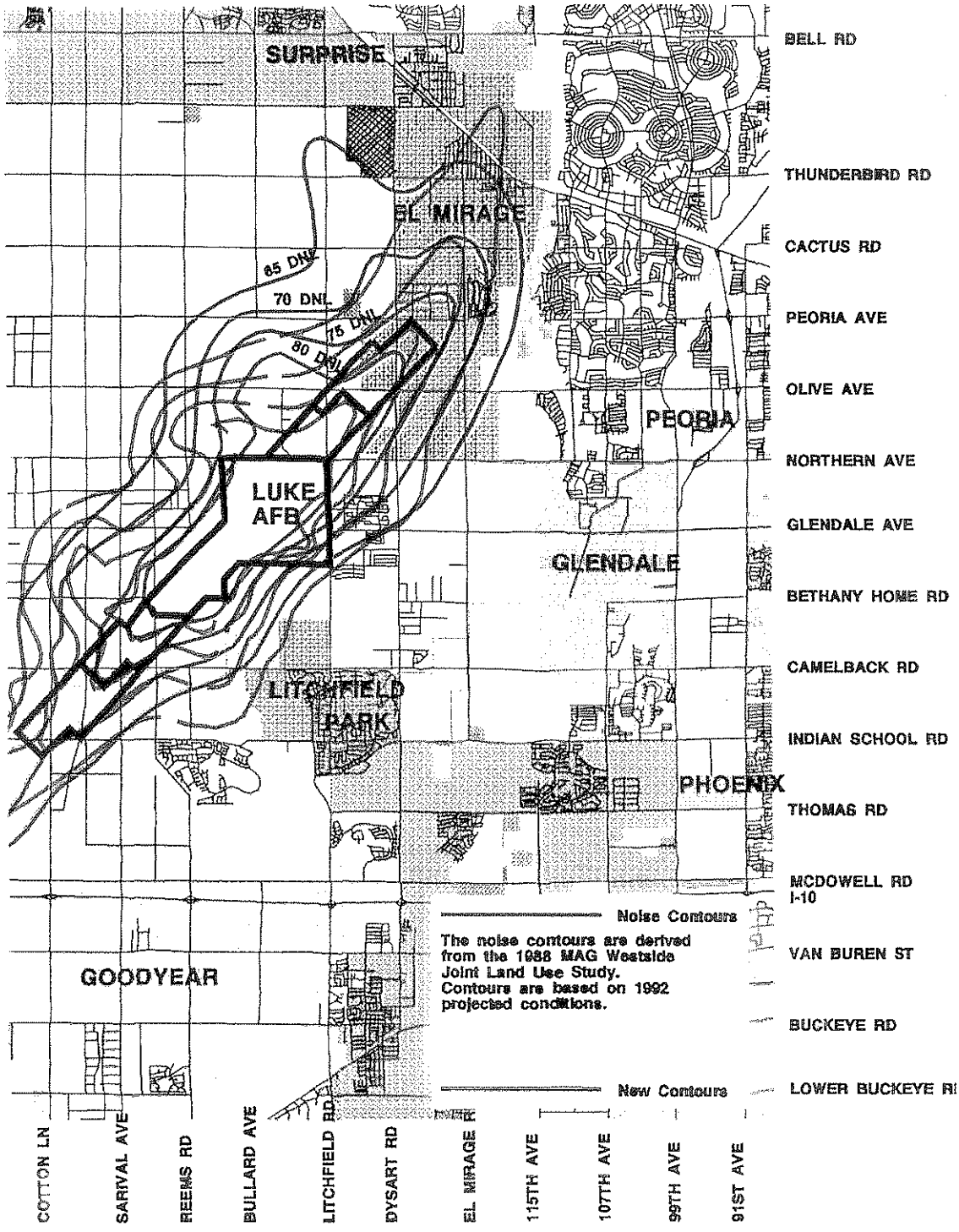
FIGURE 8



LAFB AICUZ boundaries

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FIGURE 9

Section III - Proposed Site Development

A. Area Calculations

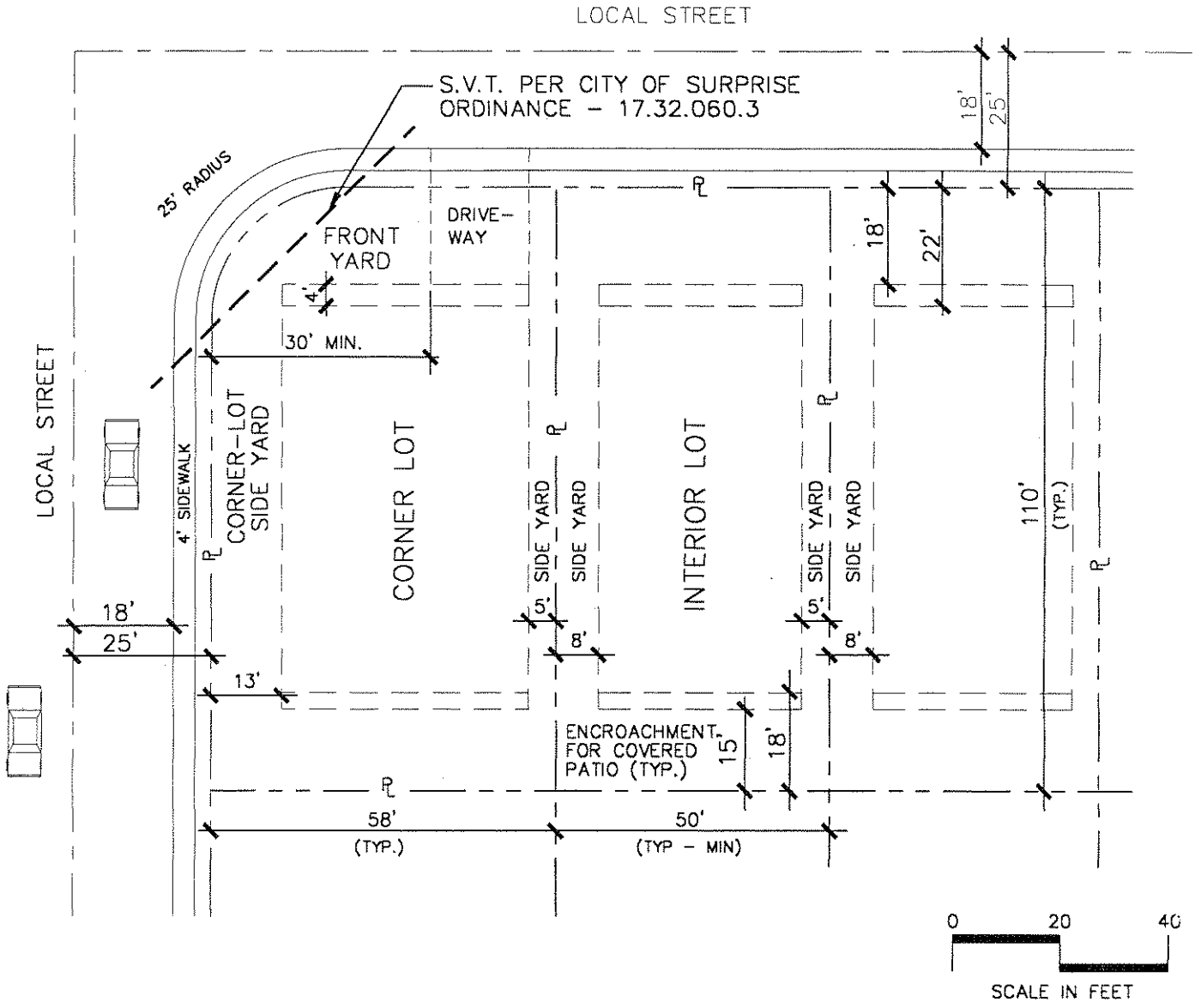
	Acreage	% (percent)
The total (gross) area of the property is: (per A.L.T.A.)	307ac.	100
The total area of arterial streets is:	14 ac.	5
Estimated area of collector and local streets is:	67 ac.	22
The total area of private open space is: (Basins/open space = ±22 acres) (Trails/open space = ±3 acres)	25 ac.	8
The total area of single-family residential use is:	201 ac.	65

(See Exhibit B -- Conceptual Land Use Plan)

B. Residential Lot Standards

1. Density

A diversity of lot sizes and housing types is encouraged by this PAD. Minimum lot widths within the Roseview PAD for single-family detached residential dwelling units is 45-feet (see Development Agreement). Frontage on lots on a cul-de-sac or street knuckle may be decreased, provided full standard lot width per unit type can be achieved at a point 20-feet from the chord of the front property line (see Diagram 2). Corner lots shall be 8-feet wider (13-feet total street side yard) than the typical interior lot width. The minimum standard street lot depth for single-family detached residential dwelling units shall be 105-feet. Lots that back onto the perimeter boundary streets of the project shall be a minimum of 115-feet deep. There shall not be more than one single-family detached dwelling on any one lot. No lots shall front onto a collector or arterial street. (See Figure 10, Setbacks)



setbacks

FIGURE 10

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Fax: 602/285-1984

DMJM

An amendment to the City of Surprise General Plan (approved in May of 1997) designates the Roseview property as Typical Neighborhood. Typical Neighborhood as defined by the City's *Comprehensive Development Guide* provides a mix of low to high density residential uses with an overall gross density not to exceed 7 dwelling units per acre (*page 115*). Thus, the number of allowable dwelling units in terms of gross residential density is 7 DU/AC X 307 acres, or 2149 dwelling units. The developer intends to cap the number of dwelling units at 1500, total. In the event the PAD is amended at a later date, density transfers between phases and parcels will be allowed.

2. Setbacks

The City of Surprise Municipal Code Title 17 (R1-5) shall apply except as may be modified below. Minimum residential building setbacks shall apply for this project:

Front yard:	Face-of-garage: 18-feet minimum, measured from property line. Staggered front yard setback permissible in 4-foot increments (18-foot, and 22-foot) provided that no two adjacent homes occupy the same setback. Face-of-residence: 15-feet minimum. A 3-foot projection into the front yard setback is permissible in situations where the appurtenances of the principal residence (bay windows, fireplaces, front porches, etc.) extend **forward** the front face of the garage. The width of this encroachment cannot exceed 25% of the width of the lot. (See Diagram 1)
Interior Side Yard:	5-foot and 8-foot minimum typical (13-foot aggregate per lot).
Corner Street Side Yard:	13-feet from property line

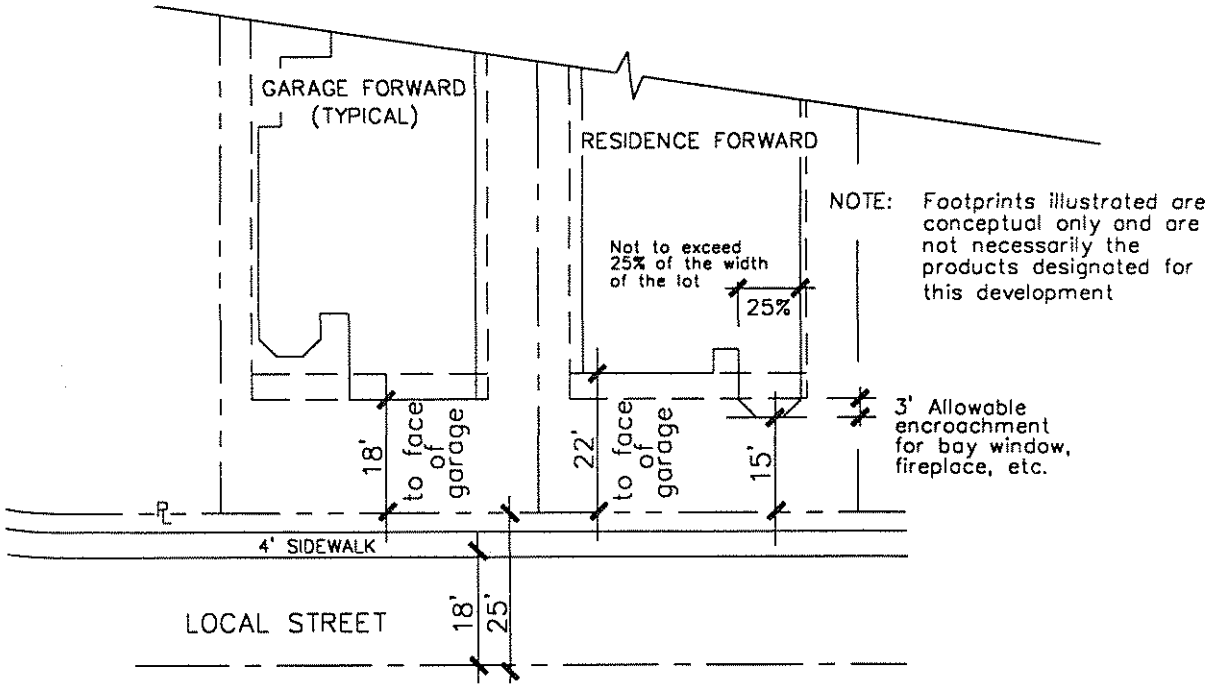


Diagram 1. Face of Residence Setback

Rear Yard: 18-foot minimum. (Patios open on at least 2-sides may project into the minimum rear yard setback to within 15-feet of the lot line (measured from the face of the structure).

Rear yard setbacks on arterial streets shall be a minimum of 30-feet *unless a minimum 10-foot landscape tract (measured from the right-of-way line to the perimeter theme wall) is provided* (in which case the 18-foot standard rear-yard setback described above shall apply).

Architectural features such as chimney flues, stairways, balconies, etc., may project a maximum of 3-feet into the minimum rear yard setback.

Maximum Building Height: 30-feet

3. Minimum Single-Family Residential Lot Dimensions

The following minimum single-family residential lot dimensions and areas shall apply for this project:

Minimum Standard Lot Width:	45-feet
Minimum Chord Width: Cul-de-Sac or Street Knuckle	25-feet
Minimum Standard Depth:	105-feet
Minimum Project Perimeter Depth:	115-feet
Minimum Lot Area:	4725 sq. ft.

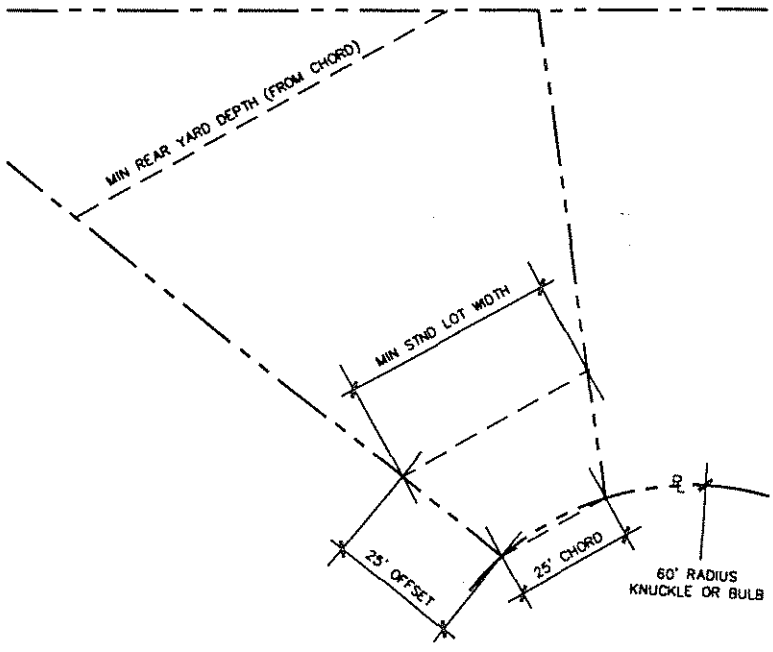


Diagram 2. Minimum Lot Dimensions at Knuckle & Cul-de-Sac

4. Parking

Two minimum 18-foot deep spaces per single-family dwelling unit shall be provided in each garage. Parking for 2 additional vehicles (minimum 18-foot deep – interior dimension x 20-foot width – interior dimension) shall be provided in the driveway of each single-family dwelling unit.

C. General Design Standards and Guidelines

- Grading, Drainage and Stormwater Management - Per Maricopa Association of Governments (MAG) Standards and Specifications and Maricopa County Flood Control District Design Standards.

- Water Distribution System - Standards and Specifications by the City of Surprise, MAG, and Citizens Utilities.

- Fire Water Distribution - Per City of Surprise/Citizens Utility Standards and Specifications.

- Sanitary Sewer Collector System - Per City of Surprise and MAG Standards and Specifications.

- Roadways and Streets - Per City of Surprise, Maricopa County Department of Transportation, and the Manual on Uniform Traffic Control Devices (MUTCD).

- Landscaping - Per City of Surprise; and standards established by Section IV of this PAD.

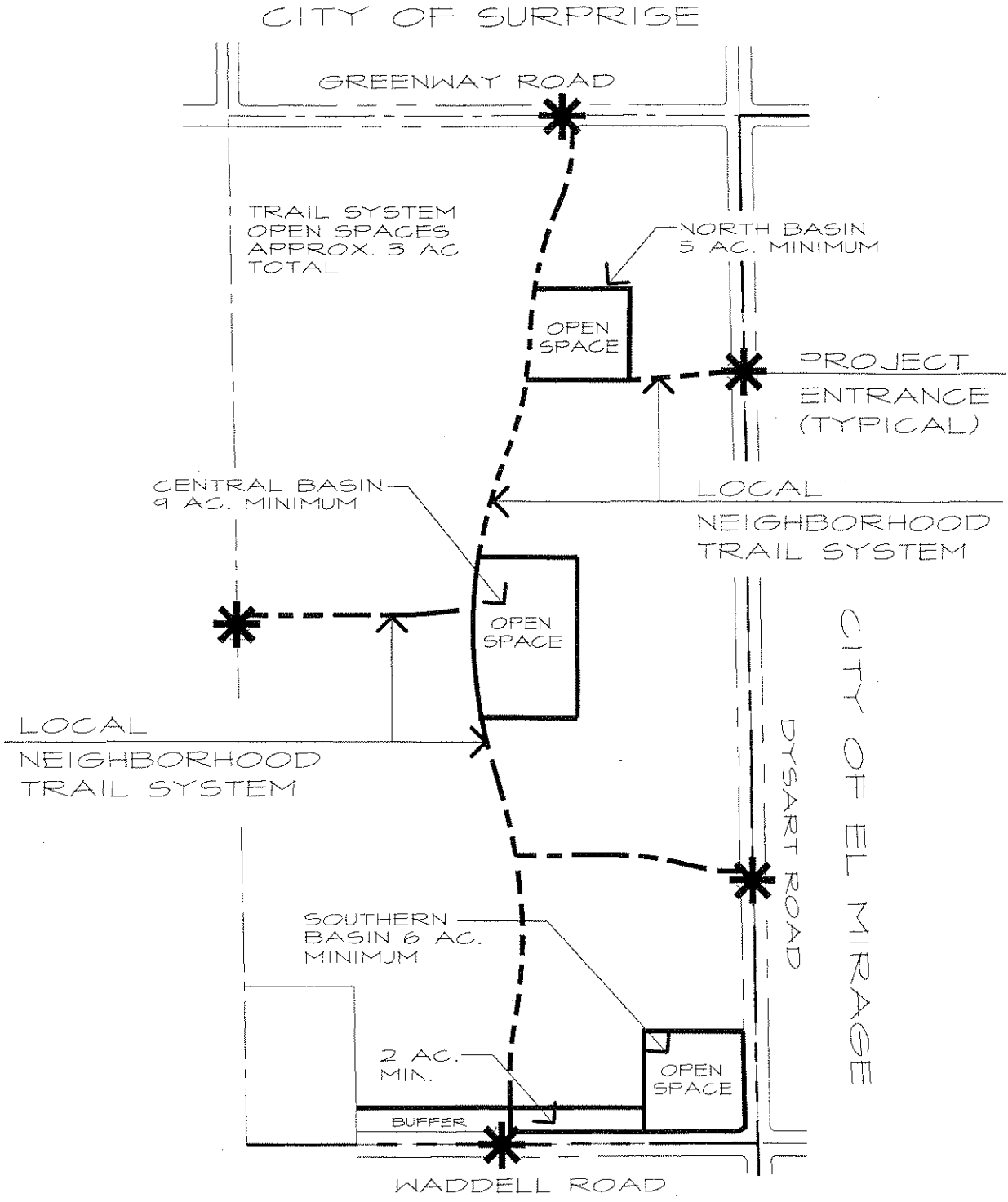
D. Open Space & Trails

Approximately 25-acres of privately-controlled open space which represents approximately 8% of the total PAD area (7% is required by City of Surprise Code) is planned for this development in the form of active/passive recreation areas, stormwater retention areas/open space, buffering/screening, and a pedestrian trail system that will link on-site open space with off-site open space. (See Figure 11 -- Open Space and Trails.) All open space will be dedicated to a Homeowner's Association (HOA). The HOA will pay for and control all aspects of the maintenance and use of this open space.

The builder will provide minimum of one tot-lot play area (and a minimum of one ramada with minimum of one open charcoal-based BBQ equipment) in each HOA-dedicated open space site interior to the project larger than 5 acres. The builder will provide minimum of one of the following elements: active multi-purpose field, one sand volleyball court, one horseshoe pit, and/or one crushed stone jogging path (in any HOA-dedicated open space larger than 8 acres).

A master landscape plan and typical retention basin/open space layout will be submitted for review and approval at the time of submittal of the Preliminary Plat.

Per the City of Surprise *Comprehensive Development Guide*, local neighborhood trail systems are to provide a secondary linkage between existing parks and regional parkways, and between residential areas and elementary schools/neighborhood parks within the Planning Area. The local neighborhood trail system will be a meandering eight-foot wide path located adjacent to one side of the collector streets.



NORTH

open space and trails

DMJM

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FIGURE 11

E. Water and Sewer

1. Assured Water Supply.

ADWR has issued a letter dated July 30, 1997, acknowledging the physical availability of a 100-year supply of groundwater for this property based on an Assured Water Supply Analysis prepared by DMJM and dated May 22, 1997. To receive an Assured Water Supply Certificate, the developer must submit an application to ADWR with a plat and proof of financial capability to provide water.

2. Water Supply and Storage

The developer will construct a water supply, storage and distribution system for the development (see Volume II, Appendix E: Water Facilities Design Memorandum). The system will be sized and constructed to accommodate the phased development of the property. The water system will consist of a new well sized to provide the peak daily demand of water for the development. Reimbursement for water facilities dedicated to the City is addressed in the Development Agreement.

3. Proposed Water Distribution and Fire Protection Systems

The proposed development will be served by a looped water distribution system consisting of 8-inch minimum waterlines. This system will be sized to provide enough capacity to serve the entire development for water consumption as well as fire protection. A cross-over tie-in with the neighboring West Point Towne Center development's 12-inch water main on Greenway Road will be provided for emergency backup water supply per the City's Mutual Aid Agreement with Citizen's Utilities. A conceptual layout of the proposed water distribution system can be found in Exhibit No. C -- Conceptual Water Plan. This layout is subject to change in final design, at which time a detailed hydraulic analysis of system pressures and head losses will be performed.

RECEIVED

AUG 0 1 1997

DMJM

ARIZONA DEPARTMENT OF WATER RESOURCES
Office of Assured and Adequate Water Supply
500 North Third Street, Phoenix, Arizona 85004
Telephone (602) 417-2460
Fax (602) 417-2423

FIFE SYMINGTON
Governor

RITA P. PEARSON
Director

July 30, 1997

Mr. Bud Reyes
Project Manager
DMJM Arizona, Inc.
300 West Clarendon, Suite 400
Phoenix, AZ 85013

Re: Status of the application for an Analysis of Assured Water Supply
Arena 320
DWR No. 28-300317

Dear Mr. Reyes:

In response to your request, this letter addresses the status of the application for an Analysis of Assured Water Supply for the above referenced development. To date four of the five Analysis of Assured Water Supply requirements have been reviewed. They are as follows:

- **Physical and continuous availability of water for 100 years**
  The Department has determined that under current conditions, groundwater withdrawals to meet the development's water demand will not cause water levels to exceed 1000 feet below land surface.

- **Consistency with Management Plan for the active management area**
  The Department has determined that the projected use, presented in the application for an Analysis of Assured Water Supply, is consistent with the Second Management Plan.

- **Consistency with Management Goal for the active management area**
  While it is possible for this standard to be met at the time an application for an Analysis of Assured Water Supply is submitted, it is not required. The application states that the method for meeting this requirement will be to enroll the subdivision lands in the Central Arizona Groundwater Replenishment District.

- **Financial Assurance of the construction of the water system**
  This standard is met by submitting a Verification of Construction Assurance for a Proposed Subdivision, signed by the appropriate platting entity. Since most projects have not begun the platting process at this stage, this form is expected as a part of the Certificate of Assured Water Supply filing.

The remaining assured water supply requirement, adequate water quality, has not been completed.

All requirements for an Analysis of Assured Water Supply must be reevaluated when an application for a Certificate of Assured Water Supply is received. It is at that time that the subdivision lands must meet the consistency with management goal and financial assurance requirements. A current water quality review showing that the water provider is in compliance with drinking water standards is also required.

If you have any questions, please contact me at 417-2460.

Sincerely,

Christa M. Faulk

Christa M. Faulk
Water Resource Specialist

The fire protection system will be constructed in strict accordance with the City's Fire District requirements. Fire hydrants will be installed along the major thoroughfares for fire protection, and to be used as blowoffs at low points and deadends along the water mains. Combination air and vacuum relief valves will be installed at high points along the water mains to permit automatic entrance and escape of air in and out of the pipeline during draining and filling, as well as to permit accumulated air to escape while it is in service. Detailed locations of all fire hydrants, valves and appurtenances will be established during final design of the water system.

4. Proposed Sewage Collection System

According to construction as-builts for the existing sewage collection system, the existing 24-inch sewer on Dysart Road has slopes ranging from 0.0014 foot per foot to 0.0035 foot per foot, equivalent to full-flow capacities of 5.5 MGD (million gallon per day) to 8.7 MGD. Proposed sewer line locations for Phases I through IV are shown on Exhibit No. D -- Conceptual Sewer Plan. Phases I through IV sewer peak flow volumes are estimated to be 0.258 MGD, 0.289 MGD, 0.272 MGD, and 0.235 MGD, respectively. Number of lots contributing wastewater at these tie-in points are estimated at 364, 415, 367, and 354, respectively. Pipeline design will be based on requirements of the Arizona Department of Environmental Quality (ADEQ) requirements.

Proposed sanitary sewers in the development will consist of gravity sewers made up of 8-inch sewer mains and 4-inch residential sewer laterals. Where practical, sewer tie-in points at the existing 24-inch sewer will connect to existing 60-inch diameter manholes, otherwise, new 60 inch diameter manholes will be installed at tie-in points. Inside the development, where sewers will be installed at relatively shallower depths, manholes will be 48-inches in diameter. Water and sewer pipeline alignments will be designed based on a minimum wall to wall separation of 10-feet.

5. Citizen's Utilities Cross-connection

An 8-inch cross-connection between Roseview and West Point Towne Center's 12-inch line located in Greenway Road, will be provided to act as a temporary back-up water supply system in case of emergency. A manually operated valve, linking the two systems will remain closed until such time as necessary. Citizen's Utilities requires a flow meter to measure flow in either direction and an unmetered emergency bypass. They will provide construction details based on a similar installation at Mountain Vista Ranch. Citizens Utilities will be responsible for operating and maintaining the cross-connection.

F. PHASING

Development of the site is proposed to take place in four to eight phases, commencing from northwest to southeast. Each phase will be constructed to facilitate a smooth transition between it and adjoining phase(s). The original terms of the sale of the land releases an 80-acre section of the property every year over a four-year period, starting with the 80-acre section adjacent to Greenway Road. Roadways, both on and off-site, will be constructed in phases, as will grading, drainage and utilities. With the sale of 80 acres in the northwest half of the project to Lennar Communities Development, Inc. (October, 1997) the phasing pattern for development has been established as follows:

First 80-acre land release, (adjacent to, south of Greenway Road):

West half: Phase 1

East half: Phase 3

Second 80-acre land release, (south of first 80-acre release)

West half: Phase 2

East half: Phase 4

Third 80-acre land release, (south of second 80-acre release)

West half: Phase 5

East half: Phase 6

Fourth (final) land release, (south of third 80-acre release, north of Waddell Road)

West half: Phase 7

East half: Phase 8

See Figure 12 -- Conceptual Phasing.

may be done during the initial phase of construction. This will be decided during the negotiation and scheduling period with APS prior to Final Plat Preparation.

The construction phases are expected to proceed as follows (see Figure 12, Conceptual Phasing):

PHASE 1 LENNAR COMMUNITIES DEVELOPMENT, INC.:

Sub-phase of the first land release

This Phase will consist of :

1. Removal of existing irrigation channels. Construct/protect conveyance of irrigation well water to remaining channels and farmland.
2. Installation of water distribution system (well, storage facility, etc.), sewer lines and other underground utilities within Phase 1.
3. Construct Phase 1 portion of retention facility.
4. Construct major roadways: west half of collector road; Greenway Rd. south half from mid-section line to the project's north/south collector.
5. South half paving (no curb, gutter, sidewalk) from the collector road, through to Dysart Road.
6. Provide secondary entrance off Greenway Road.

PHASE 2 LENNAR COMMUNITIES DEVELOPMENT, INC.:

Sub-phase of the second land release

This Phase will consist of :

1. Removal of existing irrigation channels. Construct/protect conveyance of irrigation well water to remaining channels and farmland.
2. Installation of water distribution system, sewer lines and other underground utilities within Phase 2.
3. Construct Phase 2 portion of retention facility.
4. Construct east/west collector road from the collector road to the mid-section line; west half of north/south collector road.

PHASE 3 (builder to be determined)

Sub-phase of the first land release

This Phase will consist of :

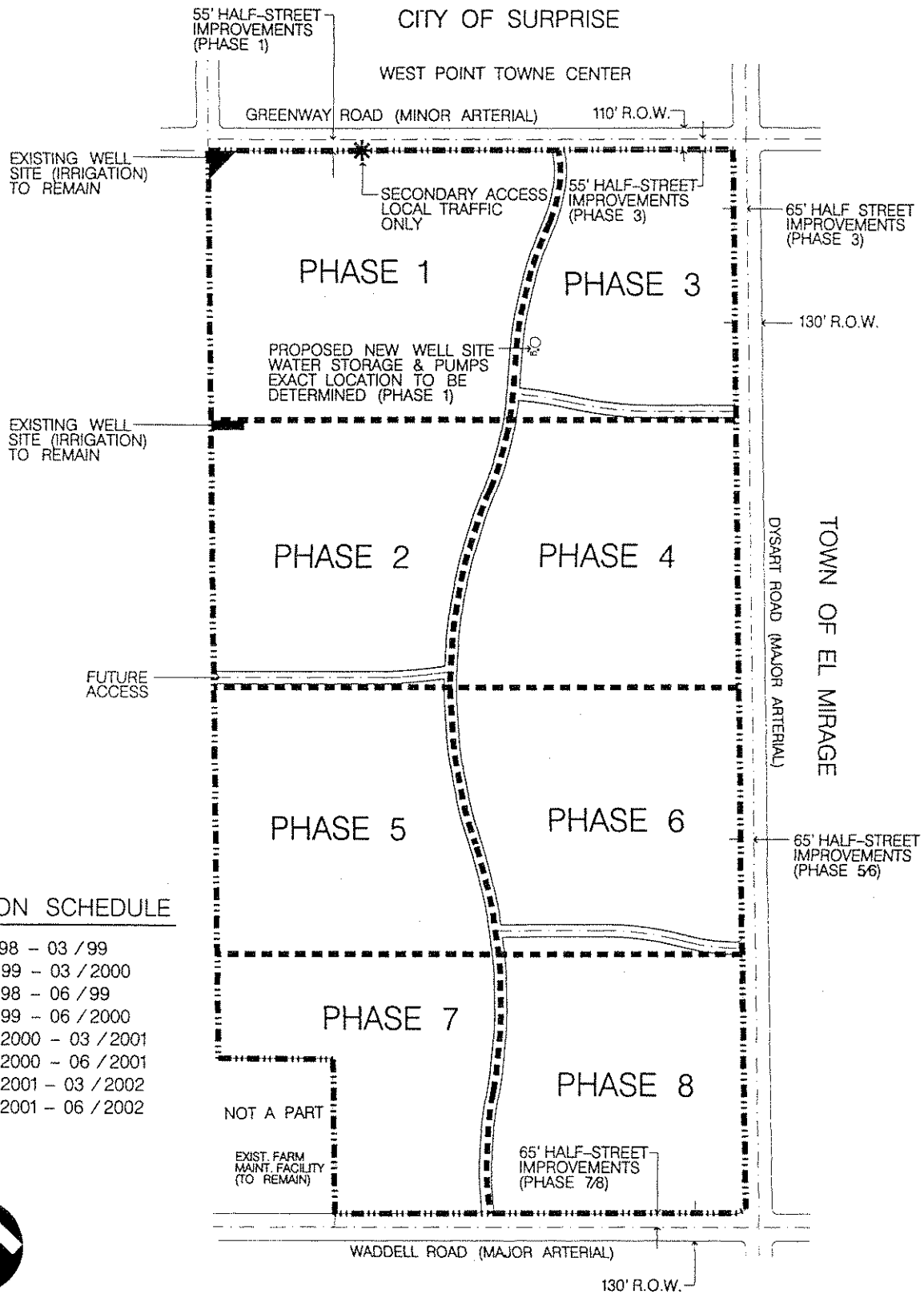
1. Removal of existing irrigation channel. Adapt method to convey well water to remaining channels and farmland.
2. Installation of Phase 3 water distribution system, sewer lines and other underground utilities within Phase 3.
3. Construct Phase 3 portion of retention facility.
4. Construct major roadways: south half of Greenway Rd. from the north/south collector to Dysart Road -- including extension of the culvert system under Greenway Road; the north half of the east/west collector (¼ mile south of Greenway Road); and the east half of the north/south collector road.
5. Shared Cost of Traffic signal at Dysart Road and Greenway Road.
6. Construct related portion of Trail system.

PHASE 4 (builder to be determined)

Sub-phase of the second land release

This Phase will consist of :

1. Removal of existing irrigation channel. Adapt method to convey well water to remaining channels and farmland.
2. Installation of Phase 4 water distribution system, sewer lines and other underground utilities within Phase 4.
3. Construct Phase 4 portion of retention facility.
4. Construct major roadways: east half of north/south collector; the south half of east/west collector road (¼ mile south of Greenway Road) to Dysart Road.
5. Construct related portion of Trail system.



ESTIMATED CONSTRUCTION SCHEDULE

PHASE 1:	03 / 98 – 03 / 99
PHASE 2:	03 / 99 – 03 / 2000
PHASE 3:	06 / 98 – 06 / 99
PHASE 4:	06 / 99 – 06 / 2000
PHASE 5:	03 / 2000 – 03 / 2001
PHASE 6:	06 / 2000 – 06 / 2001
PHASE 7:	03 / 2001 – 03 / 2002
PHASE 8:	06 / 2001 – 06 / 2002

NO SCALE

conceptual phasing

DMJM

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FIGURE 12

Section IV. Site Development, Architectural & Landscape Design Guidelines.

These Site Development, Architectural and Landscape Design Guidelines are intended to guide the developer, homebuilder, and homeowner's association through the preliminary and continuing design process of development of the Roseview property. These guidelines serve to point the developer, homebuilder, and homeowner's association to the basic requirements for development and establishes the platform for the project's character and theme. All design for Roseview is subject to review and approval as to content, quality, theme, and adherence to these standards by the Community Development Director and the Surprise City Council at the time of Preliminary Plat or Final Plat.

The purpose is to achieve diversity within new residential developments relative to subdivision layout, and single-family architecture. These guidelines set objectives for the developer or home builder to meet and are not intended to restrict or impede creativity and imagination.

A. SITE DEVELOPMENT

1. Grading & Drainage. Any aesthetic landscape berming of individual lots shall not direct drainage onto adjacent lots. Grade transitions shall be even and smooth. Residential runoff shall be directed to open space retention areas which will serve as the major drainage and retention area for the community. Drainage swales shall be designed to minimize runoff velocities in order to protect sites from erosion. Grading shall be done to minimize erosion, on, or off-site. No slopes shall be steeper than 4:1, pursuant to the standards of the City of Surprise unless approved by a soils engineer and accepted by the City Engineer. All excavation and fill areas shall be sufficiently compacted to prevent erosion problems. All finished slopes shall be stabilized and planted.

2. Parking Requirements. Driveways for all single-family residential units shall provide sufficient space for a minimum of two off-street parking spaces in addition to garage spaces. Residential parking is be prohibited on arterial and collector streets on either side or both sides. Parking of boats, campers, trailers, etc., is not permitted within public view.

3. Utility Structure Placement. All exterior on-site utilities including sewer, gas, and water lines, and electrical, telephone, cable television and communications wires, shall be installed and maintained

B. ARCHITECTURE

1. General Style. All residential structures in a neighborhood shall be of materials, colors, and styles that blend with or complement each other. Architectural Styles may vary from neighborhood to neighborhood but shall be compatible throughout the project. Non-residential structures within a neighborhood shall also be of materials, colors, and styles that blend with or complement each other, as determined by the governing homeowner's association. Homebuilders shall try to de-emphasize garage fronts as the most prominent architectural feature of the dwelling-front by incorporating, front window pop-outs, covered entries or front porches, L-shape floor plans, etc., into their product mix.

2. Building Orientation. Buildings shall be orientated as much as possible to take advantage of solar access. Minimize east and west exposures to maximize energy efficiency. Residential units shall mix left and right elevations and use variable setbacks. Lotting is oriented toward the street with the emphasis on creating activity areas for neighbors to meet and to interact. No lot is to front onto a collector street. Homebuilders shall upgrade rear or side elevations along arterial or collector streets and open space areas. The same house plan may be placed on adjacent lots or directly across the street from one another only if the house elevation contrasts from one lot to the next to create street front variety. Home builders shall emphasize distinctive architectural details in the front elevations (e.g., covered front entries and/or covered front porches, door and window details, roof overhangs, parapet walls with cap features, etc.).

3. Building Materials. Finished building materials must be applied to all exterior sides of buildings and structures. Each material will be used in an appropriate manner with colors and textures compatible with the natural surroundings. Permitted exterior finished materials include plaster and masonry, slump, split, or textured decorative block, and brick. Wood or aluminum siding are not permitted materials. Wood and adobe are permitted only as exterior accent materials.

4. Roofs. Home builders shall provide elevations which have altering ridge lines and roof lines. Acceptable roof covering materials shall be concrete tile, or clay tile. Roof tiles, where feasible, should vary in shade and color. Roof parapets must be finished with compatible material and color to the building's skin

and other similar structures, are encouraged and should flow out of the building form. These features shall complement the main roof. All vent pipe stacks, gutters, flues, and any other equipment protruding above the plane of the roof and visible from neighboring properties must be painted and/or screened to match the roof.

5. Colors. A minimum of six (6) house colors shall be provided for review by the Community Development Director at the time of Preliminary Plat. The predominant colors will be pastel or natural color tones. Trim colors shall not dominate the exterior appearance and shall be of compatible color as the major color. A minimum of three (3) roof colors also shall be provided for review by the Community Development Director at the time of Preliminary Plat. Roof colors shall not produce glare, such as being white, light colored aluminum, or reflective surface.

6. Accessory Buildings. Accessory buildings are allowed pursuant to the requirements and restrictions of the PAD, and as determined by the governing homeowner's association. Such buildings shall be painted a color to match or complement the main structure.

7. Walls and Fences. All wall details and placement to be approved by the Community Development Director at the time of Final Plat. Acceptable fence materials shall include, but not be limited to, masonry, rails or pickets, stone, brick, or metal. Texture, color, and form of walls adjacent to buildings shall harmonize with the building's design. Long, continuous lengths of screen wall at the same height will not be accepted. Use of decorative materials, variations of height and form, and staggered setbacks are encouraged to break the visual impact of long continuous walls. Perimeter walls should respect the right-of-way line but do not need to follow the alignment exactly. Walls and fences, under normal conditions, shall be a maximum of six feet, as measured from an adjacent grade along rear and side of lot lines and shall conform to City zoning ordinances and visibility triangles. When walls are located adjacent to a road for decorative or screening purposes, they shall be a maximum of three feet in height, conforming to City zoning ordinances and visibility triangles per the City of Surprise Code. Chain link fencing is not permitted as a fencing material for Roseview. (See the Zoning Ordinance for further restrictions.) Open fencing , such as decorative block and wrought iron, may be provided adjacent to open spaces.

The perimeter theme wall shall be of masonry construction. (See Figure 13 -- Conceptual Entrance Monumentation.) Pilaster columns shall be of split face (or other textured masonry) integral color or accent painted color. The fence will be of varied heights at the pilasters. The entire perimeter wall will be consistent with each phase and shall be installed by the developer.

8. Hardscape. Hardscape elements should be used in coordination with the architecture and landscape to provide a link between the street edge and individual developments. Hardscaping can improve pedestrian safety, movement and visual enjoyment of public areas. Utility lines should not be installed under such special materials if at all possible. At the developer's option, non-slip paving materials including integrated color cement, brick, native stone, pre-cast interlocking pavers, cobbles, bomanite, or any combinations of the above may be used -- as generally depicted on Figure 13 -- Conceptual Entrance Monumentation (subject to approval by the Community Development Director. Painted paving surfaces other than those for traffic control and marking of parking areas within parking areas are prohibited.

C. LANDSCAPE

1. Plant Materials. All landscaping to be approved by the Community Development Director. All plant material should be drought resistant and selected for compatibility with adjacent landscape material within their particular community setting or neighborhood. Landscape placed on public rights-of-way must conform to the most current *Low Water Using Plant List* (a copy of the August 1997 *List* can be found in the back of this Volume) for the Phoenix Active Management Area available from the Arizona Department of Water Resources. Plant materials shall not exceed 30-inches in height within the sight visibility triangles. Each subdivision shall develop similar plant lists to maintain cohesiveness throughout the PAD.

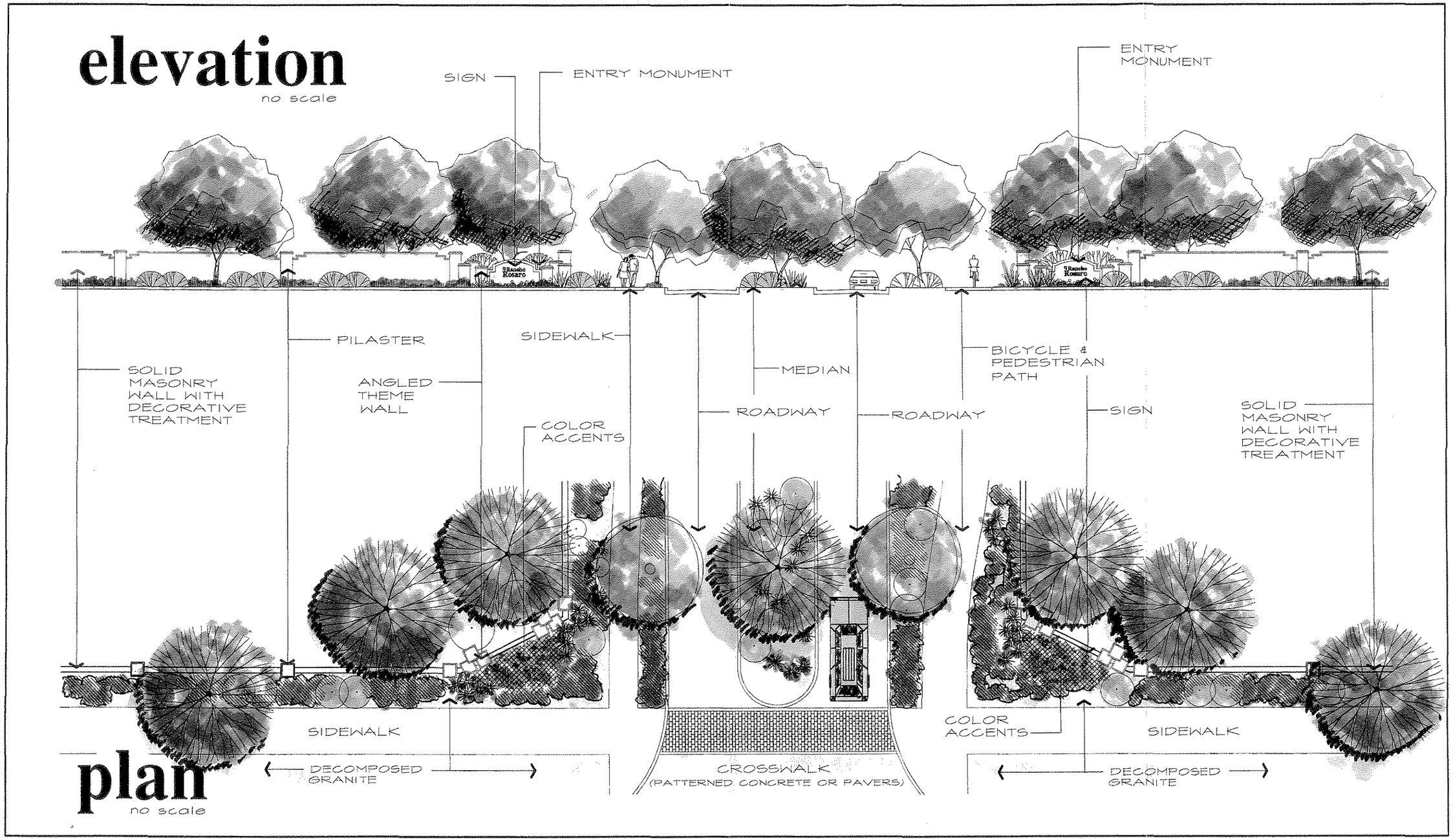
The minimum plant sizes are as follows:

Trees	15 gallon
Shrubs	5 gallon
Accents	1 gallon
Groundcovers	1 gallon

Drip irrigation systems are required, except for turf areas. All plant material shall be provided with fully automated systems. Plants should be selected to fit naturally into their space to avoid the need for excessive trimming and to allow normal growth. Backflow prevention devices shall be fully screened. Exposed earth is not permitted except in planting beds due to erosion and dust concerns.

The following landscape standards shall apply to the streetscaped pedestrian trails.

2. Streetscape. Consistent use of plant material, building materials for screen walls and sidewalks, street lighting, signage and other street furniture as required. Streetscape landscaping shall accentuate major entrances and define visual corridors. (See Figure 13 - Conceptual Entrance Monumentation).



ROSEVIEW PLANNED AREA DEVELOPMENT

CONCEPTUAL ENTRANCE MONUMENTATION

DMJM

FIGURE 13

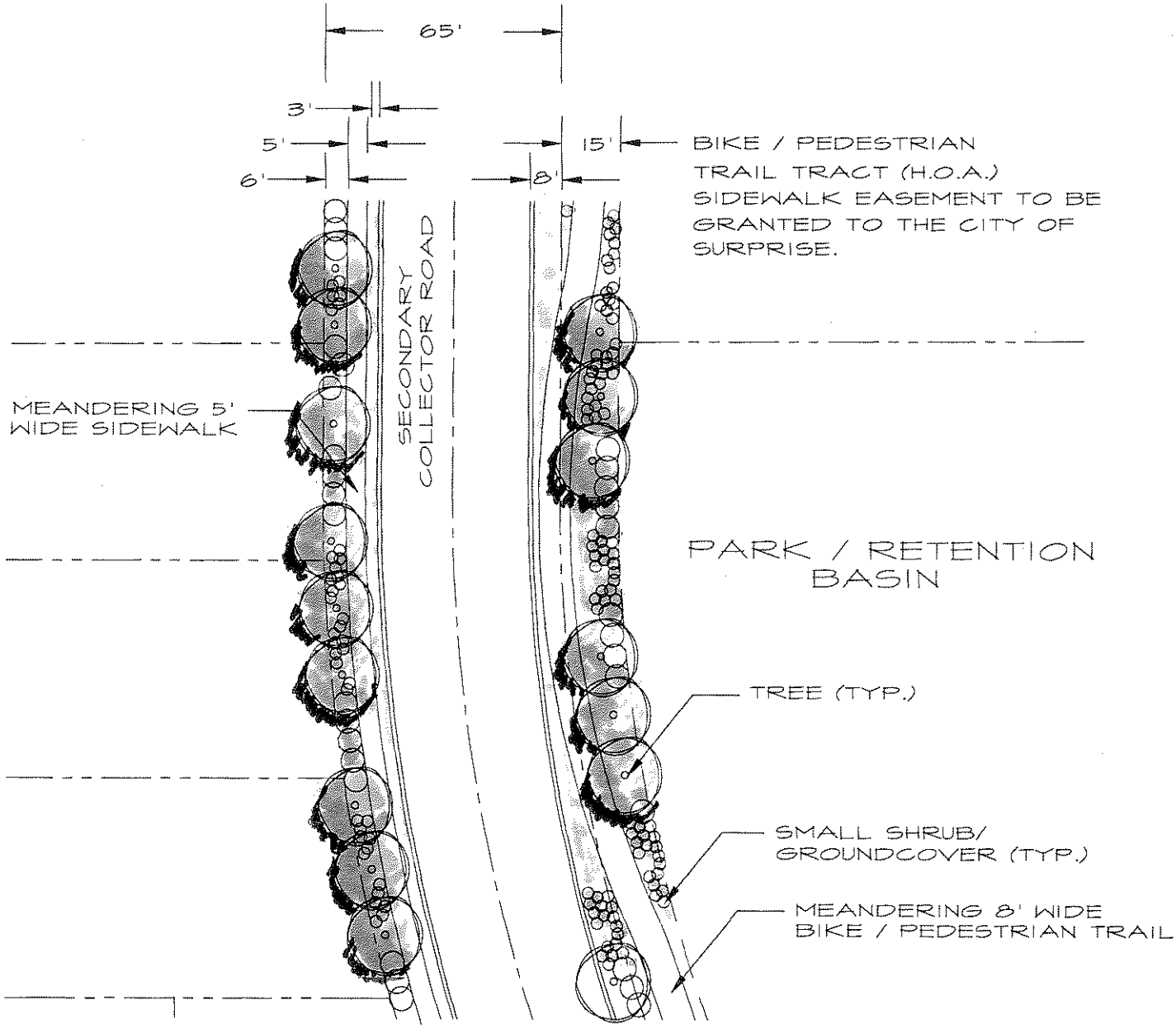
3. Open Space and Pedestrian Trails. Neighborhood interaction throughout is the primary goal for the design of the open space areas and pedestrian circulation system. The City of Surprise Comprehensive Development Guide provides that the local neighborhood trail system be developed to provide a secondary linkage between existing parks and regional parkways. The open space and pedestrian trails will extend throughout the project connecting open space areas with neighborhoods (see Figure 11). Pedestrian trails provide users the ability to circulate between neighborhoods, open space areas, and local schools. The pedestrian trail shall be a meandering eight-foot wide concrete surface to allow both pedestrian and bicycle traffic. Rest stops with canopy trees will provide additional interest and will be situated for security and ease of access adjacent to public streets. Light standards will be placed along the pedestrian trail to provide night time security. Developers shall design and improve retention areas to be useable and accessible for certain recreational purposes, such as soccer, volleyball, or tot lots, etc., as well as for specific site and architectural amenities such as ramadas, benches, par courses, etc. (See Section III D. Open Space and Trails).

4. Perimeter Arterial Streets. Subject to approval by the City, the landscaping along Dysart Road, Waddell Road and Greenway Road shall be xeriscape landscape. Such streets shall have native canopy trees in a regular alignment with desert planting below. Plant material will be selected from the Department of Water Resources official low water plant list for material placed within the public right-of-way. Plant material adjacent to these frontages will be selected for their compatibility and flowering schedule. Boulders and berms may also be used to create interest in the ground plane.

5. Collector. The landscaping along the collector street and trail system shall be accented with native canopy trees with desert planting below. (See Figures 14 -- Bike and Pedestrian Trail & 15 -- Modified Collector Cross-Section).

6. Neighborhood Street. The landscaping along neighborhood streets should reflect the landscaping of the arterial and collector roadways to provide cohesiveness throughout the project.

7. Major Entries. A formal planting at all major points of entry is intended to create a visual sense of arrival. 48-inch box (minimum) trees will be utilized at the project entries.



conceptual bike & pedestrian trail

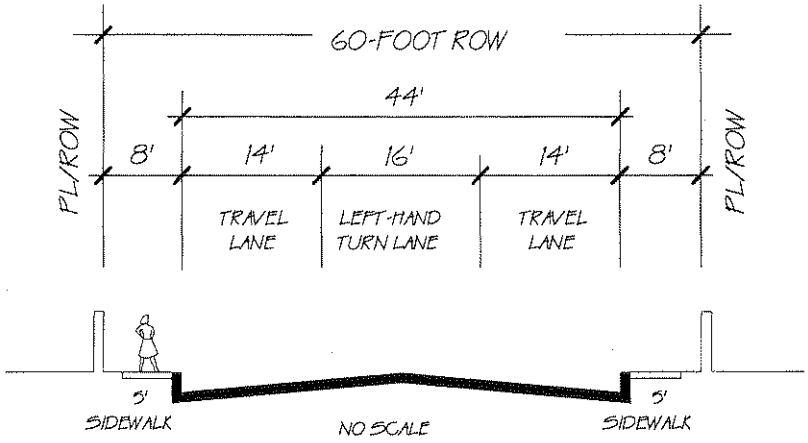
DMJM

Daniel, Mann, Johnson, & Mendenhall
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

FIGURE 14

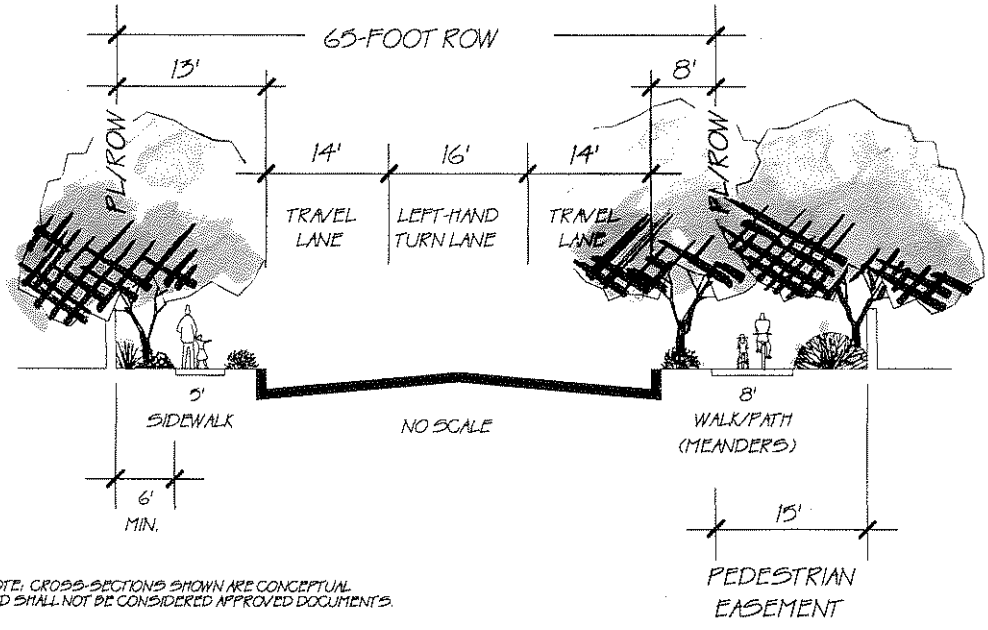
CITY STANDARD PRIMARY COLLECTOR

(PER COMPREHENSIVE DEVELOPMENT GUIDE)



MODIFIED PRIMARY COLLECTOR

(PROPOSED COLLECTOR ROAD W/ PED. EASEMENT)



NOTE: CROSS-SECTIONS SHOWN ARE CONCEPTUAL AND SHALL NOT BE CONSIDERED APPROVED DOCUMENTS.

modified collector cross-section

DMJM

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300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

FIGURE 15

Section V. Development Agreement

Note: Development Agreement to be inserted into Final PAD package prior to approval.

(currently under review by Paul Cragen, City of Surprise)

Low Water Using Plant Plist

Phoenix Active Management Area, Arizona Department of Water Resources

August, 1997

PERENNIAL WILDFLOWERS (continued)

Botanical Name Common Name	*Botanical Name* Common Name	*Botanical Name* Common Name
Erigeron divergens Spreading Fleabane	*Lotus rigidus* Desert Rock Pea	*Psilostrophe tagetina* Paperflower
Eupatorium greggii Eupatorium	*Machaeranthera gracilis* Yellow Aster	*Ratibida columnaris* Mexican Hat, Coneflower
Evolvulus arizonicus Arizona Blue Eyes	*Machaeranthera tortifolia* Mohave Aster	*Romneya coulteri* Matilija Poppy
Gaura lindheimeri Desert Orchid	*Melampodium leucanthum* Blackfoot Daisy	*Senna covesii (Cassia covesii)* Desert Senna
Hesperocallis undulata Ajo Lily	*Mirabilis multiflora* Desert Four O'Clock	*Sphaeralcea* spp. Globe-mallow
Hibiscus coulteri Desert Rose Mallow	*Oenothera caespitosa* Tufted Evening Primrose	*Stachys coccinea* Red Mint, Betony
Hymenoxys acaulis Angelita Daisy	*Penstemon* spp. Penstemon	*Tagetes* spp. Marigold
Ipomopsis longiflora Pale Blue Trumpets	*Portulacaria afra* Elephants Food	*Verbena gooddingii* Goodding Verbena
Justicia sonorae Sonoran Justicia	*Proboscidea altheaefolia* Devil's Claw	*Zephryanthes* spp. Rain Lily
Linum lewisii Blue Flax	*Psilostrophe cooperi* Paperflower	*Zinnia acerosa* Desert Zinnia
		Zinnia grandiflora Rocky Mountain Zinnia

GRASSES

Botanical Name Common Name	*Botanical Name* Common Name	*Botanical Name* Common Name
Aristida purpurea Purple Three-awn	*Bouteloua gracilis* Blue Grama	*Muhlenbergia capillaris* Gulf Muhly
Bouteloua aristidoides Six-weeks Grama	*Erioneuron pulchellum* Fluffgrass	*Muhlenbergia dumosa* Giant Muhly
Bouteloua curtipendula Side Oats Grama	*Hillaria rigida* Big Galleta	*Muhlenbergia emersleyi* Bull Grass

Phoenix AMA• 500 North Third Street, Phoenix, AZ 85004• Tel. (602)417-2465• Fax (606)417-2422• Homepage: www.adwr.state.az.us

SHRUBS		
Genus	**Species**	**Common Name**
Senna(Cassia)	*artemisioides*	Feathery Cassia
	biflora	Twin Flower Cassia
	goldmannii	
	nemophila	Desert Cassia
	phyllodinea	Silver-leaf Cassia
	wislizenii	Shrubby Cassia
Vauquelinia	*corymbosa*	Narrow-leaf Rosewood
	californica	Arizona Rosewood

GROUNDCOVERS		
Genus	**Species**	**Common Name**
Acacia	*redolens*	Trailing Acacia (cv. 'Desert Carpet')
Atriplex	*semibaccata*	Australian Saltbush
Baccharis	*cv. 'Centennial'*	Centennial Baccharis
Dalea	*greggii*	Trailing Dalea
Gazania	*rigens*	Trailing Gazania

SUCCULENTS/ACCENTS		
Genus	**Species**	**Common Name**
Agave	*americana*	Century Plant
	colorata	Mescal Ceniza
	parryi	Parry's Agave
	victoriae - reginae	Royal Agave
	vilmoriniana	Octopus Agave
	murpheyi	Murphy's Agave

SUCCULENTS/ACCENTS

Genus	Species	Common Name
Aizoaceae - Ice Plant Family		
Carpobrotus spp.	*chilensis*	Ice Plant
	edule	Hottentot Fig
Malephora	*crocea*	Ice Plant
Cephalophyllum	*cv. 'Red Spike'*	Red Spike Ice Plant
Drosanthemum	*speciosum*	Dewflower
Mesembryanthemum	*crystallinum*	Common Ice Plant
Aloe	*barbadensis (vera)*	Medicinal Aloe
	ferox	Tree Aloe
	saponaria	Tiger Aloe
	marlothii	
	striata	Coral Aloe
Cactaceae - Cactus Family		
	Carnegiea gigantea	Saguaro
	Cereus hildmannianus	Hildmann's Cereus
	Echinocactus grusonii	Golden Barrel
	Echinocereus engelmannii	Engelmann's Hedgehog
	Ferocactus acanthodes	Compass Barrel
	Ferocactus wislizenii	Fishook Barrel
	Lophocereus schottii	Senita
	Opuntia acanthocarpa	Buckhorn Cholla
	Opuntia basilaris	Beavertail Prickly Pear
	Opuntia bigelovii	Teddy Bear Cholla
	Opuntia engelmannii	Desert Prickly Pear
	Opuntia ficus-indica	Indian Fig
	Opuntia violacea	Purple Prickly Pear
	Pachycereus marginatus	Mexican Organ Pipe
	Stenocereus thurberi	Arizona Organ Pipe
	Trichocereus candicans	Argentine Trichocereus
Dasylirion	*acrotriche*	Green Desert Spoon
	wheeleri	Sotol, Desert Spoon
Fouquieria	*macdougallii*	Chunari
	splendens	Ocotillo
Hesperaloe	*campanula*	Bell Flower
	funifera	Coahuilan Hesperaloe
	parviflora	Red Hesperaloe
	nocturna	

SUCCULENTS/ACCENTS		
Genus	**Species**	**Common Name**
Nolina	*matapensis*	Tree Bear Grass
	microcarpa	Bear Grass
Yucca	*aloifolia*	Spanish Bayonet
	baccata	Banana Yucca
	brevifolia	Joshua Tree
	elata	Soaptree Yucca
	rigida	Blue Yucca
	rostrata	Beaked Yucca

ANNUAL WILDFLOWERS		
Genus	**Species**	**Common Name**
Cosmos	*bipinnatus*	
	parviflorus	
	sulphureus	Yellow Cosmos
Dimorphotheca	*sinnuata*	African Daisy
Helipterum	*roseum*	Pink Everlasting
Linaria	*texana*	Toadflax
	pinnifolia	Toadflax
	maroccana	Toadflax
Mentzelia	*involucrata*	Morning Stars
	lindleyi	Blazing Stars
Phacelia	*campanularia*	California Bluebell
	tanacetifolia	Scorpion Weed
Plantago	*insularis*	Indian Wheat
Ursinia	*calenduliflora*	
	chrysanthemoides	
	speciosa	

MOUNTAIN VISTA RANCH

Recommended Landscape Palette

Botanical Name	*Common Name*	*Size*
Trees		
ACACIA salicina	Weeping Acacia	15 Gal.
ACACIA smallii	Sweet Acacia	15 Gal./24" Box
JACARANDA mimosifolia	Jacaranda (Multi-Trunk)	24" Box
OLEA europaea 'Swan Hill'	Swan Hill Olive	30" Box
PROSOPIS chilensis	Chilean Mesquite - Multi	24" Box
PHOENIX dactylifera	Date Palm	12'/15'
PINUS eldarica	Mondel Pine	24" Box
SCHINUS terebinthifolius	Brazilian Pepper Tree	15 Gal.
ULMUS parvifolia 'Sempervirens'	Evergreen Elm	24" Box
WASHINGTONIA robusta	Mexican Fan Palm	8'/10'/12'
Shrubs / Groundcovers		
BOUGAINVILLEA sp. 'Brasil.'	Purple Bougainvillea Vine	5 Gal.
CARISSA grandiflora 'G.C.'	Green Carpet Natal Plum	1 Gal.
CHAMAEROPS humilis	Mediterranean Fan Palm	15 Gal.
CONVOLVULUS cneorum	Bush Morning Glory	1 Gal.
LANTANA camara	Dwarf Yellow Lantana	1 Gal.
LEUCOPHYLLUM frutescens	Green Cloud Texas Sage	5 Gal.
MUHLENBERGIA rigens	Deer Grass	5 Gal.
MYOPORUM parvifolium	Myoporum	1 Gal.
NERIUM oleander 'Petite Pink'	Dwarf Pink Oleander	5 Gal.
XYLOSMA congestum	Dwarf Xylosma	5 Gal.
YUCCA pendula	Pendulous Yucca	5 Gal.
CYNODON dactylon 'Midiron'	Midiron Bermudagrass	Sod or Sprig
DECOMPOSED GRANITE	Type: Coral	3/8" minus

Fax Note 7671	Date 10/2/97 # of pages ▶
JEFF S.	From R. TORIS
Co./Dept.	Co.
Phone #	Phone # 583-1090
Fax # 285 1984	Fax # 583-6108

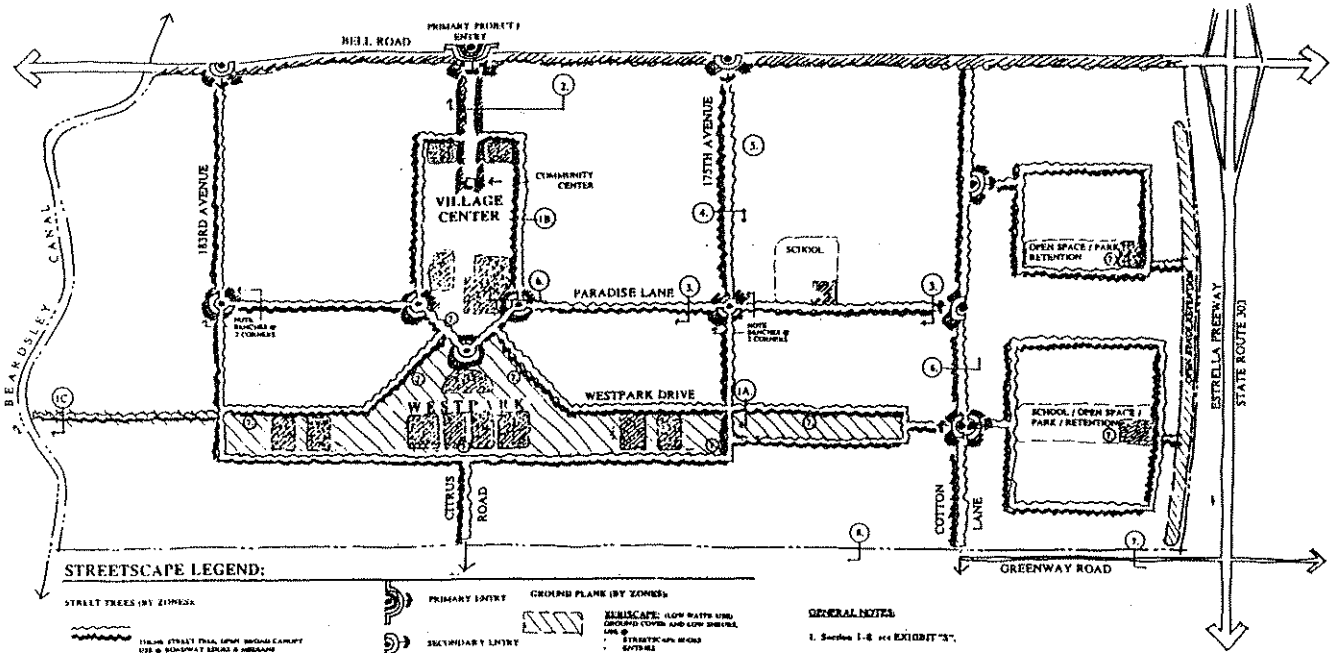
THE VILLAGES AT SURPRISE

Surprise Village Company

LANDSCAPE CONCEPT

SOUTH

EXHIBIT "H"
(ONE OF THREE)



STREETSCAPE LEGEND:

STREET TREES (BY ZONES):

PRIMARY ENTRY

SECONDARY ENTRY

"ROUNDABOUT" / (TRAFFIC ROTARY)

GROUND PLANE (BY ZONES):

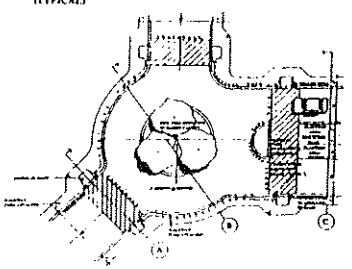
XERISCAPE: (LOW WATER USE) GROUND COVER AND LOW SHRUBS, USE @
- STREETSCAPE MOBS
- ENTRIES
- OPEN SPACE

TURF / GRASS: RECREATION-INTENSIVE LANDSCAPE ADJACENT TO PICNIC AREAS USE @
- DECORATIVE TURF & GAME AREAS
- DIMINISH TURF & GAME AREAS

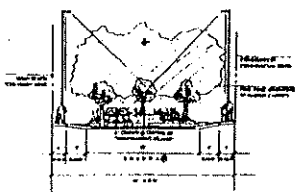
GENERAL NOTES:

1. Section 1-8 see EXHIBIT "G".

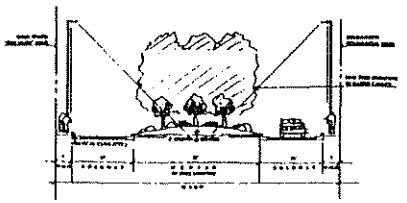
(6) ROTARY - PLAN & SECTIONS (TYPICAL)



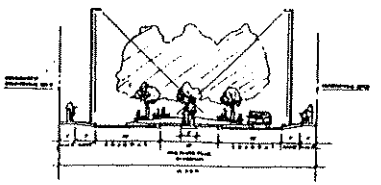
A. SECTION / ELEVATION: VIEW TO "ROUNDABOUT" FROM COLLECTOR STREET W/O MEDIAN (80' PAVING WIDTH FROM BACK OF CURB TO BACK OF CURB)



B. SECTION @ "ROUNDABOUT"

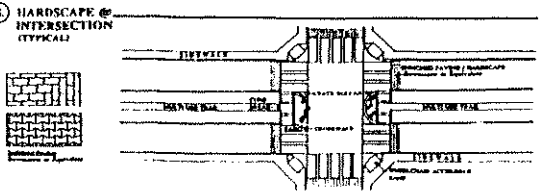


C. SECTION / ELEVATION: VIEW TO "ROUNDABOUT" FROM COLLECTOR STREET W/ MEDIAN (50' MEDIAN WITH TWO ADJACENT TRAVEL LANES @ 16' EACH)



(7) STREET FURNISHINGS (TYPICAL GROUPING @ CHEVRON EDGE AND WESTPARK)

(8) HARDSCAPE @ INTERSECTION (TYPICAL)



REVISIONS		
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AWS & A

THE PLANNING CENTER

THE VILLAGES
AT SURPRISE

Surprise Village Company

RECOMMENDED
PLANT PALETTE
SOUTH

EXHIBIT "H"
(TWO OF THREE)

Botanical Name	*Common Name*
TREES	
Acacia aneura	Mulga
Acacia salicina	Willow Acacia
Acacia smallii	Sweet Acacia
Cercidium floridum	Blue Palo Verde
Cercidium praecox	Palo Brea
Chilopsis linearis	Desert Willow
Dahlbergia sissoo	Sissoo tree
Fraxinus velutina 'Rio Grande'	Fan-Tex Ash
Jacaranda mimosifolia	Jacaranda
Phoenix dactylifera	Date Palm
Pinus halepensis	Aleppo Pine
Pithecellobium flexicaule	Texas Ebony
Prosopis chilensis	Chilean Mesquite
Prosopis glandulosa	Honey Mesquite
Prosopis juliflora	Native Mesquite
Ulmus parvifolia	Evergreen Elm
SHRUBS	
Caesalpinia mexicana	Mexican Yellow Bird of Paradise
Caesalpinia pulcherrima	Mexican Red Bird of Paradise
Calliandra californica	Baja Fairyduster
Cassia phyllodenia	Silverleaf Cassia
Convolvulus cneorum	Silverbush Morning Glory
Cordia boissieri	Texas Olive
Cordia parvifolia	Littleleaf Cordia
Dalea frutescens	Black Dalea
Dalea pulchra	Pea Bush
Dodonea viscosa	Green Hopbush
Justicia californica	Chuparosa
Justicia spicigera	Mexican Honeysuckle
Leucophyllum frutescens 'Green Cloud'	Green Cloud Texas Sage
Leucophyllum laevigatum	Chihuahuan Sage
Myrtus communis 'Boetica'	Twisted Desert Myrtle
Nerium oleander 'Petite Pink'	Dwarf Oleander
Ruellia peninsularis	Baja Ruellia
Simmondsia chinensis	Jojoba
Tecoma stans 'stans'	Arizona Yellowbells

Recommended Plant Palette (continued)

Botanical Name	*Common Name*
GROUNDCOVER / VINES / PERENNIALS	
Bougainvillea *sp.*' Barbara Karst'	Barbara Karst Bougainvillea
Lantana camara	Trailing yellow lantana
Lantana montevidensis	Trailing purple lantana
Verbena pulchella	Rock Verbena
Verbena rigida	Vervain
ACCENTS	
Agave vilmoriniana	Octopus Agave
Agave weberi	Smooth Edged Agave
Dasylirion wheeleri	Desert Spoon
Fouquieria splendens	Ocotillo
Hesperaloe parviflora	Red Yucca
Nolina microcarpa	Bear Grass
Opuntia basilaris	Beavertail Prickly Pear

EXHIBIT "H"
(THREE OF THREE)

BOTANICAL NAME	COMMON NAME

Shrubs

Justicia spicigera	Mexican Honeysuckle
Leucophyllum species	Sage
Myrtus communis 'Boetica'	Twisted Desert Myrtle
Ruellia species	Ruellia
Salvia species	Salvia
Sophora secundiflora	Texas Mountain Laurel
Tecoma stans	Sonoran Yellow Bells

Groundcovers/Vines/Perennials

Asparagus meyerii	Foxtail Fern
Baileya multiradiata	Desert Marigold
Bougainvillea 'Barbara Karst'	Bougainvillea
Dalea greggii	Smoke Bush
Encelia farinosa	Brittle Bush
Lantana species	Trailing Lantana
Melampodium leucanthum	Blackfoot Daisy
Oenothera species	Primrose
Penstemon species	Penstemon
Rosa banksia	Lady Bank's Rose
Verbena peruvianus	Verbena

Accents

Agave species	Agave
Aloe species	Aloe
Chamerops humilis	Mediterranean Fan Palm
Cycas revoluta	Sago Palm
Dasylirion wheeleri	Desert Spoon
Fouquieria splendens	Ocotillo
Hesperaloe parviflora	Red Yucca
Muhlenbergia	Dear Grass
Nolina microcarpa	Bear Grass
Zephranthus candida	Rain Lily

WEST POINT TOWNE CENTER

A PLANNED AREA DEVELOPMENT
CITY OF SURPRISE

RECOMMENDED LANDSCAPE PALETTE

EXHIBIT C

RESOLUTION NO. 87-22

A RESOLUTION OF THE MAYOR AND COMMON COUNCIL OF THE TOWN OF SURPRISE, ARIZONA APPROVING AND ADOPTING THE TOWN OF SURPRISE COMPREHENSIVE DEVELOPMENT GUIDE, FEBRUARY 1987

WHEREAS, the Town of Surprise heretofore approved the preparation of a Comprehensive Development Guide for the Town, making provisions for land development, open space, traffic circulation, public facilities planning and redevelopment of existing areas within the Town, and

WHEREAS, the proposed plan was presented to the Surprise Planning and Zoning Commission on December 23, 1986 and was approved by the Commission, with a recommendation that it be adopted by the Town Council after being amended in accordance with the recommendation of the Commission, and

WHEREAS, the Comprehensive Development Guide dated February 1987 incorporates the recommended amendments and interested persons have been given opportunity to comment on the proposed plan.

NOW, THEREFORE, BE IT RESOLVED by the Mayor and Common Council of the Town of Surprise approving and adopting the Town of Surprise Comprehensive Development Guide dated February 1987 as the guide for development and redevelopment of the Town of Surprise.

PASSED AND ADOPTED By the Mayor and Common Council of the Town of Surprise, Arizona this 14th day of May, 1987.

ATTEST:

TOWN CLERK

MAYOR

APPROVED AS TO FORM:

TOWN ATTORNEY

ACKNOWLEDGEMENTS

The preparation of the Surprise Comprehensive Development Guide was funded through donations from property owners and businesspeople under the leadership and direction of Marshall Greenberg and the Planning Committee of the Northwest Development Group and the Town of Surprise, Arizona.

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B.1 Community Background and History

The area now known as Surprise received its first residents in 1937. The two families that settled the Original Townsite consisted of eight people who operated one service station and occupied four small dwelling units. They utilized a gasoline-powered auxiliary power unit to produce electricity and collected water from a nearby well. The surrounding land was either vacant or under agricultural production with their nearest neighbors located over two miles away. The Town name originated from its founder, Flora Statler, who upon subdividing her land remarked that it would be a "Surprise" if it were to develop into a town.

By 1950 the area population had grown to nearly 300 residents with two service stations, two grocery stores and numerous substandard houses and cabins.

Surprise became an incorporated Town on 12 December 1960 and boasted a population of nearly 1,600 people located on a townsite of 640 acres as shown by Figure 2, Original Townsite. At the time of incorporation, only 169 acres of the townsite were developed.

The existing incorporated area was expanded for the first time on 14 November 1978, when a 10-foot strip of land encompassing roughly 26 miles of unincorporated land was annexed by the Town as shown by Figure 3, Study Area. The purpose of the strip annexation was to reserve land until future development occurs in the area, at which time the Town will annex the land into its incorporated area.

Today the Town of Surprise has a population approaching 4,500 residents and is located approximately eighteen miles northwest of the Phoenix Central Business District (CBD) on U.S. Highway 60, 70, and 89 and State Highway 93 (or Grand Avenue) as shown on Figure 4, Town Location, U.S. Highway 60 and 70 are major east-west routes, linking southeastern cities with Phoenix and Los Angeles. U.S. Highway 89 links Phoenix with communities in northern Arizona and Utah. State Highway 93 links Phoenix to Las Vegas and Reno, Nevada. Another transportation link traversing the Town of Surprise is a branch line of the Atchison, Topeka and Santa Fe Railroad (AT & SF), which crosses the Townsite north of and parallel to Grand Avenue, connecting Phoenix to Los Angeles and the main line AT & SF located in Ashfork, Arizona.

Situated at an elevation of 1,130 feet above sea level, the terrain in and around the Town of Surprise is nearly flat, but exhibits a gradual slope from the northwest to the southeast. The Town is located within the Salt River Valley and is framed by the White Tank Mountains, located ten miles to the west. The Sierra Estrella Mountains are located approximately 20 miles to the south and the Hieroglyphic Mountains lie ten miles to the north.

B. INVENTORY AND ANALYSIS OF EXISTING CONDITIONS

The creation of the Comprehensive Development Guide for the Town of Surprise is based on a thorough understanding of the existing physical, social and economic conditions within the Town and its Planning Area. In order to provide a greater understanding of these conditions, they have been broken down into ten component elements and are presented in this chapter. Each component element is presented individually and begins with an introduction describing its content. All information presented was collected and analyzed by the Planning Team except the population projections (Section B.8), which were provided by the Maricopa Association of Governments (MAG). These have been reviewed by the Planning Team and are included to offer a thorough understanding of the anticipated growth for the Town of Surprise and its Planning Area within the next thirteen years.

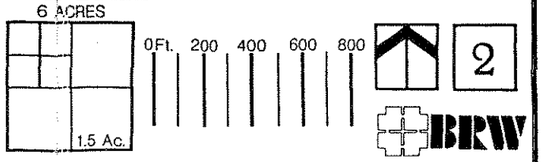
The Inventory and Analysis of Existing Conditions for the **Surprise Comprehensive Development Guide** is presented in the following ten elements.

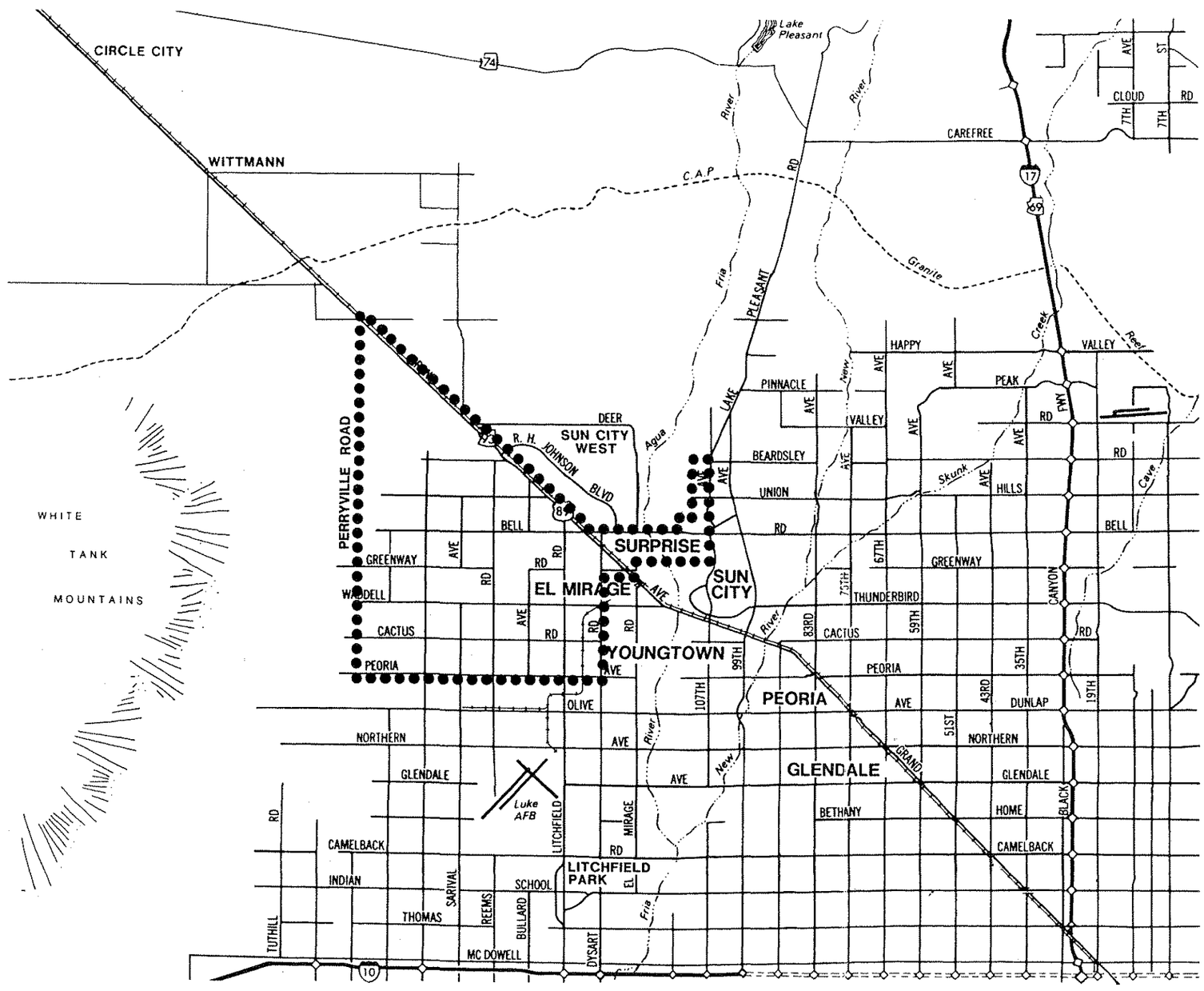
B.1 Community Background and History
B.2 Natural Resources
B.3 Land Use and Zoning
B.4 Land Ownership
B.5 Housing
B.6 Public Facilities and Services
B.7 Circulation
B.8 Population
B.9 Municipal Fiscal Conditions
B.10 Issue Identification

ORIGINAL TOWNSITE

SURPRISE
Comprehensive Development Plan

6 ACRES





Location Map

Study Area Boundary

SURPRISE
Comprehensive Development Plan

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ORIGINAL TOWNSITE

SURPRISE
Comprehensive Development Plan

6 ACRES

1.5 Ac.

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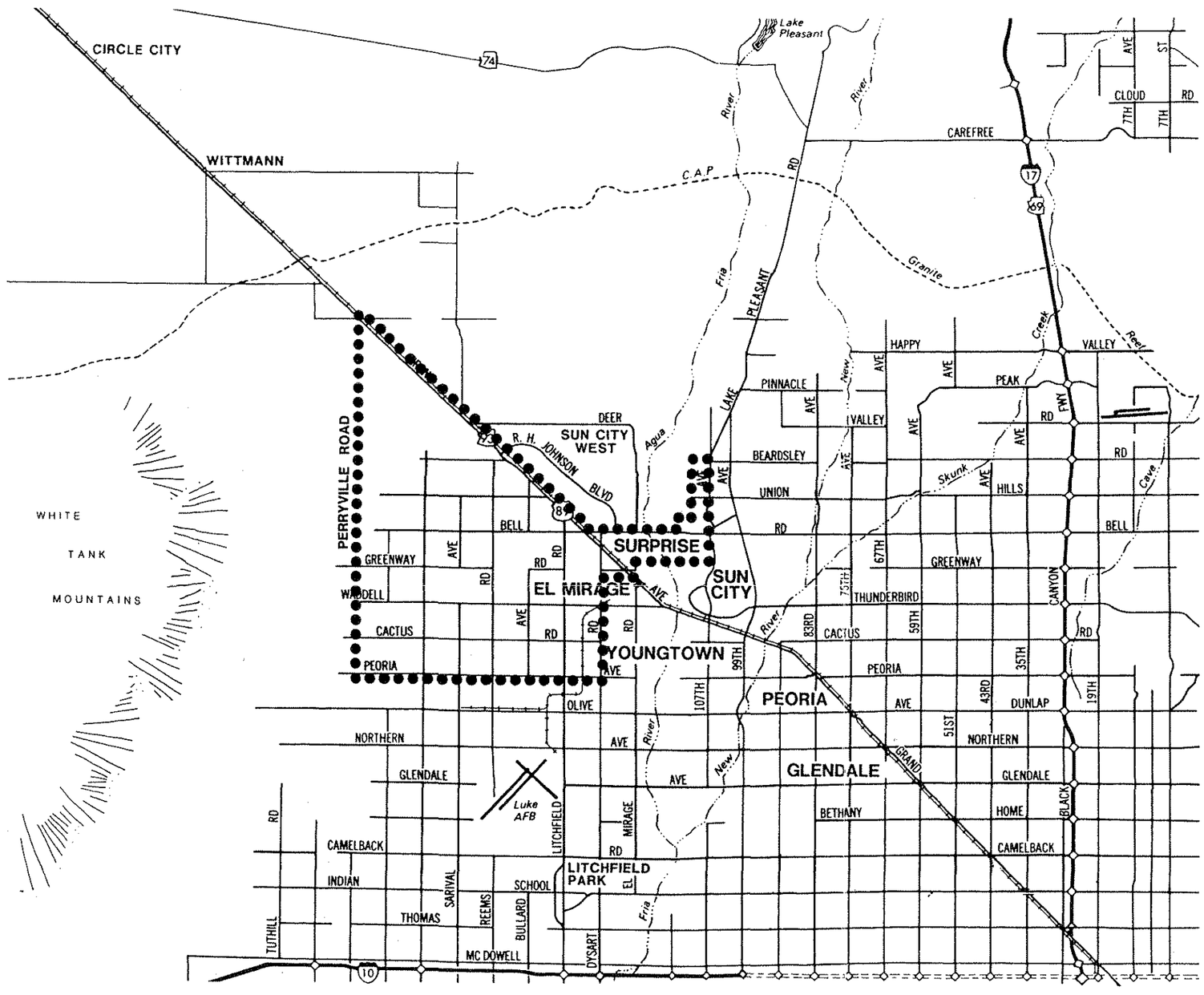

Location Map

Study Area Boundary

SURPRISE
Comprehensive Development Plan

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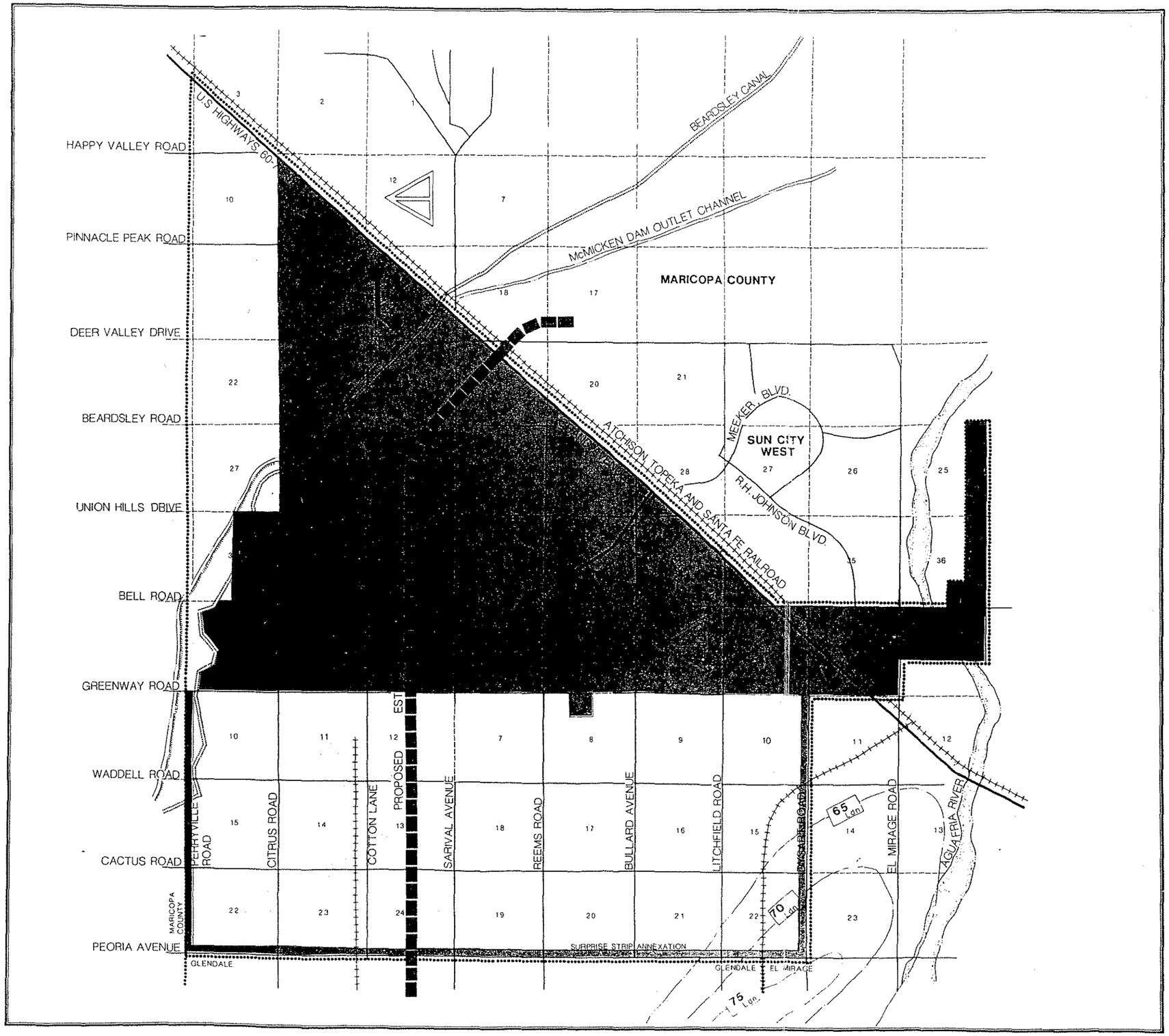

Study Area

Annexation Area

SURPRISE
Comprehensive Development Plan

640 ACRES

10 40 160

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3

BRW

B.2 Natural Resources

The Natural Resources section of the Inventory and Analysis of Existing Conditions provides a description of the key elements within the natural environment which will impact the future growth and development of Surprise. These elements are presented into the following seven sub-sections:

- Topography
- Soils
- Geology
- Hydrology and Drainage
- Vegetation
- Scenic Resources
- Noise Levels

The purpose of this identification and analysis is to formulate a basic understanding of the static and dynamic natural elements which have not only shaped growth and development in the past, but will continue to impact the Town and its Planning Area in the future.

B.2.1 Topography

The Town of Surprise is located within the Salt River Valley, exhibiting very little topographical change in the range of 0-2 percent slope. A two percent slope indicates that for every 100 foot horizontal distance, the land rises or drops two feet. As stated earlier, the existing slope drains to the southeast. A slope of two percent allows virtually unrestricted development for agricultural, rural, or urban land uses. Sanitary sewage disposal can easily be accommodated under these conditions as long as the existing soils are suitable for leach fields or septic tanks and the density of the area remains at a relatively low level. In a referendum approved by Town residents in May 1986, the Town will be constructing a sanitary sewer system within the next three years and is now in the process of installing trunk sewer lines.

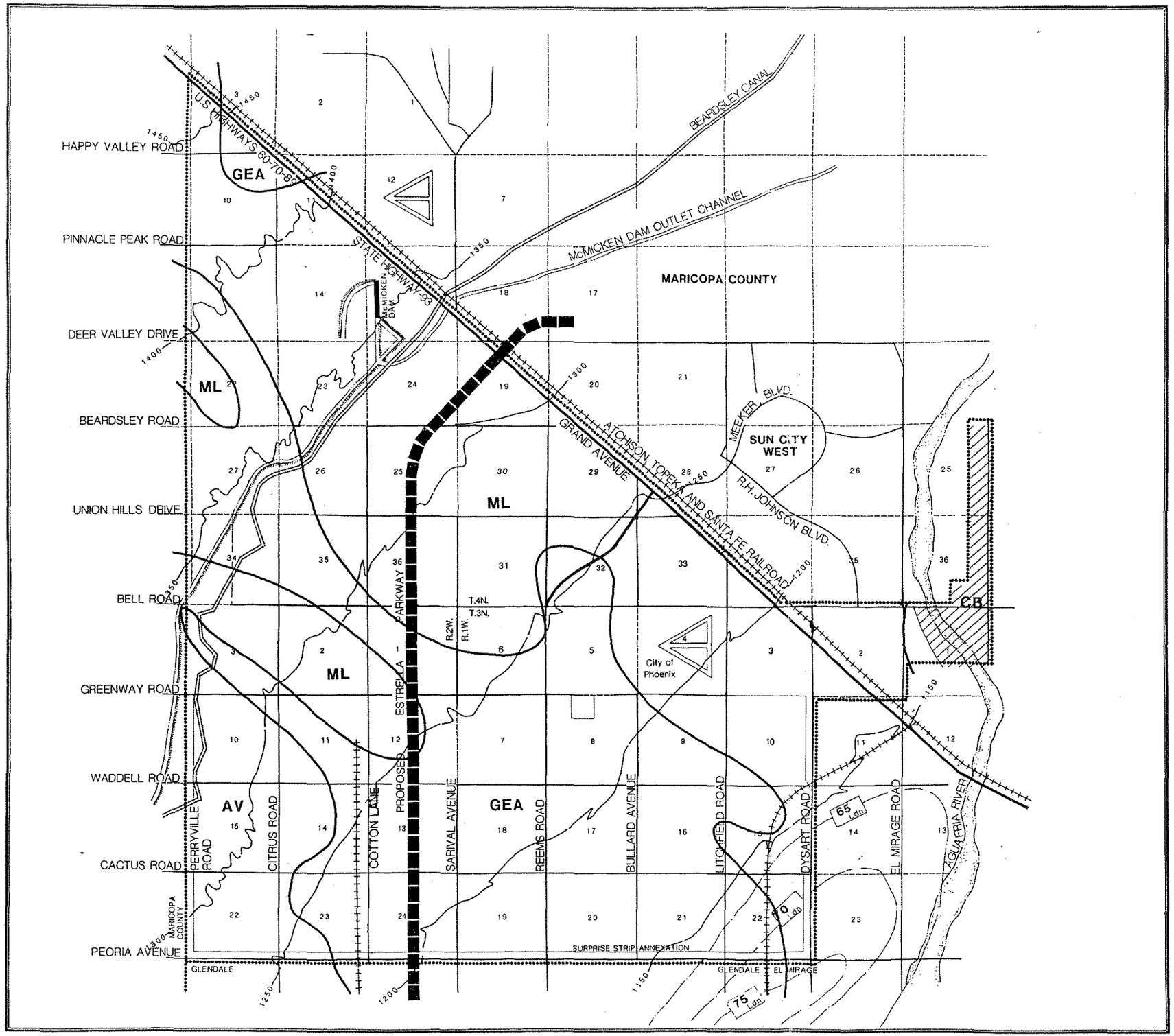
B.2.2 Soils

The Surprise Planning Area exhibits 23 different types of soil which are categorized as loams, sands, or clays and are listed below:

Symbol	Series	Texture
Aa	Agualt	Loam Sand
Aba	Antho	Sandy Loam Gravelly Sandy Loam
Bs	Brios	Sandy Loam Sand and Gravelly Sand

Symbol	Series	Texture
Cd	Carrizo	Gravelly Sandy Loam Very Gravelly Coarse Sand
Es	Estrella	Loam Clay Loam
GgA	Gilman	Loam Very Fine Sandy Loam
Gt	Glenbar	Clay Loam Silty Clay Loam
GxA	Gunsight	Gravelly Loam Very Gravelly Loam
LcA,Le	Laveen	Loam
Ma	Maripo	Sandy Loam Gravelly Sand
Mo,Mp,Mr	Mohall	Sandy Loam Gravelly Sand
PeA	Perryville	Gravelly Loam
RbA	Rillito	Gravelly Loam Gravelly Sandy Loam
Te,Tfa,TrB	Tremant	Gravelly Clay Loam Gravelly Loam
Tu	Tucson	Loam Clay Loam
Ve,Vf	Vecont	Clay
Vh	Vint	Loamy Fine Sand

The majority of soils found in the Surprise Planning Area were formed from old alluvium eroded from the White Tank Mountain Range as shown by Figure 5, Natural Resources. Although the soil types found in the Surprise Planning Area are generally very similar, each exhibits differing characteristics when utilized for development. As shown in Table 1, Soil Suitability for Development, the 17 soil series types have been listed with differing land uses to show the degree of limitation that exists for development of each soil series. The categories utilized are septic tanks, sewage lagoons, structures, and sanitary landfill. The range of limitations for these uses include good, fair and poor to denote soil suitability. The use of an indigenous soil for road fill has also been included



Natural Resources

50' Contour Intervals

100 Year Flood Plain (Within Study Area)

Soil Associations

GEA Gilman-Estrella-Avondale

CB Carrizo-Brios

ML Mohall-Laveen

AV Antho-Valencia

SURPRISE Comprehensive Development Plan

640 ACRES

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5

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TABLE 1
Soil Suitability For Development

Soil Type	Septic Tanks	Sewage Lagoons	Structures	Sanitary Landfill	Local Roads	Road Fill	Pond Reservoir Areas
Agualt	good	poor	good	good	fair	good	rapidly permeable
Antho	good	poor	good	poor	good	good	moderately rapidly permeable
Brios	poor	poor	poor	poor	poor	good	rapidly permeable
Carrizo	poor	poor	poor	poor	poor	good	very rapidly permeable
Coolidge	poor	poor	good	good	good	good	moderately permeable
Estrella	poor	good	fair	good	fair	fair	moderately slowly permeable
Gilman	good	fair	good	good	fair	fair	moderately permeable
Glenbar	poor	good	fair	fair	poor	poor	moderately slowly permeable
Gunsight	good	poor	good	good	good	good	moderately slowly permeable
Laveen	good	fair	good	good	fair	fair	moderately permeable
Maripo	good	poor	good	poor	good	good	moderately rapidly permeable
Mohall	poor	fair	fair	fair	poor	fair	moderately slowly permeable
Perryville	good	fair	good	good	fair	fair	moderately permeable
Rillito	good	fair	good	good	good	good	moderately permeable
Tremant	good	fair	good	good	fair	fair	slowly permeable
Tucson	poor	good	fair	good	poor	poor	slowly permeable
Vecont	poor	good	poor	poor	poor	poor	slowly permeable

Source: Soil Survey of Maricopa County, Arizona by U.S.D.A. Soil Conservation Service, 1977

using the same categories to indicate soil potential. The soil permeability, or its ability to transmit fluids or air, has also been identified, with the soils ability to be used as a lining for pond reservoir areas. The faster a soil transmits fluids, the more permeable or porous the soil is, making it unsuitable as an impoundment lining.

B.2.3 Geology

The Town of Surprise is located on top of an alluvial valley and connected to the Salt River Valley to the east. The alluvium is composed of three quaternary sedimentary deposits that are nearly 1,200 feet deep and contain significant deposits of gypsum and calcite. The Upper Alluvial unit is composed of relatively coarse grained unconsolidated materials and extends to a depth of 800 feet. The Middle Fine Grain Unit is composed of finer grained material that extends to a depth of 1,050 feet. The Lower Conglomerate Unit contains mostly consolidated, relatively coarse grained deposits. The characteristics of these strata create a very solid building foundation as well as holding and purifying the underground water aquifer.

Due in part to the characteristics of the sedimentary strata underlying Surprise, the region is geologically inactive with respect to faults. A seismic risk map places Maricopa County in Zone 2, which can receive moderate earthquake damage although no record currently exists. The closest linear earth fissures, which act as drains for overland water flow, have been identified in Section 25, Township 3 North, Range 2 West, which is located to the south of the Town Planning Area.

The impact of land subsidence varies throughout the Surprise Planning Area, but the majority of land has dropped from one to three feet in the last 30 years. The land located adjacent to the Beardsley Canal has been documented to have subsided less than one foot near the intersection of U.S. 60, but increases to nearly three feet as the canal parallels the White Tank Mountains. The effects of subsidence can create decreased groundwater storage capacity, change slope patterns, (affecting irrigation, flood control and drainage patterns) and cause damage to both surface and underground structures. In the future, as agricultural land is transformed to urban uses, the use of groundwater will generally be reduced, thereby diminishing the overall effects of subsidence.

B.2.4 Hydrology and Drainage

a) Existing Hydrologic Conditions

The Town of Surprise and the surrounding Planning Area are located in a relatively flat, alluvial fan as stated above. The proximity of the Agua Fria River watershed to the Planning Area places these lands in Zone B of the Flood Insurance Rate Map. Zone B identifies those areas that are between ween the limits of the 100-Year and 500-Year flood. A 100-Year or 500-Year flood is described as the level of flooding that has a one percent chance to occur in any given year. The Agua Fria Channel is labeled as Zone A4, which is in a zone of the 100-Year event where both base flood elevations and flood factors have been determined, as shown in Figure 4, Natural Resources. A manmade channel used to control drainage which is

located to the north and parallel to the A,T & SF Railroad right-of-way, has been included within Zone A. Similar to Zone B, this zone also lies within the 100-Year region, but the flood factors and hazards have not been determined.

Due to historical flooding of Luke Air Force Base, the U.S. Army Corps of Engineers constructed McMicken Dam in 1956. The earthern flood control structure later fell into disrepair and was breached in two places to allow drainage. In 1984, the Maricopa County Flood Control District revitalized the structure to make it serviceable. The land located to the north of the dam effectively functions as a retention basin for stormwater runoff from the White Tank Mountains.

The McMicken Dam follows the southern boundary of a region identified by the Flood Control District for an Area Drainage Master Study (A.D.M.S.). The A.D.M.S., when initiated, will conduct research of the area and then prepare preliminary plans for flood control. Another flooding and drainage study is currently underway for the area located south of McMicken Dam.

b) Storm Drainage

Nearly all of the original Townsite is located in the 100-Year/500-Year floodplain as defined by the U.S. Department of Housing and Urban Development (HUD). While flood potential does not create any development restrictions, it does indicate the susceptibility of the Town to shallow, sheet-flow flooding. Currently, the Town enforces a drainage and retention ordinance, but only has cross sloped streets to divert storm water.

Along with the Planning Area, the construction of paved streets, parking lots and driveways will increase the original Townsite's susceptibility to shallow, short-term flooding in the future. Therefore, a comprehensive storm drainage system study is now underway within the Town to identify and analyze existing drainage deficiencies. The resulting analysis will then provide the basis to develop a comprehensive stormwater management program for the Town of Surprise.

The White Tanks-Agua Fria Area Drainage Master Plan (A.D.M.P.) has not been funded at the present time and is not in the budget for Fiscal Year 1987-1988. The A.D.M.P., when completed, will then establish the guidelines for storm water management practices as the Planning Area develops and more surface area is rendered impermeable. As impermeable areas increase, the risk of street flooding and water damage to both property and structures also increases, creating the need for effective solutions to safely retain and transport storm water.

B.2.5 Vegetation/Wildlife

The region surrounding the Town of Surprise is identified to be within the Lower Sonoran Desert Scrub Plant Community. The existing vegetation is generally characterized by creosote, mesquite, paloverde, cacti, and annual grasses or forbes. This indigenous environment creates a habitat for a wide variety of mammals, reptiles, and birds. A partial list would include Desert Cottontail, Gambel Quail, Tiger Rattlesnake, and Desert Mule Deer.

Within the Town of Surprise, both indigenous and introduced plant species are used to landscape residential and commercial properties. These introduced species include a variety of deciduous, coniferous, and palm trees as well as a host of shrubs and groundcovers.

B.2.6 Scenic Resources

Due to the Town's location, on a nearly flat alluvial fan, scenic views or vistas are minimal. The location of the White Tank Mountain Range to the west provides both an aesthetic backdrop for the Town, as well as hiking areas where distant views of Surprise and the Salt River Valley can be achieved.

Within the Original Townsite, aesthetic vistas are minimal due to an abundance of substandard housing and dated commercial/retail areas. New commercial facilities are currently under construction along Bell Road (i.e. Crossroads Towne Center), which provides a good example for future development. The quality of construction and lush landscaping of this commercial area is creating the potential for a strong view corridor along this major arterial road.

B.2.7 Noise Levels

In response to development pressure infringing upon U.S. Air Force installations, an Air Installation Compatible Use Zone (AICUZ) Report was prepared in 1985 for Luke Air Force Base by the Department of the Air Force. The purpose of this report is two-fold. It first seeks to evaluate the effects of military aircraft noise and accident potential with respect to the public's health, safety and welfare. Secondly, it seeks to accomplish the first goal while protecting the full operational capabilities of the military installation. The Luke Air Force Base AICUZ Report focuses on the primary determinants where airfield planning is concerned: accident potential zones, noise zones and height obstruction zones. As illustrated on Figure 5, the Surprise Planning Area boundary lies to the north of the Accident Potential Zone (APZ) II, which recommends the restriction of any high density land use. Noise levels, which are read by the designator Ldn, produce a series of contours that range from 65 Ldn to 80 Ldn. The study recommends a level below 65 Ldn as compatible for residential land uses. Height obstructions include not only structures, but also uses which produce smoke, intense light, attract birds or jam avionics equipment. At the present time, the southeast region of the Surprise Planning Area is under agricultural production and thus offers no height hazard to the air base.

Another AICUZ study was prepared by the Maricopa County Department of Planning and Development for the White Tanks Agua Fria Technical Guide in January, 1982. The noise contours exhibited in the Guide do not encroach into the Planning Area as far as the Luke Air Force Base Study, but because these contour lines are based on actual noise readings and have been adopted by the Maricopa Association of Governments (MAG), they have been included within the analysis and are shown in Figure 5, Natural Resources. The contour pattern, ranging from 65 to 75 Ldn, impacts less than 700 acres at the southeast corner of the Planning Area.

In response to the development pressure that is now being exerted on the northwest Salt River Valley and the adjacent communities, lack of recognition of the 1985 AICUZ study resulted in the passage of legislation granting a one year opportunity for affected municipalities to voluntarily study appropriate means in which to reconcile both civilian and military needs. The Maricopa Association of Governments (MAG) Joint Land Use Study, which is currently in progress, is an outgrowth by adjacent communities and Luke Air Force Base to collectively and cooperatively accommodate the development needs of surrounding jurisdictions while preserving the mission of the base. The study will establish a long range program for land use compatibility, as mandated by Arizona Statutes, for the adjacent communities of El Mirage, Glendale, Goodyear, Phoenix, Surprise, Maricopa County and Luke Air Force Base. The MAG Joint Land Use Study was completed in November 1987.

B.3 Land Use and Zoning

The Land Use and Zoning section of the Inventory and Analysis of Existing Conditions is presented in the following four sub-sections.

- Existing Pattern of Land Development
- Locations of Special Concern
- Existing Zoning Pattern
- Zoning Regulations

The purpose of the Land Use and Zoning section is to identify existing land use and zoning for the Town of Surprise, describe areas of concern with regard to existing land use and to review existing zoning regulations which have functioned to guide both growth and development in the past.

The land use pattern of Surprise has developed since the early 1940s in a predominantly north-south grid pattern with the high volume arterial street, Grand Avenue, cutting across the Original Townsite from the northwest to the southeast. Located parallel and to the north of Grand Avenue is the A,T & SF Railroad right-of-way, which also divides Surprise, and imposes both vehicle and pedestrian conflicts at grade crossings. Currently, Grand Avenue occupies approximately 150 feet of right-of-way with an adjacent 200 feet dedicated for railroad use. The barrier posed by this approximate 350 foot right-of-way effectively divides one portion of the Town from the other.

At the present time, Bell Road provides the major east-west linkage for the Town. The absence of improved north-south arterials has been the result of both the Town's location and the history of slow growth within Surprise.

B.3.1 Existing Pattern of Land Development

a) Original Townsite

As illustrated on Figure 6, Land Use (Original Townsite), the existing land use pattern within the original incorporated area is divided into uses which include: commercial, industrial, institutional, residential, public facilities and vacant land. Under each of these land use categories are sub-categories which define each parcel as to its specific use.

- Commercial Use

  Commercial use zones include such uses as retail trade, professional office space, recreational, wholesale, and services. The majority of commercial use is split between the frontage along Grand Avenue, which

has been in place for a number of years and can be categorized to be in structurally standard/poor condition; and the frontage along the south side of Bell Road, which has been developed recently and has dramatically improved this entry into the Town of Surprise.

- Industrial Use

Industrial use zones include agriculture, construction, manufacturing, and warehousing. Due to the absence of a previous Town Land Use Plan, industrial use is spread over the entire Town. The area bounded by Cottonwood Street to the north and intersected by Santa Fe Drive to the south comprises the largest assemblage of industrial parcels within the Planning Area. The area bounded by Union Hills Drive to the north and Dysart Road to the east is currently under agricultural production. The chief crops grown on the land include cotton, lettuce, and citrus.

- Institutional Use

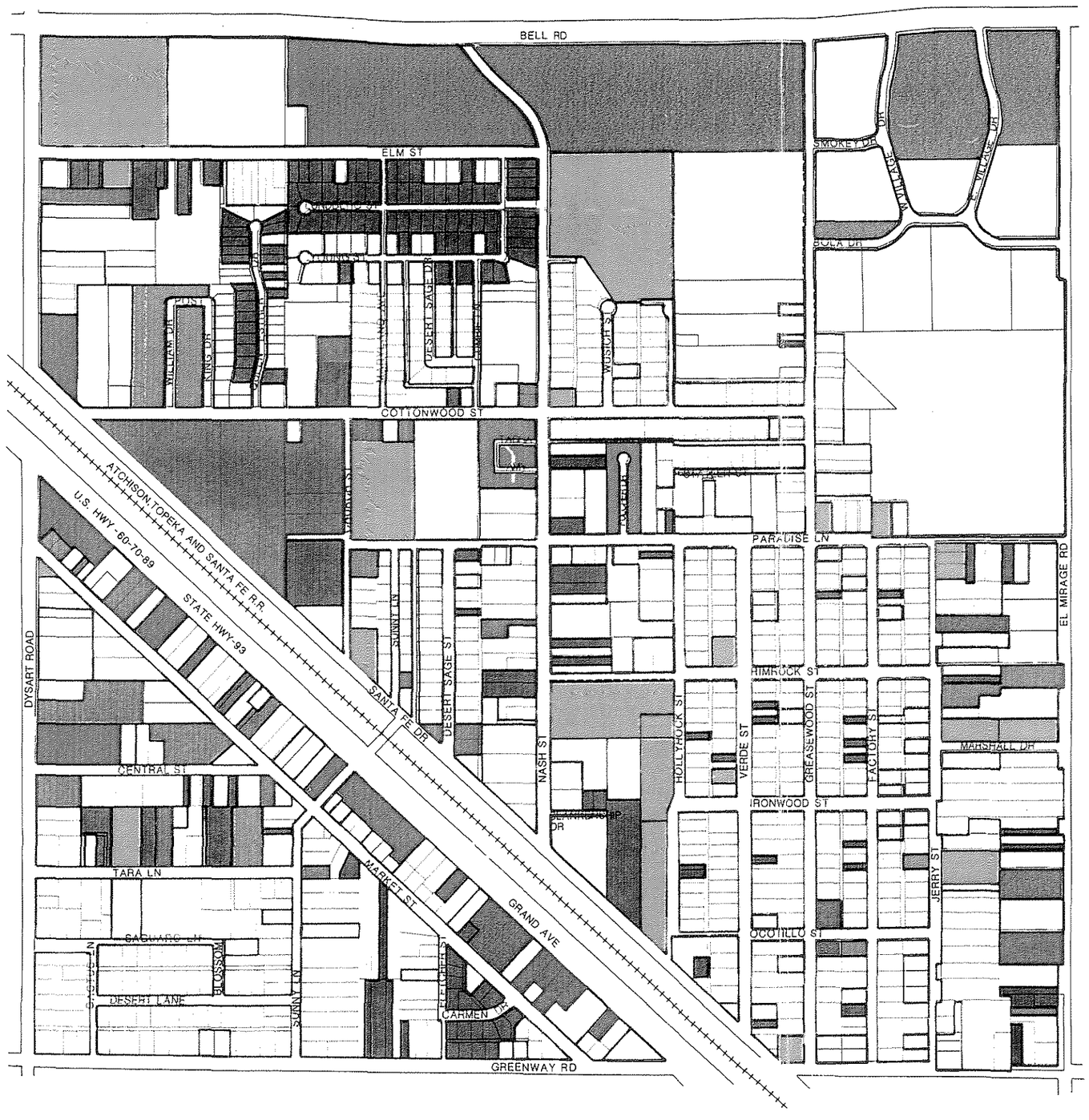
Institutional use zones include police, fire protection, transportation, government, schools and churches. All of the Town services are located at the Town Hall. These include police, fire protection, solid waste disposal, as well as the Town government. District III, Maricopa County Sheriff's Department operates a substation at the intersection of Bell and Dysart Roads. At the present time, there are no schools located within the Town, forcing students to be bussed to various schools within the Dysart Unified School District. A large number of small churches are scattered throughout the Town and represent nearly all denominations.

- Residential Use

The Residential use zones are comprised of the following sub-categories: single-family detached, multi-family, manufactured housing, recreational vehicle parks and public housing. Due in part to the economy of the area, residential housing within the Town consists of predominantly single-family detached units in various states of repair, interspersed with manufactured housing projects. One apartment project has been recently constructed at the southwest corner of the intersection of Cottonwood and Nash Streets, utilizing two-story multi-unit structures.

- Public Facilities

Public Facilities are divided into the following sub-categories: health services, entertainment centers, utilities, telecommunications, and open space. Currently, the only health care services located within the Town include a satellite health clinic and a dental facility. Residents must travel to Sun City or Youngtown for both emergency and general medical care. The Town Library functions as the only cultural/entertainment facility within Surprise. Two utility sites currently exist within the Original Townsite that are owned by the El Mirage Water Company and provide large-scale water storage. The Town currently maintains three park facilities which are illustrated on



ORIGINAL TOWNSITE
Land Use

- Single Family Residential
- Multi-Family Residential
- Trailer, Recreational Vehicle, Mobile Home
- Commercial
- Industrial
- Public/Semi-Public
- Parks/Open Space
- Vacant

SURPRISE
Comprehensive Development Plan

6 ACRES

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Figure 6, Land Use (Original Townsite). As the figure shows, these facilities are located on the eastern half of the Original Townsite and have capabilities for softball, basketball, football, soccer, play equipment and picnics.

- Vacant Land

  The existence of vacant land is prevalent within the northeast quarter of the Townsite, but also exists in all incorporated areas of Surprise. Within the Planning Area, much of the land to be annexed north of Union Hills Drive has vacant status at the present time.

b) Remainder of the Planning Area

The existing land use within the remainder of the Planning Area has been generally grouped into three categories as shown by Figure 7, Land Use (Planning Area). Residential uses currently comprise more than 1,400 acres of isolated pockets of single-family, multi-family and recreational vehicle parks. Agricultural uses currently utilize more than 19,000 acres and are primarily located on the south half of the Planning Area. Vacant land uses are mainly located northwest of the Beardsley Canal and utilize over 9,000 acres.

B.3.2 Locations of Special Concern

The evolution of land use within the Original Townsite has produced a number of conflicts where abutting land uses are incompatible. Single-family residential uses should not be encouraged to front Grand Avenue due to the noise and high traffic volumes that exist. The location of Greasewood Street, which functions as a collector roadway, linking Bell and Greenway Roads, creates safety hazards for fronting residences. This same problem also exists for Nash Street, as it connects to Bell Road and links with R.H. Johnson Boulevard.

The existing multi-family housing is scattered on small parcels throughout the Original Townsite and the two Maricopa County Housing Authority Projects (located at the northwest corner of Cottonwood Street and King Drive and on Fulcher Drive, north of Paradise Lane), generate increased traffic volumes in single-family areas. Although isolated pockets of mobile home sites located adjacent to single-family residences do not create compatible land use, the economic status of Original Townsite residents may not change this situation in the near future. If these sites were grouped together, land values would potentially appreciate for both conventional home and trailer owners.

The existence of commercial activity at the corner of Ocotillo and Greasewood Streets, and fronting both Jerry Street and El Mirage Road conflicts with adjacent residential uses. The "islands" of industrial uses are also incompatible with adjacent uses. The lack of open space/parks in the southwest quarter of the Town creates a safety hazard for residents crossing Grand Avenue to reach other recreational facilities.

B.3.3 Existing Zoning Pattern

a) Original Townsite

The existing zoning pattern for the Original Townsite has developed utilizing ten zoning districts as shown by Figure 8, Zoning (Original Townsite). These districts show that the trend was to zone residential districts within the interior of the Townsite and utilize the exterior area for multi-family and commercial districts. Isolated pockets of interior commercial zones currently exist in the southern half of the Townsite and should be phased out over a period of time to allow residential infill. The lone industrial zone has been located along the AT & SF line to buffer residential areas. The absence of zoned land for public use in the southwest corner of the Original Townsite should also be addressed to create an open space/park site.

b) Remainder of Planning Area

At the present time, nearly 2,800 acres of land have been zoned or are under a Planned Area Development (PAD) classification as shown by Figure 9, Zoning (Planning Area) in the remainder of the Planning Area. The existing residential districts have been limited to either mobile home or recreational vehicle parks, but future growth will be targeted to R-1 or R-2 districts. Commercial zoning has followed the Bell Road alignment to the west and Grand Avenue to the northwest. The zoned land bounded on the east by the proposed Estrella Parkway alignment will soon be linked across the annexed Town area by the Estes Company project that will involve the development of over 3,300 acres of existing agricultural land into a planned residential community.

B.3.4 Zoning Regulations

The Town of Surprise currently enforces a Zoning Ordinance to regulate the size and type of land use permitted within a described zone. The current Zoning Ordinance was last revised in January, 1983 with its established zones being generally described as follows and geographically located on the following two figures.

1) **Rural Zoning District (R)**

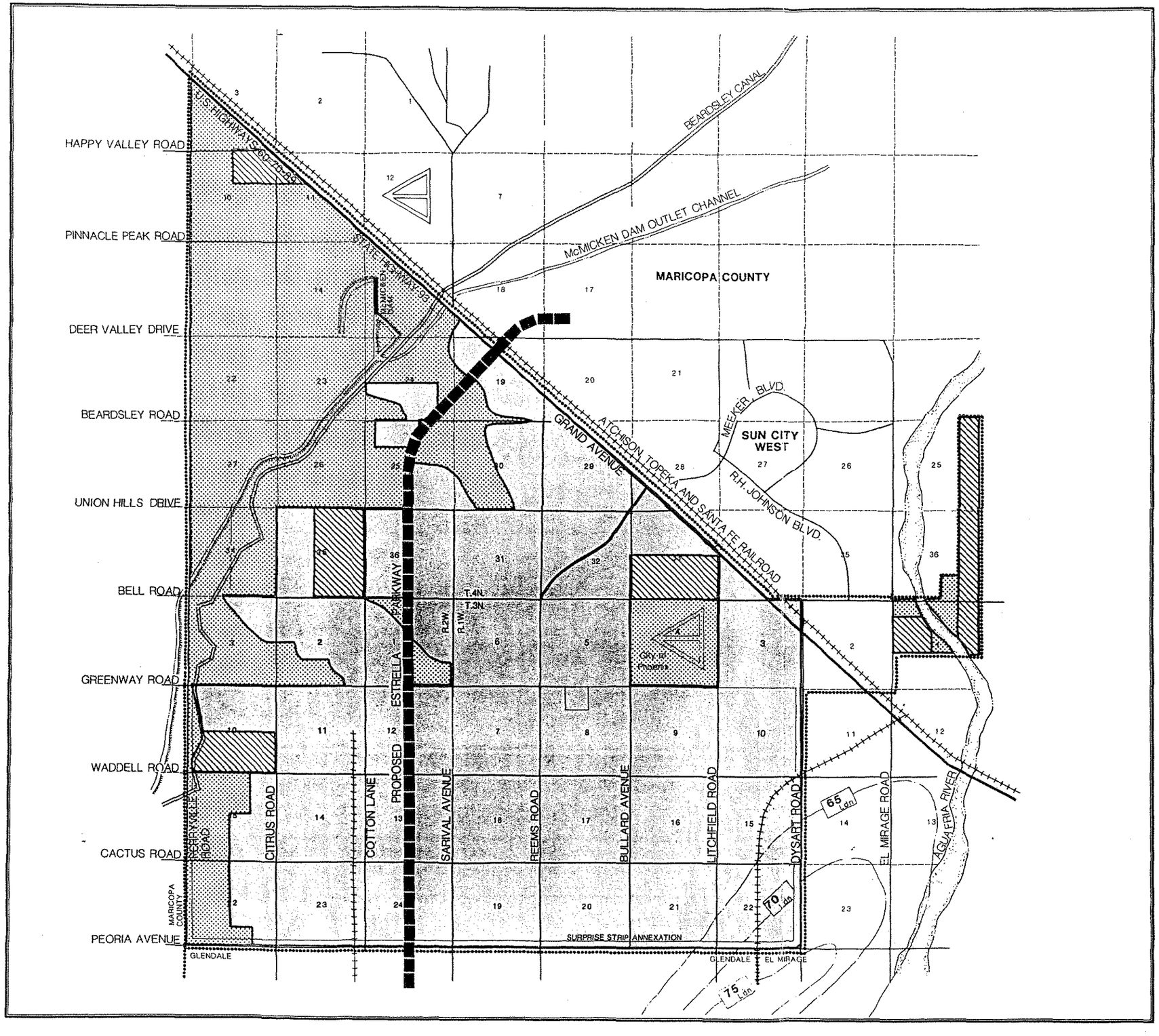
   Permitted Uses: One dwelling unit per 43,560 square feet (one acre) of site. Agricultural Activities.

2) **Single-Family Residential Zoning District (R-1)**

   Permitted Uses: One dwelling unit per 6,000 square feet of lot with maximum lot coverage of 40 percent.

3) **Multi-Family Residential Zoning District (R-2)**

   Permitted Uses: One dwelling unit per 6,000 square feet of lot with maximum lot coverage of 50 percent.



Land Use

- Residential
- Agricultural
- Vacant

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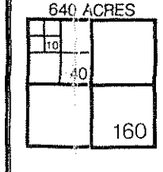

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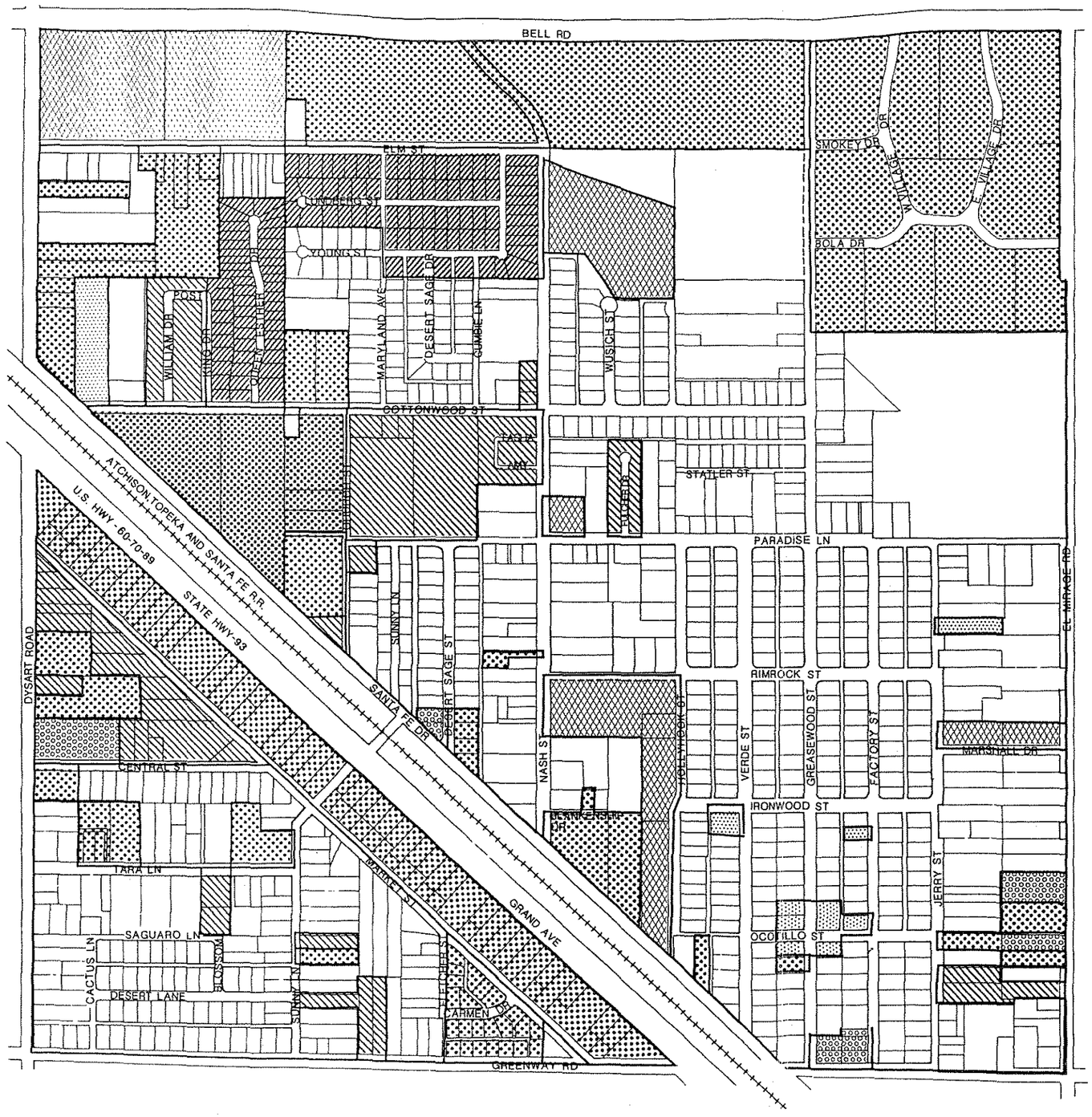

ORIGINAL TOWNSITE
Zoning

- Public Property
- R-1
- R-2
- RMH
- RV-1
- C-1
- C-2
- C-3
- I-1
- PAD

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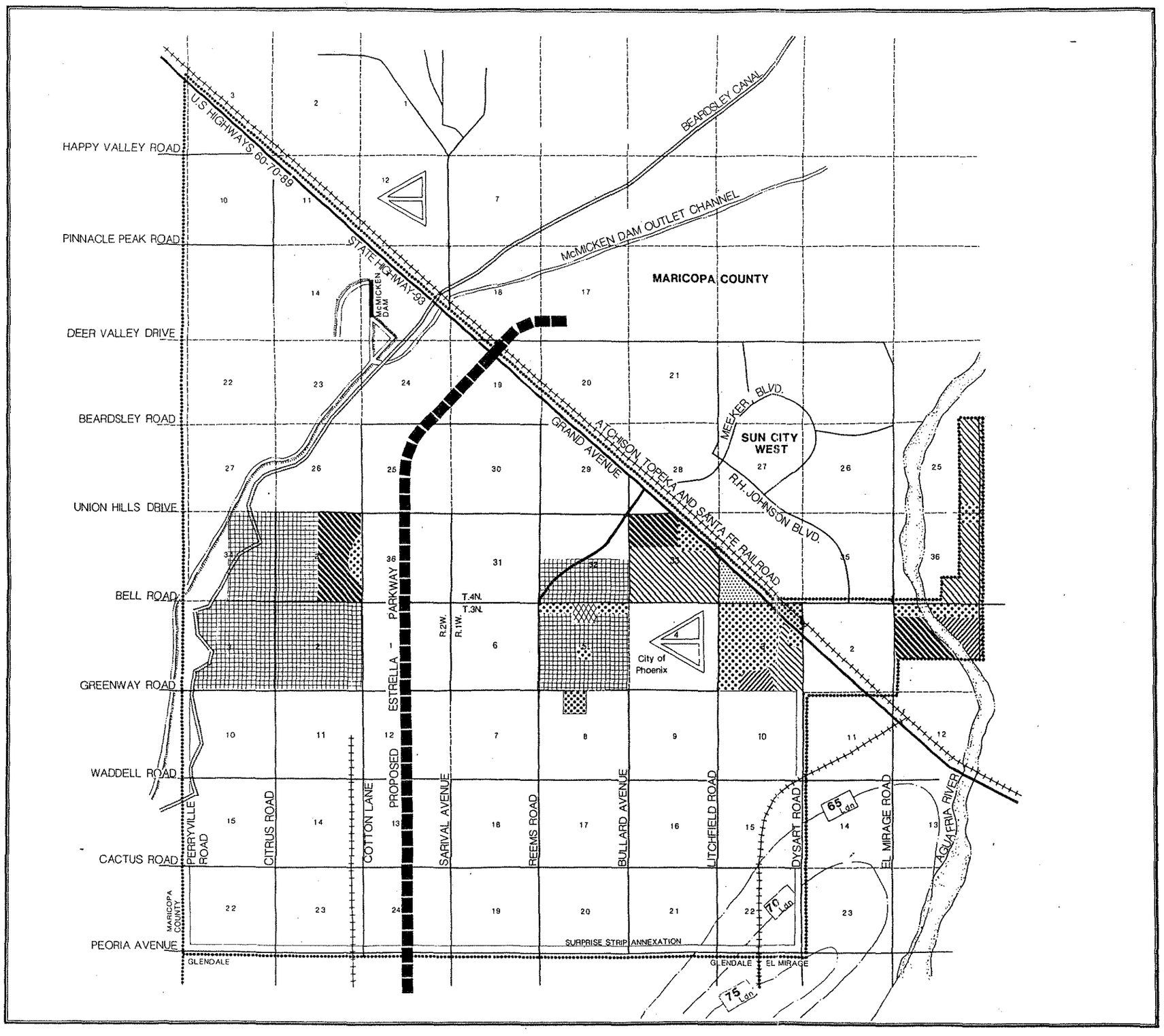

Zoning

- Public Property
- R-1
- R-2
- RMH
- RV-1
- C-1
- C-2
- C-3
- I-1
- PAD

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4) Neighborhood Commercial Zoning District (C-1)

Permitted Uses: Shops and services conveniently located to meet citizen's needs with maximum lot coverage of 50 percent and building height restriction of 30 feet, or two stories.

5) Intermediate Commercial Zoning District (C-2)

Permitted Uses: Any permitted use in the "C-1" Zoning District and commodities, services, and activities located outside residential neighborhoods along major collectors and arterial streets. Lot coverage shall not exceed 50 percent and building height not to exceed 40 feet, or three stories.

6) General Commercial Zoning District (C-3)

Permitted Uses: Any permitted use in the "C-2" Zoning District and commercial uses of wholesale or distribution activities located with adequate access. Lot coverage shall not exceed 50 percent and building height not to exceed 45 feet, or three stories.

7) Light Industrial Zoning District (Ind-1)

Permitted Uses: Any permitted use in the "C-3" Zoning District and light industrial uses. Minimum lot area of 6,000 square feet with a maximum height of 40 feet, or three stories, and a maximum lot coverage of 60 percent.

8) General Industrial Zoning District (Ind-2)

Permitted Uses: Any industrial use not in conflict with Surprise Ordinances and also having the approval of the Town Council. Minimum lot area shall be 6,000 square feet and lot coverage shall not exceed 60 percent.

9) Mobile Home District (R-MH)

Permitted Uses: Those areas deemed suitable for mobile home placement and development of mobile parks or mobile home subdivisions.

a. Mobile Homes: A maximum density of eight lots per gross acre along with a maximum height of two stories, or 30 feet, and a 5 percent open space land dedication.

b. Mobile Home Subdivisions: A minimum lot area of 6,000 square feet and height, yard, and use intensity of the "R-2" district.

c. Mobile Home Parks: A minimum lot area of 3,000 square feet and height, yard, and use intensity of the "R-2" district.

10) Planned Residential Development (PRD)

Permitted Uses: A minimum project area of 10 acres utilizing a cohesive mixture of residential, commercial, or industrial land uses in accordance with a carefully formulated and reviewed site plan.

B.4 Land Ownership

The Surprise Planning Area, which includes both incorporated and unincorporated areas of the Town, has a total land area of nearly 30,000 acres or nearly 47 square miles. Ownership within the Planning Area is divided among many interests, which include the State, Federal Government, City of Phoenix and private owners as shown by Figure 10.

State Land Ownership accounts for 960 acres or three percent of the Planning Area. Most of the State Land is located along the Beardsley Canal, but a small tract is located east of the Townsite along the Agua Fria River.

Located between the State land parcels and northwest of the Beardsley Canal is the 1,250-acre Trilby Wash Basin. Currently under the jurisdiction of the Maricopa County Flood Control District, the area is presently being utilized to retain flood waters during storms, alleviating flood damage to existing agricultural land and Luke Air Force Base.

The City of Phoenix owns a number of small parcels in the Planning Area, but its largest holding is the abandoned 640-acre Luke Air Force Base Auxiliary Field located between Bell Road to the north, Greenway Road to the south, Litchfield Road to the east and Bullard Avenue to the west.

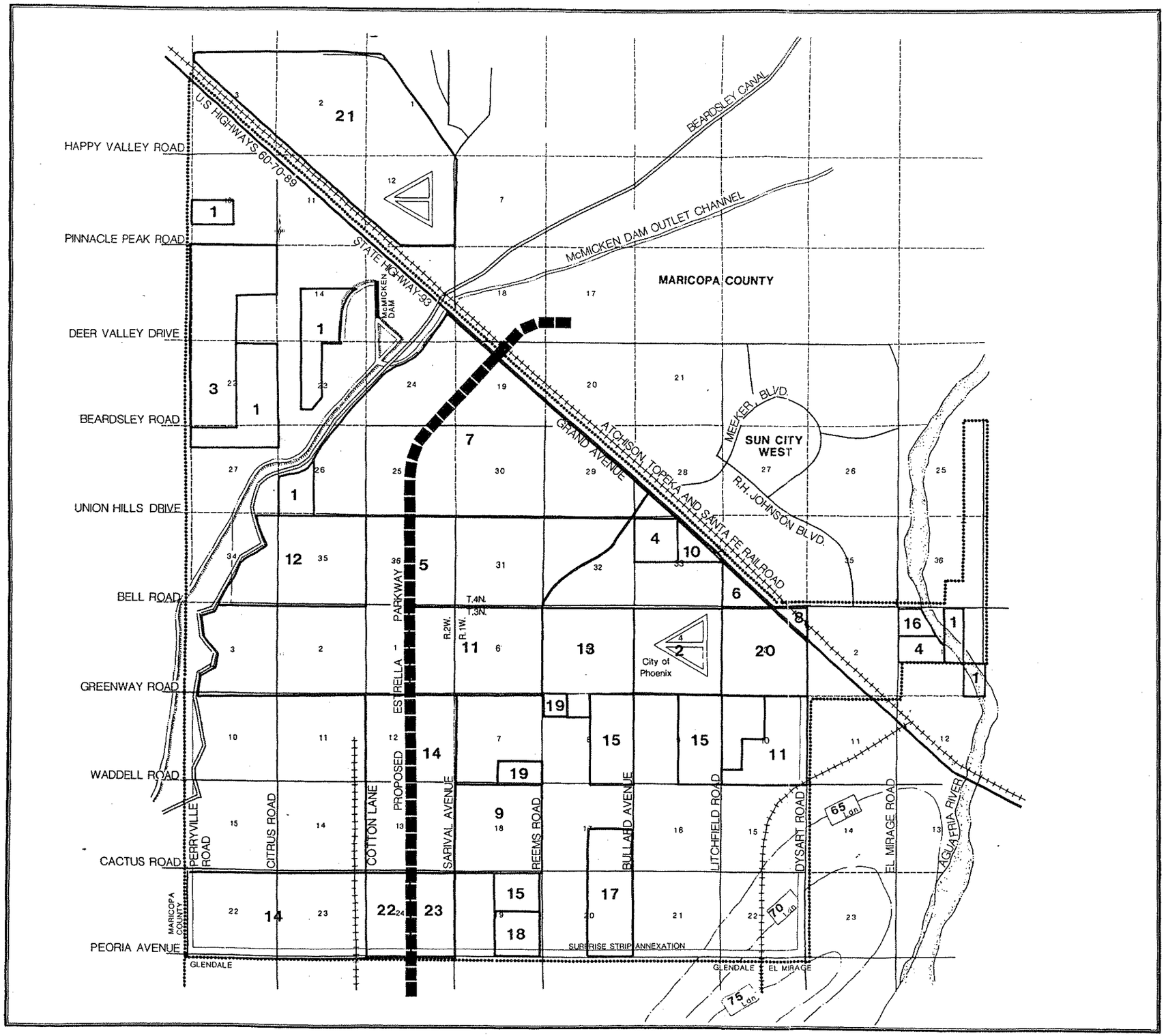
Due to the large amount of cultivated agricultural land present in the area, the majority of land is held by private interests. Private ownership can be further divided into land use categories of urban/developed land, agricultural land and vacant land. The majority of urban/developed land is located within the Original Townsite, although a few isolated housing tracts are scattered throughout the Planning Area, totaling only three percent.

Residential development projects now under construction or design include Happy Trails, Sun Village and Kingswood Parke, the last two projects being developed by the Estes Company. Phase One of Happy Trails is a 320-acre parcel created as an adult retirement community offering improved lots for trailers or recreational vehicles. Bounded by Union Hills to the north, Bell Road to the south and Cotton Lane to the east, a total of 2,200 lots have been designed with 1,800 platted. The proposed site also contains another full section of land abutting Phase One development to the west which will be reserved for future use. Kingswood Parke is a 3,300-acre master planned community promoting a mix of residential, commercial, municipal and recreational uses for its residents. The Estes Company plans to develop approximately 1,800 acres and sell the remaining 1,475 acres in a bulk package. The developed acreage will contain such amenities as an 18-hole golf course, several miles of greenbelt and water features. Sun Village is another large-scale project being developed by the Estes Company. Marketed as a resort community, the 335-acre project will feature recreational amenities which include a golf course, tennis courts, swimming pools and a recreation center.

Located directly north of the Kingswood Parke site is another large tract of land that encompasses approximately 2,850 acres and is owned by Palmer-Whitehead, a limited partnership. Bounded by Union Hills Drive to the south, Grand Avenue to the northeast and the Beardsley Canal, the owners will be creating six or seven planning areas for development that range in size from 400 to 1,200 acres. They are now in the preliminary planning stages for this mixed use development.

Commercial development is also increasing within the Original Townsite as Americor, Inc. is creating a 174,000 square foot shopping center anchored by a Lucky Supermarket, Revco Drugstore and branches of Thunderbird Bank, Merabank and Arizona Bank, located at Bell Road and R.H. Johnson Boulevard. A 200-room Quality Suite Hotel will be sited on a two-acre parcel located directly east of the Crossroads Town Center and will combine with the remaining 18 acres targeted for office, restaurant and retail space to increase the Town's sales tax revenue and provide employment opportunities.

As shown by Figure 10, Major Land Ownership, a number of large parcels of land are owned within the Town Planning Area, but are not currently being planned for development. Because of the fertile soil, available water and minimal slope, the region has long been utilized for agricultural production. Within the Planning Area, over 20,000 acres are utilized by private interests to grow saleable crops. The characteristics that create prime agricultural land also account for the strong development pressure that has been felt in the region as shown by the Happy Trails, Kingswood Parke and Sun Village developments. The remainder of the land held in private ownership has been left in its natural state due in part to both natural and manmade constraints. These parcels are primarily located in the northwest portions of the Planning Area and account for nearly 7,600 acres.



Major Land Ownership

1. State of Arizona
2. City of Phoenix
3. Arizona Mutual Assets
4. Dixon
5. Estes Company
6. Jaren
7. Palmer/Whitehead
8. Republic & Gazette Plant Site
9. Smith
10. Stuckey
11. Waddell
12. Western Savings and Loan Corporation
13. Sun Village Company
14. L.D.S.
15. Hancock
16. U.F.I.
17. Davidson
18. Technolex
19. Stegall
20. Bellamah
21. Sperry
22. Moore
23. Carter

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B.5 Housing

The Housing section of the Inventory and Analysis of Existing Conditions is presented in the following two sub-sections:

- Housing Characteristics
- Housing Conditions

The housing segment of the Surprise Comprehensive Development Guide serves to create an understanding as to the amount, type, location, resident characteristics and physical conditions of the existing housing within the Town of Surprise.

B.5.1 Housing Characteristics

According to the 1985 Special Census of Population and Housing, the Town of Surprise had 4,355 residents. At that time, there were approximately 1,212 units available for occupancy in the Town, but 6.1 percent were vacant. By subtracting the vacant units from the total units and then dividing that number into the total population results in an average household size within the Town of 3.5 persons. This figure contrasts sharply with the national average of the 1985 U.S. Census figure of 2.7 persons per household. The national average has been attributed to the decline of the baby boom and the increase in divorce. The high figure exhibited in Surprise has resulted from the low average annual household income (estimated in 1985 to be $13,770 using 1979 dollars by Mountain West Research, Inc.) a figure which does not induce new housing development. A method used to identify housing affordability utilizes a 2.5 factor multiplied by gross household income to arrive at an estimated new home affordability of $34,425. Based on moderate 1985 construction costs of $40 per square foot to construct new residential units, the average potential home buyer in Surprise could only afford to purchase 860 square feet of new housing, an unlikely situation at best.

To calculate a monthly rental cost of affordability, the $13,770 annual income is multiplied by 0.25 and divided by 12 to arrive at an average monthly rental payment. The resulting $286 figure would generally not rent anything larger than a one-bedroom apartment, which could not adequately house the average household of 3.5 persons.

The Original Townsite currently has 54 units of Section 8 (low income) rental housing. The units were built in 1983 and are located in two separate areas. One site is located on William Drive, north of Cottonwood Street and is comprised of 16 one-bedroom and eight two-bedroom units. The other project is located on Fulcher Drive, north of Paradise Lane and includes 14 two-bedroom, 12 three-bedroom and four four-bedroom units. The monthly rent is based upon 30 percent of the adjusted income with allowances given under extenuating circumstances. At the present time, the vacancy rate is very low which stems from the fact that the annual household income averages less than $14,000.

B.5.2 Housing Conditions

A generalized housing survey was completed by the Planning Team to assess the condition and location of the existing housing stock in the Original Townsite of Surprise. The existing exterior condition of the structure formed the basis by which each unit was evaluated and rated under the three classifications defined below.

Rating	Condition	Definition
1	Good	Structurally sound, well maintained, may require minor exterior maintenance.
2	Fair	Minor structural rehabilitation required, general rehabilitation required overall to building and property.
3	Poor	Structurally unsound (not suitable for rehabilitation)

The results of the housing conditions survey of the Townsite can be generally summarized as follows:

- By comparing the condition of all residential structures in the Original Townsite, over 48 percent can be considered to be in good condition.
- The residential structures in fair condition are not grouped in one area of the Townsite, but are interspersed throughout the Townsite and represent approximately 46 percent of the housing stock.
- The remaining six percent of residential structures deemed in poor condition are also interspersed throughout the Townsite, and generally constitute visual blight and pose both health and safety hazards.
- The Original Townsite also has a large number of trailers and mobile homes which are generally in poor condition because of the structural neglect and lack of pride to keep the surrounding grounds well maintained.
- The Original Townsite also has a significant proportion of small, irregular-shaped lots which would not be considered acceptable for contemporary development. Residential development on many of these lots does not respect proper setbacks and is of poor condition, contributing to the poor image of the Townsite.

B.6 Public Facilities and Services

The Public Facilities and Services section of the Inventory and Analysis of Existing Conditions provides an overview of the various public safety, public administration, school and health facilities located within the Town of Surprise, as shown by Figure 9, Public/Semi-Public Facilities. Public and private utilities are also addressed in this section.

The Public Facilities and Services are presented in the following five sub-sections:

- Public Safety Services and Facilities
- Public Administration Facilities
- School Facilities
- Health Facilities
- Public Utilities and Services

The Public Facilities and Services section will serve to inventory and document present condition, capacity and use of the above facilities and services. The assessment of the identified sections that follow is not intended to be an in-depth evaluation of their operations or programs, but identifies their capacity and limitation with respect to future Town planning and development.

B.6.1 Public Safety Facilities

The Surprise Police Department patrols only the incorporated areas of the Town of Surprise, with the unincorporated area under the jurisdiction of the Maricopa County Sheriffs Department. The unincorporated area is divided into two districts by Dysart Road. Currently, the Department does not have any facilities located within District 2, west of Dysart Road.

a) Surprise Police Department

The Surprise Police Department is located within the Town Hall and utilizes approximately 1,000 square feet of space. The Department operates with 11 full-time officers and one reserve officer. Their transportation facilities include seven vehicles, five that have been in operation for five years and two that are eight years old. The Town does not have its own jail facilities, so offenders are transported to the Dysart Center, which holds 50 inmates or El Mirage, which has a capacity of ten persons.

Although travel time and manpower of the existing facilities seem adequate for the square mile Townsite, further growth to the west will put a strain on current manpower and increase response time. Centralizing the Police Department within Town Hall works well at present, but future growth may force the relocation of Department facilities within the incorporated area or the establishment of substations. The passage of the budget override will allocate funds (in the 1986-1987 FY budget) for the construction of a satellite police and fire facility.

b) Maricopa County Sheriffs Department

The Maricopa County Sheriffs Department currently operates a substation at the southeast corner of the intersection of Dysart and Bell Roads. The substation provides protection from Glendale Avenue to the Maricopa County boundary and from interstate 17 (I-17) to 163rd Avenue. The substation has a staff of 35 deputies and detectives, one commander and two secretaries. Transportation is provided by 12 cars, which are less than six years old. The 10,600 square foot structure has been in place since 1982. The facility does not operate a long-term detention center, only short-term facilities for trustees, those inmates who have a history of good behavior.

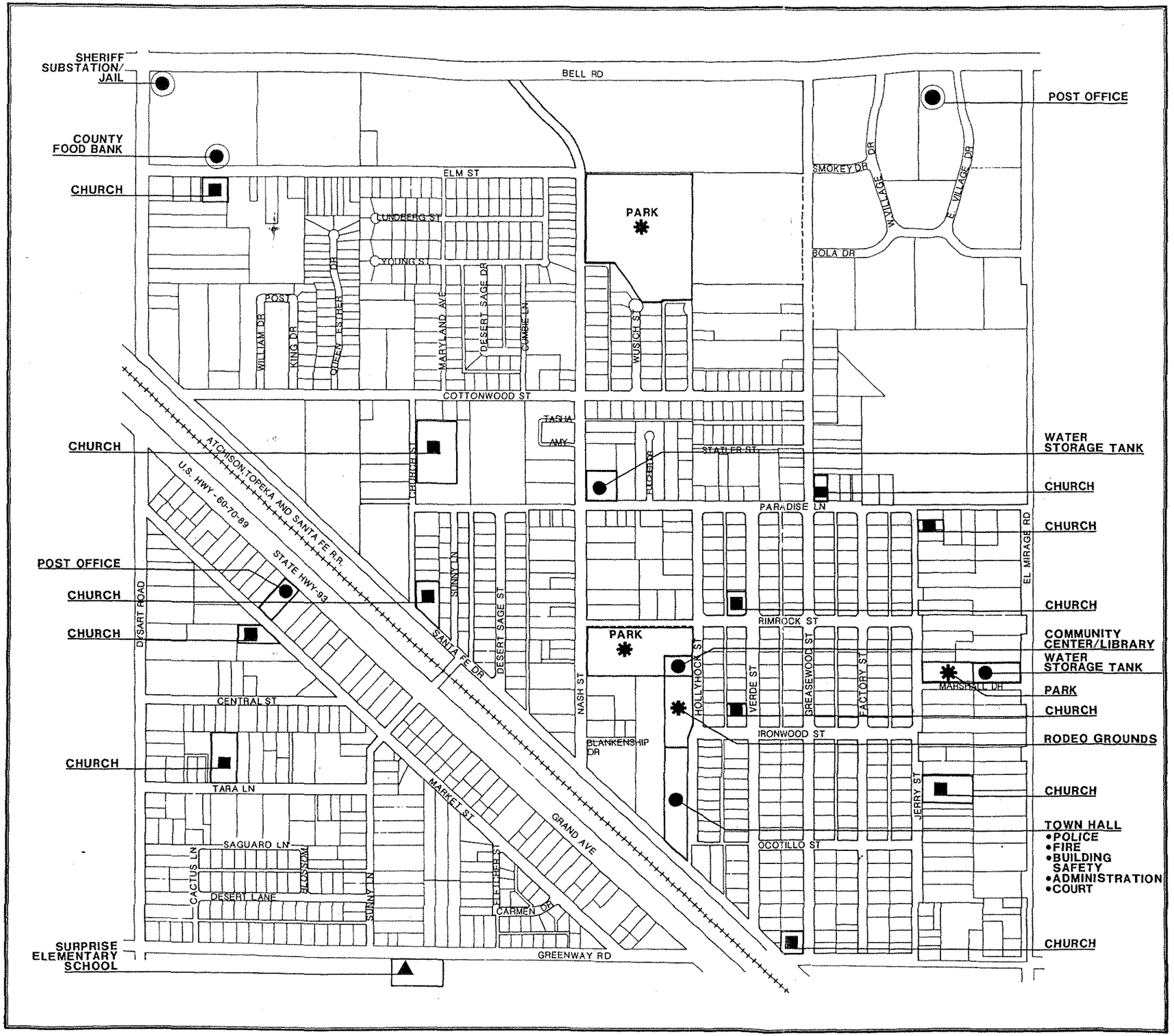
The location of the substation is optimal for the unincorporated area of Surprise. The furthest distance to the Planning Area is only six miles and the proximity of Grand Avenue provides good response time.

c) Fire Department

The Surprise Fire Department is located at Town Hall and has 14 volunteer firemen with six having undergone Emergency Medical Training (EMT). The Department has two pumper trucks that were purchased in 1967 and 1956. They also have two 1946 vintage models that are used for brush fires and a 12 year-old diesel tanker truck with a 5,000-gallon capacity. The Surprise Fire Department is under mutual contract with both the El Mirage and Peoria Fire Departments to fight fires that occur within the incorporated area. The Rural Metropolitan Fire Department services the unincorporated Planning Area and is under private contract with both Maricopa County and Sun City. The Surprise Fire Department has an Underwriters Insurance Rating of 8, based on the number of existing fire hydrants, personnel and equipment. This insurance rating affects the premium paid by both residential and commercial policyholders.

The Fire Department primarily uses the ambulance service from Valley View Hospital. As an alternative, the Rural Metropolitan Fire Department provides ambulance service to Boswell Hospital in Sun City. An emergency that requires air evacuation transports patients to St. Joseph or John C. Lincoln Hospitals.

The existing fire protection facilities are adequate for the Town, although tanker and pumper trucks are dated. The Original Townsite requires additional fire hydrants to better serve existing structures. The growth that is now occurring to the west of the Townsite will soon establish a need for additional facilities located in this area. As an interim solution, the Town should commit itself to a temporary facility, paying employees only for going on calls.



ORIGINAL TOWNSITE
Public/Semi-Public Facilities

- Educational Facilities
- Municipal Facilities
- Parks & Recreational Facilities
- Religious Facilities

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B.6.2 Public Administration Facilities

a) Town Hall

The Surprise Town Hall is located at 12604 Santa Fe Drive and provides facilities for fire and police protection, building safety, sanitation, Town administration and court services. Currently there are 32 full-time positions which include the administrative personnel to operate the Town, Police Department, Parks Department and Sanitation Service. The building was originally constructed in 1970 and has undergone expansion in 1976 and 1985 to increase space for existing services.

The Town Hall building is extremely crowded at the present time. The growth occurring in the western portion of the Planning Area suggests that satellite facilities for both fire and police service be located to the west of the Townsite to provide more efficient service. The Town is also allocating funds for a new 900-square foot building to house police service. The increased growth which Surprise is experiencing will necessitate the addition of two building inspectors, an accounts clerk, full-time firefighters (3) and captain.

b) Community Center/Library

The Surprise Community Center combines both a center for community functions and the library. The structure was dedicated in 1981 and is located on Hollyhock Lane, just north of City Hall. The Community Center has nearly 6,000 square feet of space complete with full kitchen facilities. A small part of the center includes the library, which has been in operation since May 1985. The library has a total of 3,000 volumes which includes both hardback and paperback books in Spanish and English. The supply comes from both the Maricopa County Library and private donations. The library currently operates on a part-time basis by a volunteer staff. The existing facility is at capacity after less than a year of operation. If the community is committed to having a library that adequately serves both children and adults, a larger facility with a full-time librarian is needed.

B.6.3 School Facilities

Currently there are not any existing schools within the Planning Area, forcing Surprise students to be bussed within the Dysart Unified School District. Within the school district three elementary schools, one elementary/junior high school and one high school are available as listed on Table 2.

As the table indicates, the total enrollment is 75 percent of total school capacity, with class sizes averaging 26 students. The District has increased approximately 112 students over the last year and is projected to increase by 200 students in the next school year. At the present time, forecasted projections are prepared by an individual school survey, projecting pupils on a grade-by-grade basis. Coupled with this unscientific method of school population projection, is the existence of nearly 700 transient migrants in the community which makes any reliable projection of

b) Gas Service

Natural gas service is provided to the Town and its Planning Area by Southwest Gas Company. Service is available to all parts of the developed area and can be extended as desired when development occurs in outlying areas.

c) Telephone Service

Mountain Bell currently provides telephone service to the Town and its Planning Area through underground lines. Service has been extended to all developed parts of Town and can be extended to areas not currently served.

d) Sewer Service

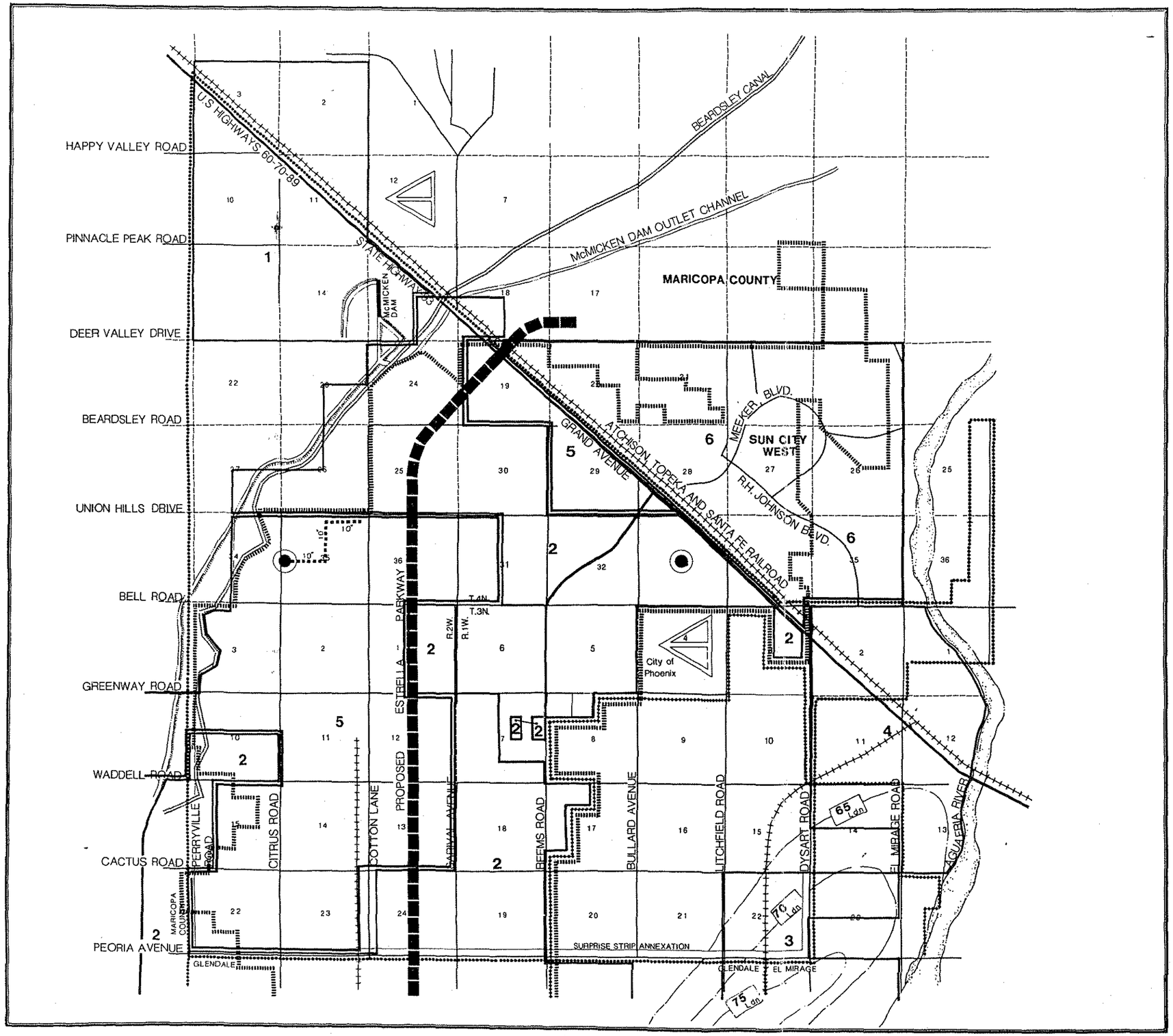
At the present time, all wastewater generated within Surprise is handled through the use of septic tanks. The combination of their age and the increasing density of the area will severely affect the ability for this approach to wastewater disposal to continue to function effectively, thus retarding future growth. A conceptual wastewater master plan was prepared in January, 1985 that identified a number of options for both the near term and long-range future of the Surprise area. One option calls for developing a centralized wastewater plant located at the southeast corner of the Original Townsite with trunk sanitary sewer lines extending west along section lines. Tertiary treated effluent would then be stored in a central location and piped through a pressure distribution system for reuse as irrigation (e.g. parks, public street rights-of-way, golf courses).

The Town is currently planning to create 8-10 mini-wastewater districts to service both the incorporated and strip annexed areas. The main purpose of these districts is to provide open space areas where tertiary treated effluent can be utilized to conserve groundwater and to balance the districts from overload and under-capacity periods.

e) Water Resources

Water resources for the Planning Area are supplied by a number of methods. Currently irrigation districts, public and private domestic water franchises, the Town of Surprise and private wells function as major supply sources.

Within the Planning Area two irrigation districts exist, supplying vast amounts of water to agricultural areas. As shown by Figure 12, Water Resources, both the McMicken Irrigation District and the Maricopa County Municipal Water Conservation District #1 (MCMWCD #1) cover the entire Planning Area. The McMicken District has a municipal and industrial (M&I) allocation of 9,513 acre feet of water per year along with a non-Indian agriculture allocation of 7.38 percent of its non-Indian supply. MCMWCD #1 also has an agricultural allocation of 4.66 percent of the non-Indian supply. These agricultural applications can be converted to M&I use at the rate of one acre foot of water per acre per year of developed land. The MCMWCD #1 also utilizes the Beardsley Canal to deliver water from Lake Pleasant, which resulted from the construction of Waddell Dam. The canal crosses the northeast corner of the Planning Area with laterals extending out to deliver water to nearby farmland.



Water Resources

Irrigation Districts

- MCMWCD #1
- McMicken Irrigation District

Water District Franchises

- 1 Beardsley
- 2 Citizens
- 3 Consolidated Utilities
- 4 El Mirage
- 5 Sun City
- 6 Sun City West
- Existing Water Line
- Existing Well

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The Agua Fria River also provides water to the MCMWCD #1 through an annual appropriation of approximately 188,000 acre feet (one acre foot equals 325,851 gallons). Due to prior appropriation of nearly all existing flows, the Agua Fria cannot be the utilized by the Town as a viable water source.

Groundwater has been used extensively within Surprise since the area was first settled. Although a substantial quantity of excellent quality water still exists, the depth of existing wells are increasing due to the unequal extraction/recharge cycles. The Agua Fria River, through floodwater infiltration, has been the major recharge source for the underground aquifer. The water extracted from wells has been analyzed and exhibits good quality, but small quantities of both dissolved nitrate and fluoride are present as shown by the sample of existing well sites on Table 3, and geographically shown in Figure 13, Well Water Analysis Locations.

TABLE 3
Existing Well Water Data

Map Key Number	Year Drilled	Pump Total Depth (feet)	Capacity (gpm)	Year Tested	Nitrate (mg/l No3)	Fluoride (mg/l)
31	1976	900	1,200	1976	4.00	0.24
				1977	6.00	0.27
				1981	2.20	0.30
34	1980	1,013	1,200	1981	1.70	0.30
88	1978	1,004	1,000	1978	4.00	0.25
				1981	1.00	0.20
5	1978	1,064	1,000	1979	5.00	0.20
				1981	1.20	0.30
4	N/A	600	300	1977	8.50	3.20

Source: Arizona Department of Water Resources Records; and Arizona Department of Health Services Records, 1984

The total depth of the well does not reflect the actual water depth, as water is encountered between 100 and 500 feet below the surface. The added depth may be needed in the future as groundwater levels continue to drop. In the period from 1952 to 1964, the average decline totaled 130 feet. An additional 40 foot drop occurred from 1964 to 1972 with annual declines now averaging from 8 to 15 feet in the eastern portion of the Planning Area and nearly 4 feet in the western areas.

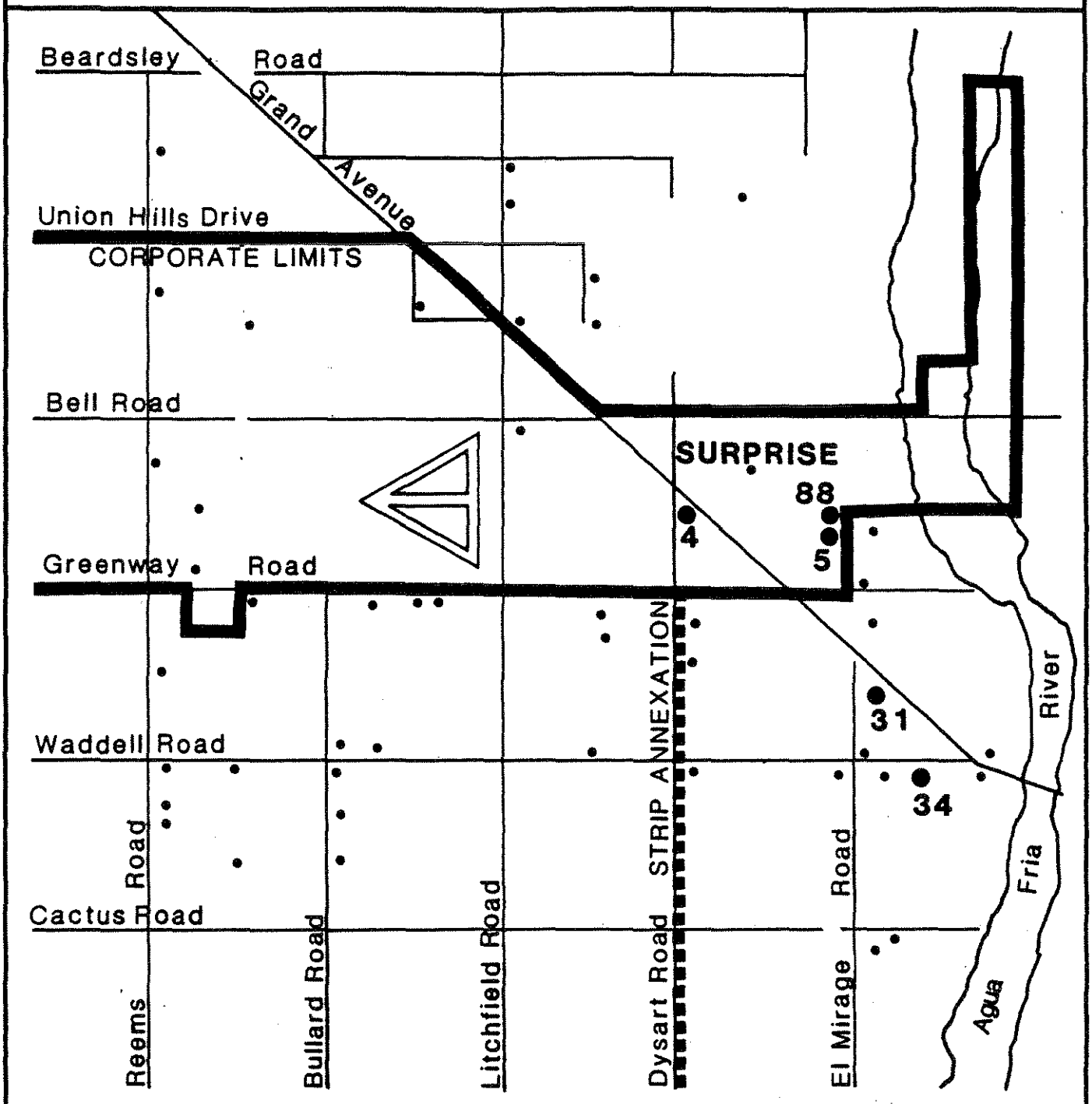
f) Solid Waste Disposal

Solid waste disposal services are provided by the Town of Surprise and collected from approximately 800 accounts. The Town currently charges a monthly fee of $6 for residents and $25 for commercial users with pickups occurring twice weekly. Currently, the refuse is taken to the El Mirage Landfill, but will be transported to the new landfill located to the west of Perryville Road and south of Deer Valley Drive when completed within the

next year. The location of the new landfill will reduce the resulting stress on machinery and improve staff efficiency. Three full-time employees utilize one 1980 packer vehicle and a 1974 flat bed truck for pickup. A 12-year old packer is also available for use, but is only available as a backup. The Town will be purchasing a new sideloader vehicle and heavy duty residential containers to improve service and safely contain solid refuse. One clerk is responsible for administrative duties. Sanitation facilities are inadequate at the present time, and do not generate any revenue back to the community, requiring subsidization by the Town.

Well Water Analysis Locations

• EXISTING WELL SITES
● ANALYZED WELL SITES



Surprise Comprehensive General Plan
Town of Surprise, Arizona

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B.7 Circulation

The Circulation section of the Inventory and Analysis of Existing Conditions is presented in the following three sub-sections:

- Existing Conditions of Transportation Systems
- Planned Transportation Improvements
- Identification of Transportation System Issues

B.7.1 Existing Conditions of Transportation Systems

a) Streets and Highways

Convenient access to a major highway route, U.S. 60, 70 and 89 (Grand Avenue), influenced the establishment of the Town and will continue to be a factor in its growth and development. With the outward urbanization of the Phoenix Metropolitan Area, other arterial streets, particularly Bell Road, are becoming increasingly important to provide traffic access.

Average daily traffic (ADT) volumes for the Town of Surprise and its Planning Area are shown in Figure 14, Existing Transportation System for both existing and projected conditions. Existing volumes were collected from 1984 data and projected volumes utilize the Year 2005 projections, both obtained from the Maricopa Association of Governments (MAG).

As illustrated in the figure, Grand Avenue continues to serve the highest number of vehicles, with daily volumes in the range of 7,000 to 20,000. Bell Road carries high traffic volumes east of Grand Avenue as a result of its service to Sun City West and its through continuity of over 25 miles eastward to Scottsdale. Grand Avenue and Bell Road are the only two roadways which bridge the Agua Fria River to the east of the Town. The Beardsley Canal along the western boundary is bridged by Grand Avenue and Greenway Road.

A basic grid pattern of arterial streets is developing within the Town and its Planning Area. Of these streets, Dysart, Waddell and Litchfield Roads serve the highest traffic volumes, ranging from 1,500 to 4,000 cars per day. The remaining routes, including Cactus Road, Peoria Avenue, Reems Road and Cotton Lane, serving less than 500 vehicles per day each in 1984. The traffic service provided by these arterial routes is currently quite good, with no significant congestion problems. Recent improvements to Bell Road include:

1. New bridge over the Agua Fria River,
2. Dedicated 130 foot right-of-way west of Grand Avenue and 110 foot right-of-way east of Grand Avenue,
3. New signalization at the Grand Avenue intersection, and
4. Upgraded crossing protection at the AT & SF Railroad right-of-way.

These improvements have eased previous congestion east of Grand Avenue and improved safety at intersecting streets.

Three years of accident data (for 1983, 1984 and 1985) were obtained from the Arizona Department of Transportation (ADOT), Traffic Studies Branch. This data appears incomplete, perhaps due to inconsistent accident reporting by overlapping law enforcement jurisdictions and operating agreements among the Towns of Surprise, El Mirage and Youngtown, Maricopa County and the Arizona Department of Public Safety. Multiple accident intersections, with three or more in a year were:

- Bell Road/Greasewood Street
- Bell Road/R.H. Johnson Boulevard
- Bell Road/El Mirage Road
- Bell Road/Dysart Road
- Grand Avenue/Sunny Lane
- Dysart Road/Cactus Road

One fatal accident occurred in 1985 at Cottonwood Street and Maryland Avenue. One pedestrian-related accident took place in 1985 at Rimrock and Jerry Streets, and a bicycle-related accident at Cumbie Lane and Desert Sage Street.

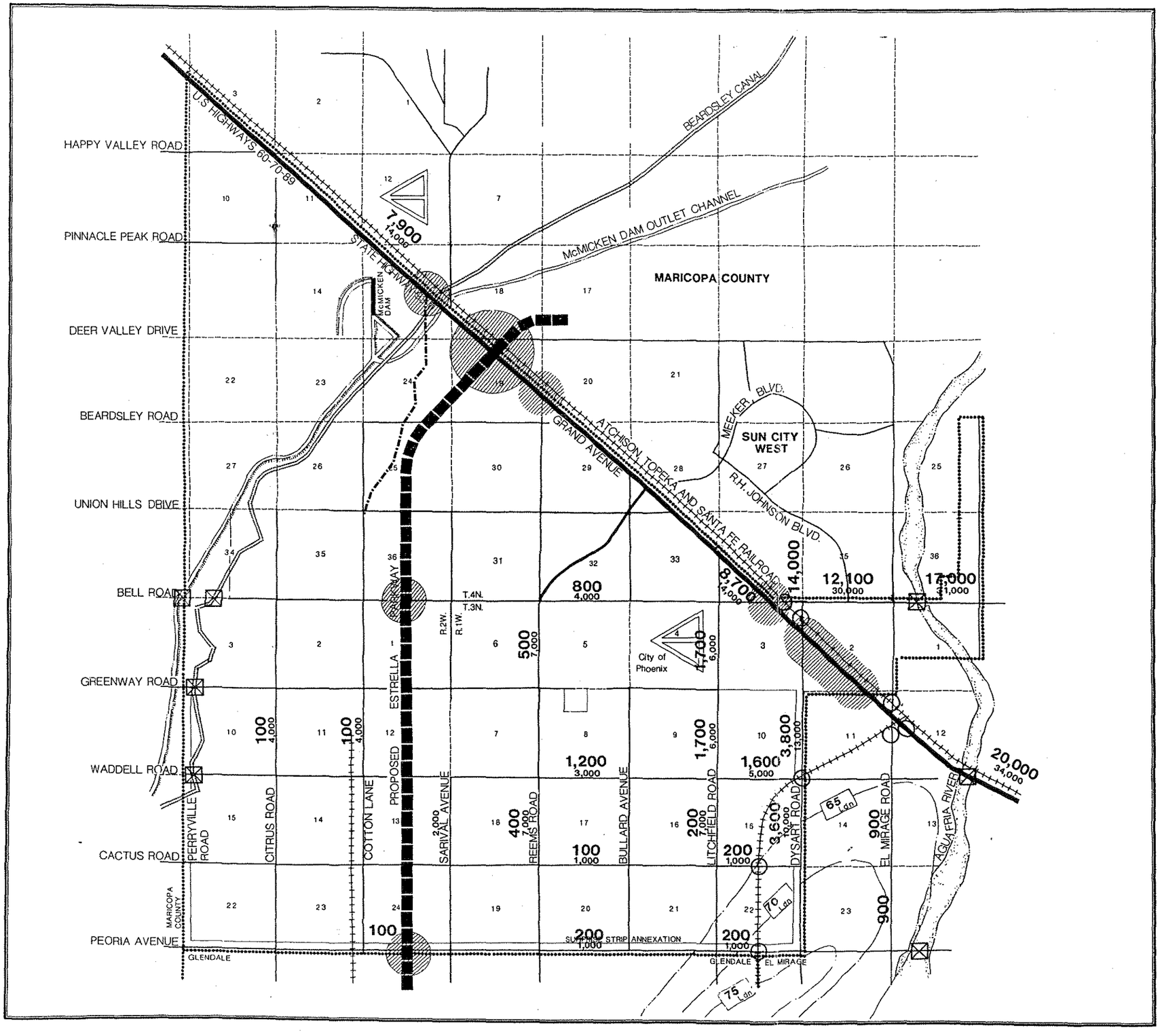
Existing traffic controlled intersections exist at Bell and El Mirage Roads, Dysart Road and Grand Avenue, and Bell Road and Grand Avenue. Needed traffic controls include a signalized intersection at the new Bell Road/Grand Avenue intersection, which will be constructed in 1987, and flashers to supplement stop signs at the Grand Avenue/Sunny Lane and Litchfield Road/Waddell Road intersections. The remaining major street intersections are stop sign controlled.

At-grade railroad crossings occur along the AT & SF Railroad which parallels Grand Avenue, and a spur line which parallels Dysart Road. The at-grade railroad crossings are listed below:

- Factory Avenue
- Sunny Lane
- Dysart Road
- Bell Road
- Waddell/Dysart Road
- Cactus Road
- Peoria Avenue
- R.H. Johnson Boulevard

At the present time, only the Bell Road crossing is upgraded with crossing arms and flashers, Factory Street has crossing arms, but lacks flashers. The remaining locations are only marked with crossbucks.

A minimum 110 foot right-of-way is being required for all arterials on one mile spacings, consistent with Maricopa County standards. Some roadway improvements, particularly Bell Road west of Grand Avenue, have been constructed to Town standards by the private sector in conjunction with new development.



Existing Transportation System

- Principal Arterial
- Proposed Major Arterial
- XXX 1984 Average Weekday Traffic
- XXX 2005 Average Weekday Traffic

Transportation System Issues

- Railroad Crossing
- River/Canal Crossings
- Freeway/Expressway Interface Areas

SURPRISE
Comprehensive Development Plan

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Pavement conditions vary considerably throughout the Town. The local streets are primarily strip-paved, without curb and gutter or sidewalks. Only Greasewood Street in the Original Townsite and Bell Road in new subdivisions are improved with curb and gutter. Street improvements are now occurring on Sunny Lane, Santa Fe Drive and Cottonwood Street and planned for Greenway and Nash Streets.

b) Parking

Off-street parking is provided to serve new development according to Town standards. The quantities of parking provided as well as the circulation aspects should continue to receive close scrutiny to minimize congestion and safety problems on the arterial and collector streets used for access.

On-street parking exists primarily on local neighborhood streets in the Original Townsite area. This parking results from small lot sizes and inadequate off-street space available for parking. It does not present a significant obstacle to traffic movement, however, with children playing in and near the street, but it does potentially obstruct drivers' views.

c) Public Transit Service

Currently, Dial-a-Ride is the only public transit service in the Town of Surprise. The nearest fixed route/fixed schedule bus service is about eight miles to the east at 59th Avenue and Greenway Road.

Regional Rideshare, a service of MAG, provides carpool matching assistance to anyone within the Surprise Planning Area.

d) Pedestrian and Bicycle Systems

The only bicycle system that exists is the recently completed path located on Bell Road, west of Grand Avenue.

B.7.2 Planned Transportation Improvements

a) Streets and Highways

Two major highway corridor studies are now underway to determine the location and design features of elements of the regional freeway/expressway system which will serve the Town of Surprise. These routes are:

- U.S. 60, Grand Avenue - proposed to be upgraded to an expressway.
- Estrella Freeway - a proposed freeway linking Interstate 10 (I-10) with Grand Avenue near Deer Valley Road and with Interstate 17 (I-17) near New River.

Sales tax funding for the regional freeway/expressway system was authorized by Maricopa County voters in October, 1985, enhancing the prospects of their implementation. The implementation schedule of MAG recommends completion of the Estrella Freeway by the Year 2005. The Grand Avenue Expressway is scheduled for completion in segments as follows:

- 1991 - Estrella Freeway to Agua Fria Freeway
- 1995 - Agua Fria Freeway - Papago Freeway

The Town of Surprise is working with the Arizona Department of Transportation and its consultants on both the Estrella Freeway and Grand Avenue studies. The level of traffic service provided will influence the volume and speed of traffic both on the new roadways and connecting streets. Land use development will also be greatly influenced by these facility decisions.

Continued roadway improvements by the private sector in conjunction with private development is anticipated throughout the Planning Area. Future improvements will take place on Nash Street and Greenway from Grand Avenue to Dysart Road through the use of Community Development Block Grant (CDBG) monies. At the present time, planned improvement districts include the Reems-Meeker connection, extending from Bell Road to Grand Avenue and the connection of Litchfield Road to Reems Road. The Town of Surprise requires roadway construction in coordination with adjacent private development to Town standards.

b) Parking

No changes in existing on-street or off-street parking are currently planned. In connection with roadway construction, all new development will be required to construct off-street parking to Town standards.

- Public Transit Service

Changes in public transit services are not currently planned, although a regional study has recently been completed.

The West Valley Transit Study was conducted by MAG to study future transportation needs of West Valley communities through the Year 1995. Based on this study, the following four points are recommended regarding future transit planning for Surprise and its Planning Area.

- Cooperation of transit marketing and coordination with nearby communities is preferable to each community instituting its own transit program, due to the existing low population base of the area. A formal organization should be established among communities to render impartial decisions.

- The service connecting both Sun City and Sun City West through Surprise could economically benefit the Town due to retiree patronage and added transit service.

- Service to other communities should grow from route extensions eminating from Phoenix/Glendale.

- The redesign and upgrading of Grand Avenue will give Surprise the opportunity to reserve land for a "Park and Ride" facility for express service to Phoenix. In the long-range future, another similar facility could be developed at the intersection of Grand Avenue and the Estrella Freeway.

B.7.3 Identification of Transportation System Issues

Transportation issues identified on the previous page are illustrated on Figure 15, Transportation Issues and summarized below.

- The Agua Fria River on the east and Beardsley Canal on the west interrupts the arterial street system and limits regional access in the Planning Area.

- Limited crossings of Grand Avenue and the parallel railroad tracks restrict movement between the neighborhoods and community facilities on either side of the Original Townsite.

- Poor geometrics result in a bottleneck at Grand Avenue/Sunny Lane and indirect traffic movement at Factory, Greenway and Greasewood Streets.

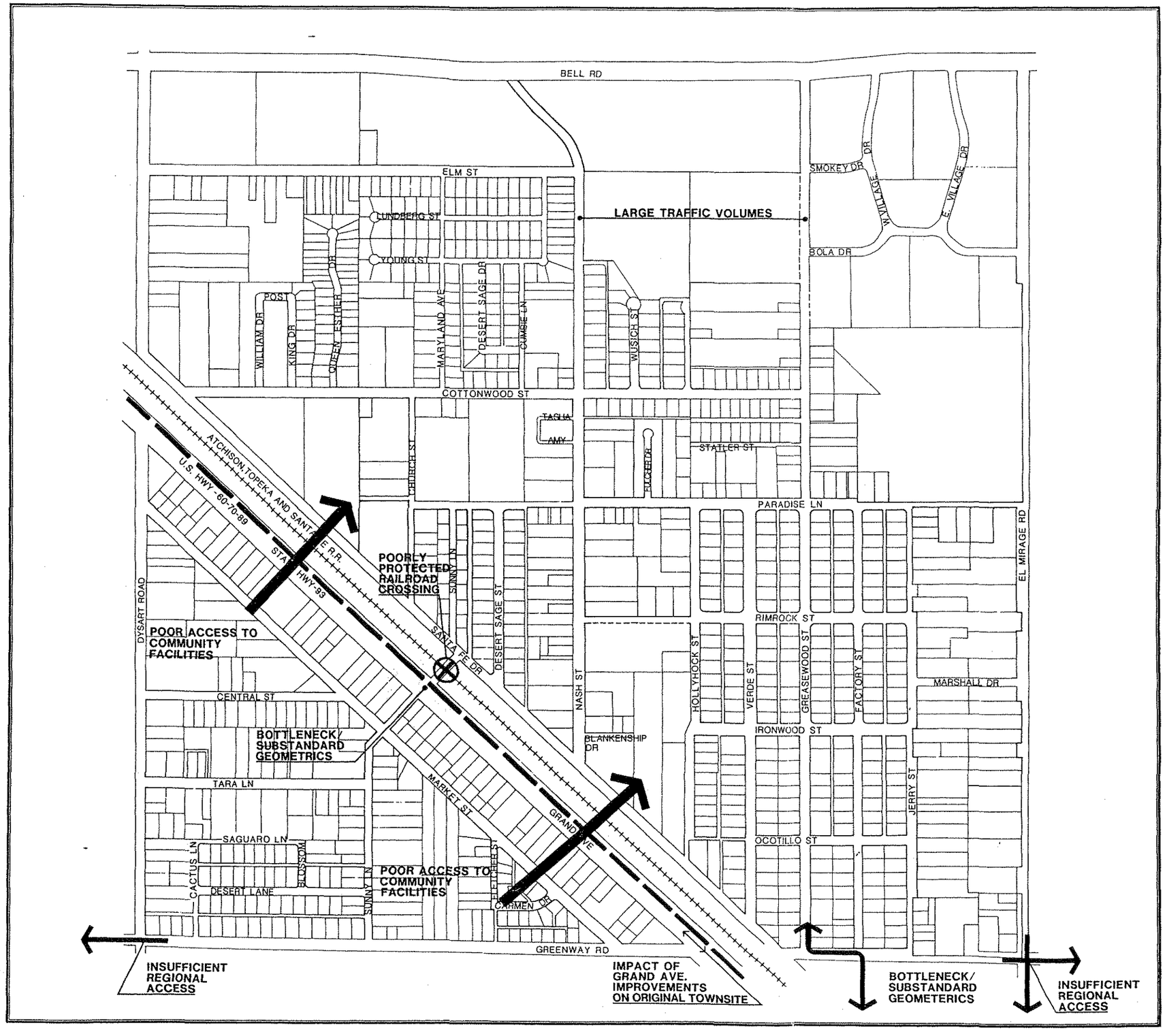
- Minimum railroad crossing protection is provided at most street and railroad crossings.

- Pavement conditions vary widely, most streets have no urban improvements (curb, gutter and sidewalk).

- Residents have complained that traffic is too heavy on some community streets.

- Major transportation and land use changes will occur in the areas adjacent to interchanges with upgrading of Grand Avenue to an expressway and the development of the Estrella Freeway.

- Public transportation and facilities for pedestrians and bicycles are lacking in the Town of Surprise and its Planning Area.



ORIGINAL TOWNSITE
Transportation Issues

Proposed Expressway

Issue Areas

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Comprehensive Development Plan

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B.8 Population

The purpose of the Population section of the Inventory and Analysis of Existing Conditions is to analyze the projected population growth of Surprise and its Planning Area through the Year 2000.

The population allocations for Municipal Planning Areas (MPA's) and Districts are prepared by the Maricopa Association of Governments/Transportation Planning Office (MAGTPO) staff, which are then subject to an extensive review process and adoption by the MAG Regional Council.

As stated by MAG in its 19 December 1984 statement of adopted population allocations for Maricopa County: 1985 - 2015;

> "...the allocations to the Municipal Planning Areas and District levels were based upon an approach that combined elements of urban growth and dynamics with subjective evaluation for each district within the County. District specific land use, employment and population, and housing information were compiled from each jurisdiction and from various secondary data sources. Particular attention was given to input from the local planning community. The location of existing major employment centers, planned major developments, and the location and timing of the transportation network within Maricopa County were also included in the analysis."

According to the Arizona Department of Economic Security, as of July 1986, the State increased its population base to 3,298,000. This figure represents more than a three percent annual growth factor, which closely parallels the July 1986 growth for Maricopa County, having a population of approximately 1,863,900 residents. Although the Town had an October 1985 population of 4,355 residents, as reported by MAG, this figure is considered low by the Town Staff because the growth does not include the number of seasonal residents (i.e. Sunflower or Happy Trails) and the population figure for 1985 does not include undocumented residents who contribute between 500-600 people to the Town's population. As shown in Table 4, Surprise Population Projections, the MAG allocations start from the Year 1980 population base figure to project future population growth for the Town and its Planning Area to the Year 2015.

TABLE 4
Surprise Population Projections

MPA District	1980	1985	1990	1995	2000	2005	2010	2015
Surprise 15	491	467	5,098	27,261	38,045	44,745	52,007	60,419
Surprise 16	3,633	3,888	9,630	15,312	16,285	16,677	16,894	16,923
MPA TOTAL	4,124	4,355	14,727	42,573	54,329	61,422	68,901	77,342

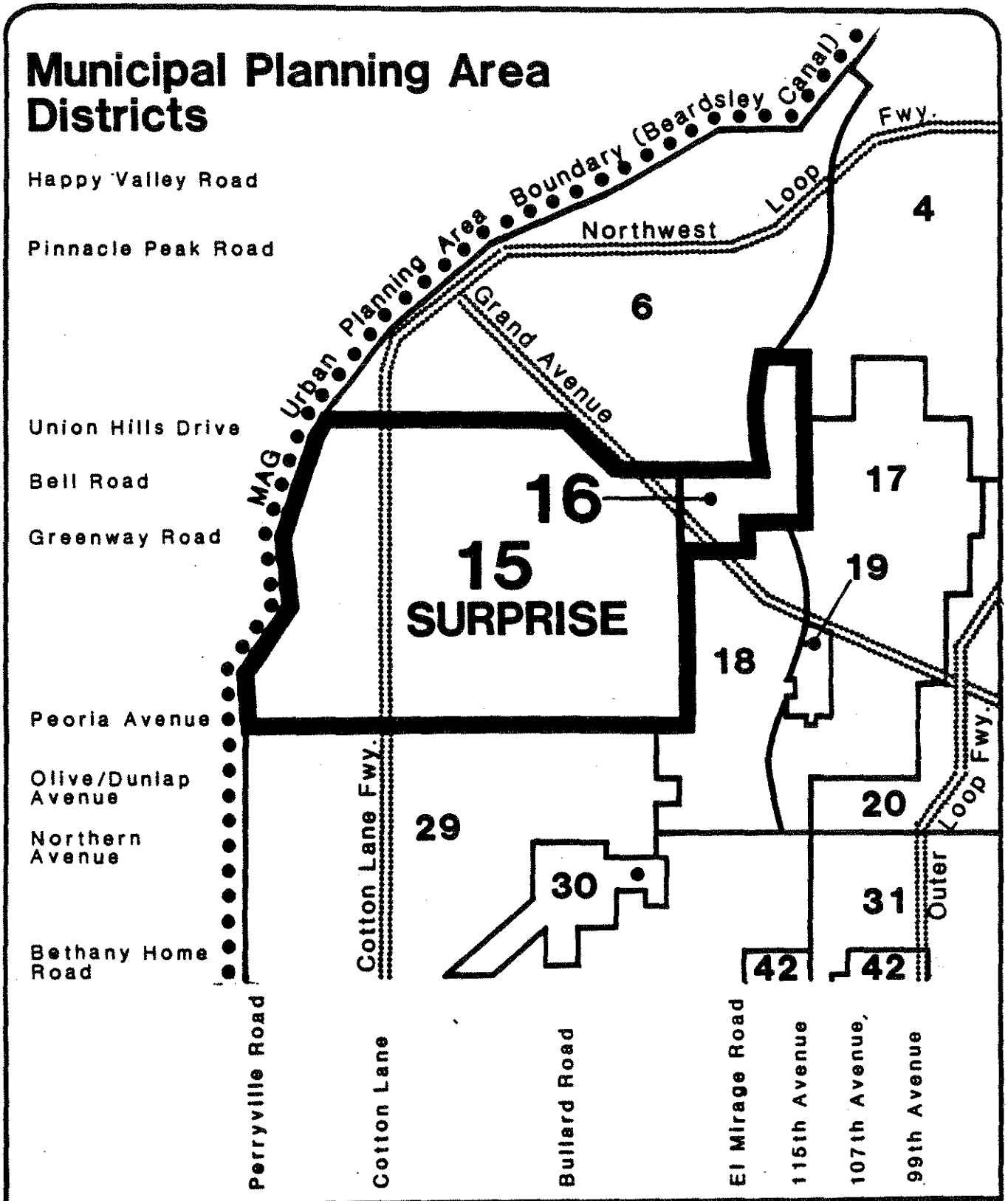
Source: Maricopa County Association of Governments, 1987

The Municipal Planning Area (MPA) totals were taken from the two districts that comprise the Surprise Allocation Area (Surprise 15 and 16), as illustrated on Figure 16, Municipal Planning Area Districts. These districts do not quite include the entire Town of Surprise Planning Area.

The analysis of the MPA total for six future forecast periods shows that the Town is projected to grow by more than 200 percent through the Year 1995. This growth is projected to sharply decline (27 percent) through the Year 2000 and will maintain a constant 12 percent growth rate through the Year 2015. The projected growth will then be cut in half at each five-year period through the Year 2015. The primary reasons for the dramatic population increase for the Surprise Planning Area hinge upon the availability of large, single owner land parcels for development, relatively low land costs and the recent decline of interest rates.

Although the MAG figures are conservative for the Town and its Planning Area, the population projections were still utilized to indicate the future population that is expected within the Planning Area.

Municipal Planning Area Districts



Surprise Comprehensive General Plan

Town of Surprise, Arizona

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B.9 Municipal Fiscal Conditions

The Municipal Fiscal Conditions section of the Inventory and Analysis of Existing Conditions analyzes the existing and projected revenues and expenditures of Surprise, as well as projecting future resources for the Town.

The Town of Surprise fiscal year budget runs from July 1 to June 30 each year and has a ceiling of $820,000 for expenditures. This state imposed spending limit can be surpassed by the passage of a Home Rule Election or an Override Election. A Home Rule election is set for 1987 and is voted on at the General Primary. The Override Election took place on 20 May 1986 and passed by a margin of 315 to 23. The $1.4 million override will be used to hire police officers and firefighters, purchase patrol cars and purchase a rapid rail automated rubbish collection system for residential pickup. A second ballot issue also passed 299 to 37, which will give Town officials the authority to pursue the establishment of a municipal sewer system.

The Summary of Expenditures for the Town of Surprise is illustrated on Tables 5, 6 and 7, and presents the Town's expenditures by department/ program and fund for Fiscal Years (FY) 1985-1986, 1984-1985 and 1983-1984 respectively. Each summary has been broken down to include the previous adopted budget, contingency adjustment, past expenditures and the present adopted budget. Over the past three-year period (1983-1986), the adopted budget has maintained a consistent 20 percent annual increase while contingent adjustments have been balanced at the end of each year. Revenue for the Town has increased dramatically and results from a number of sources. Intergovernmental revenues, sales tax, urban revenue sharing and the state lottery are large contributors to Town funds. Highway user revenues are generated from a combination of the Town population and the gas tax. The Town was also the recipient of three federal Urban Development Action Grants (UDAG), which have been used to stimulate economic development. Federal Community Development Block Grant (CDBG) funds received through Maricopa County are used regularly for capital improvement projects and are currently being used for major street improvements. The sales tax has also increased Town revenue nearly $93,000 in the past year. The development pressure and resulting construction has also added revenue through development fees, building permits and increased garbage collection service. Expenditures have increased dramatically in the past year due to salary increases for Town administrative staff and a decline in Federal Revenue Sharing Funds. The adopted budget for the current fiscal year has risen 89 percent, which has been the result of both the organization of street improvement districts and special assessment debt service.

The current fiscal condition within the Town is very sound with the passage of the override election and continued increases in City, State and Town revenue. The only limitation exists with the antiquated state imposed spending limit which used a formula derived from the 1979 Town population and the 1980 budget year.

TABLE 5
Summary of Expenditures by Each
Department/Program and Fund:
Fiscal Year 1985-1986

Department Program		Adopted Budget Previous Year	Contingency Adjustment	Estimated Expenditures Previous Year	Adopted Budget Current Year
(1)	Mayor and Council	$18,377	$ -	$18,276	$25,220
(2)	Town Manager	80,329	-	64,074	96,540
(3)	Town Court	25,798	-	25,652	55,190
(4)	Town Attorney	20,000	819	20,819	25,000
(5)	Town Clerk	56,942	20,481	77,423	101,865
(6)	Police Department	311,830	-	285,500	371,695
(7)	Fire Department	13,400	967	14,367	26,850
(8)	Community Center	5,000	-	2,794	5,000
(9)	Building Regulation	-	-	-	44,140
(10)	Maintenance Department	22,000	-	21,285	23,970
	Less: Work Order Credits	(22,000)	-	(21,285)	(23,970)
(11)	Risk Management (Insurance)	-	-	-	14,000
(12)	Parks and Recreation	57,524	-	50,971	94,545
(12a)	Library	-	-	-	3,625
(13)	Elections	2,000	-	688	
(14)	Sanitation Department	75,200	-	69,863	86,205
(15)	Streets & Highways - HURF	312,653	-	135,368	238,915
(15a)	Streets & Highways - ITAF	74,452	-	-	75,000
(15b)	Streets & Highways District	-	-	-	7,618,000
(15c)	Special Assessment Debt Service	-	-	-	1,524,000
(16)	Federal Revenue Sharing (itemize by function)				
(16a)	Capital Outlay (All Depts)	25,000	33,008	58,008	43,995
(16g)	Attorney	-	13,100	13,100	-
(16h)	Travel	-	221	221	-
(16i)	Maricopa County Water Conservation District	-	2,000	2,000	-
(16j)	Animal Control	-	2,138	2,138	-
	Contingency	54,746	(50,647)	-	-
	Contingencies	57,552	(22,267)	-	53,588
	TOTAL DEPARTMENTS/ PROGRAMS	**$1,190,803**	**$ -**	**$841,262**	**$10,503,373**

*Adjustments resulting from contingencies approved during the year.

Source: Town of Surprise Annual Budget, August 1985

TABLE 6
Summary of Expenditures by Each
Department/Program and Fund:
Fiscal Year 1984-1985

Department Program		Adopted Budget Previous Year	Contingency Adjustment	Estimated Expenditures Previous Year	Adopted Budget Current Year
(1)	Mayor and Council	$16,315	$ -	$15,969	$17,000
(2)	Town Manager	33,500	1,757	35,257	72,000
(3)	Magistrate Court	22,950	-	21,557	23,300
(4)	Town Attorney	12,000	5,166	17,166	20,000
(5)	Town Clerk	37,300	1,874	39,174	52,000
(6)	Police Department	243,050	-	238,834	278,000
(7)	Fire Department	8,100	2,232	10,322	13,000
(8)	Community Center	2,300	1,762	4,062	5,000
(9)	Zoning Board	903	-	841	1,000
(10)	Maintenance Department	17,504	2,174	19,678	22,000
	(Less: Work Order Credits)	(17,504)	(2,174)	(19,678)	(22,000)
(11)	Retirement & Unemployment	38,400	-	36,103	54,400
(12)	Parks and Recreation	48,275	4,497	52,772	53,500
(13)	Elections	-	-	-	2,000
(14)	Sanitation Department	72,918	-	68,237	75,200
(15)	Streets Department	236,109	-	110,963	387,105
(16)	Federal Revenue Sharing (itemize by function)				
(16a)	Capital Outlay	-	-	-	-
(16b)	General	-	5,655	5,655	-
(16c)	Police Department	-	-	-	25,000
	Contingencies	45,694	(5,655)	-	54,746
	Contingencies	127,544	(17,288)	-	57,552
	TOTAL DEPARTMENTS/ PROGRAMS	$945,358	$ -	$656,649	$1,190,803

*Adjustments resulting from contingencies approved during the year.

Source: Town of Surprise, August 1984

TABLE 7
Summary of Expenditures by Each
Department/Program and Fund:
Fiscal Year 1983-1984

Department Program		Adopted Budget Previous Year	Contingency Adjustment	Estimated Expenditures Previous Year	Adopted Budget Current Year
(1)	Mayor and Council	$ 17,270	$ -	$ 16,299	$ 16,315
(2)	Town Manager	17,590	-	15,624	33,500
(3)	Magistrate Court	24,844	-	18,869	22,950
(4)	Town Attorney	17,000	-	10,067	12,000
(5)	Town Clerk	27,140	-	22,769	37,300
(6)	Police Department	194,748	-	177,392	243,050
(7)	Fire Department	9,310	-	6,770	8,100
(8)	Community Center	3,000	-	2,038	2,300
(9)	Zoning Board	452	70	473	903
(10)	Maintenance Department	17,848	-	15,912	17,504
	(Less: Work Order Credits)	(17,848)	-	(15,912)	(17,504)
(11)	Retirement & Unemployment	49,250	-	33,900	38,400
(12)	Parks and Recreation	19,023	1,220	20,243	48,275
(13)	Elections	2,000	-	1,080	-
(14)	Sanitation Department	62,666	5,959	68,625	72,918
(15)	Streets Department	232,131	-	198,282	236,109
(16)	Federal Revenue Sharing (itemize by function)				
(16a)	Capital Outlay	-	-	-	-
(16b)	General	2,318	2,000	4,150	-
(16c)	Police Department	25,000	(2,000)	20,000	-
(16d)	Operating	-	-	-	-
(16e)	Parks and Recreation	10,000	-	10,000	-
(16f)	Public Safety	10,000	-	9,904	-
	Contingencies	-	-	-	45,694
	Contingencies	34,347	(7,249)	-	127,544
	TOTAL DEPARTMENTS/ PROGRAMS	$758,089	$ -	$636,485	$945,358

*Adjustments resulting from contingencies approved during the year.

Source: Town of Surprise Annual Budget, August 1983

B.10 Issue Identification

The Issue Identification section summarizes the Inventory and Analysis of Existing Conditions of the Surprise Comprehensive Development Guide and utilizes the two sources listed below to identify key planning issues.

- Community Issue Identification
- Planning Team Inventory and Analysis

The results of the issue identified action process was evaluated, and then used to formulate Chapter C, Goals Objectives and Policies. The preparation of interrelated goals, objectives and policies provided the basis to guide the remainder of the planning process.

B.10.1 Community Issue Identification

The first community workshop held on 10 March 1986 was sponsored by the CDGAC and focused on the identification of community issues that will affect the future planning and development of Surprise. Residents, business people, property owners and Town Council members were invited to attend so they could participate in the planning process.

More than 20 citizens attended the meeting to identify issues that are concerns of both the Town officials and residents. Participants at the workshop identified 30 specific issues within the categories of land use/development, transportation, public facilities and services, and redevelopment/revitalization. Within each category, a specific issue was identified and then assigned a high, medium, or low value by the audience to target important issues to be used to formulate Goals, Objectives and Policies.

B.10.2 Planning Team Inventory and Analysis

As the Planning Team prepared the Inventory and Analysis of Existing Conditions chapter for the Surprise Comprehensive Development Guide, it noted specific issues that surfaced as a result of the extensive inventory and documentation that was conducted. This included identifying issues in the areas of compatible land uses; functional circulation; adequate public facilities and services and redevelopment/revitalization.

B.10.3 Issue Identification Summary

All major issues generated from the two sources described above have been compiled and are summarized below. Issues are presented in the four general categories of Land Use/Development; Transportation; Public Facilities and Services; and Redevelopment/Revitalization. These form the foundation of the Goals, Objectives, and Policies chapter of the Development Guide.

Table 8, Summary Issue Identification and Rating, presents the list of issues along with a summary value rating assigned to each issue of the Inventory and Analysis of Existing Conditions within the Comprehensive Development Guide. Also included in the table are notes on the principal points of interest which have evolved from the rating procedure.

TABLE 8
Summary Issue Identification and Rating

Issues	Value Rating High	Value Rating Medium	Value Rating Low	Notes
LAND USE AND DEVELOPMENT				
Dedication of Park/School Sites with New Development	●			(1)(2)
Retirement Area Extension			●	(3)
Proper Land Use Mix			●	(4)
Zoning Changes Consistent with Land Use Plan	●			(5)(6)
Community Character	●			(7)(8)
Attract Employment	●			(9)(10)
Land Use Based on Existing Infrastructure	●			(11)(12)
Control Commercial and Industrial Development	●			(6)(10)
PUBLIC FACILITIES AND SERVICES				
Overcrowded Schools	●			(1)
Lack of Crosswalks and Sidewalks	●			(13)
Lack of Park System	●			(2)(13)
Public Services to Match Growth	●			(11)(12)(13)
Children's Community Centers	●			(13)
Lack of Sewer System	●			(11)(12)(13)
Senior Social Program	●			(14)
Public Service Activities	●			(15)
TRANSPORTATION				
Develop Functional Street System	●			(16)
Access to Parks	●			(2)(13)
Linear Park System		●		(2)
Need for Street Lighting	●			(13)
Estrella Parkway R.O.W. Access		●		(16)(17)
Grand Avenue Alternatives	●			(18)
Dedicate Future R.O.W.	●			(16)
Evaluate Transit Alternatives	●			(19)

TABLE 8
Summary Issue Identification and Rating
(Continued)

Issues	Value Rating High	Medium	Low	Notes
REDEVELOPMENT/REVITALIZATION				
Traffic - Greasewood and Nash Streets	●			(16)(20)
Factory Street Bottleneck	●			(16)(18)
Grand Avenue Impact	●			(16)(18)
Original Townsite Utility Conditions	●			(13)
Low Income Housing	●			(21)
Mobile Homes		●		(5)(6)(22)
Sweat Equity to Rehabilitate	●			(14)(15)
Police Protection	●			(11)(12)(23)

Source: BRW, Inc., 1986

Notes on Issue Identification

(1) Currently no schools are located within the Surprise Planning Area boundary. As the population grows, a school master plan will have to be created to phase construction and locate schools in proximity to large residential districts.

(2) The only existing parks within the Townsite are located to the north of Grand Avenue. A linked system should be created to tie both existing existing and proposed parks for use by pedestrians and cyclists within the Planning Area.

(3) Due to the proximity of Sun City West and the low median age of Surprise residents, promoting increased retirement areas was not considered an important issue.

(4) Due to the low economic base of the Town, the residents do not seem concerned with having an adequate, diverse blend of land uses.

(5) The existing zoning map is dated and does not reflect future growth trends for the Planning Area. An updated map reflecting a combination of community desires and solid planning concepts will satisfy this issue.

(6) The existing zoning ordinance will need both expansion and refinement in the areas of residential, commercial and industrial zones; design standards; placement and control of mobile homes; and streamlining the development process.

(7) The existing Townsite suffers from a negative image, which can be enhanced through the usage of signage control, entry statements, landscaping and architectural treatment.

(8) Strive to save and rehabilitate structurally sound buildings within the Original Townsite.

(9) Establish a strong community image based on the family, which would include adequate housing, shopping opportunities, schools and recreation areas.

(10) Provide suitable zoning districts for office, commercial and industrial users.

(11) Promote infill development.

(12) Utilize growth management techniques and development phasing to promote orderly growth.

(13) The financing of street improvements and other public services/facilities must be properly planned and publicized so public infrastructure is maintained and upgraded on a frequent basis.

(14) Develop a program to involve senior citizens as volunteers and promote senior citizen interaction.

(15) Utilize citizens and civic organizations in a community-wide program to clean blighted areas to promote Town pride.

(16) A functional street classification system should be established which includes design standards and locations of both existing and future collector and arterial streets.

(17) Once the freeway alignment and interchanges are located, analysis of future land use should be completed to plan for future development along the future high volume corridor.

(18) Evaluate both the low and high volume Grand Avenue alternatives to determine the optimum solution for the Town in terms of access points and through traffic capability.

(19) Analyze the West Valley Transit Study to determine the present and future transit needs for the Town.

(20) Strategies must be developed to limit the volume and speeds of vehicles using both Greasewood and Nash Streets.

(21) Analyze affordable low cost housing alternatives to provide satisfactory shelter for Town residents.

(22) Strategies must be developed to locate mobile home communities in areas of compatible land use.

(23) The future growth of Surprise will dictate the need to create a public safety master plan to initiate and upgrade the protection needs of the community.

C. GOALS, OBJECTIVES AND POLICIES

The formulation of realistic and implementable policies for the Surprise Comprehensive Development Guide is predicated upon the definition of a set of comprehensive goals and objectives in each of the Development Guide's six component elements:

- Land Use
  - Land Use/Growth Management
  - Housing
  - Economic Development
- Environmental Enhancement and Design
- Open Space and Recreation
- Circulation
- Public Facilities and Services
- Redevelopment/Revitalization

This chapter of the Surprise Comprehensive Development Guide represents the Goals, Objectives and Policies by Development Guide element area. The goals are intended to define rather broad aims in each subject area. The objectives are intended to identify basic approaches to achieving those goals which are measurable and verifiable. The policies are brief, direct statements of what the Town of Surprise intends to do to implement the goals and objectives.

The Goals, Objectives and Policies were presented for review and critique to the Town staff and Development Guide Advisory Committee on 23 June 1986, and at a Community Goals, Objectives and Policies Workshop at the Surprise Town Hall on 16 September 1986.

These Goals, Objectives and Policies were adopted by the Surprise Planning and Zoning Commission on 23 December 1986, and set the stage for public and private actions geared to the orderly development of the Town of Surprise Planning Area, aggressive economic development for the Town, revitalization of the older portions of the Town, and the establishment of a comprehensive system of public infrastructure and facilities to support the Town's growth and revitalization.

The Land Use Goals, Objectives and Policies are presented in three component areas:

- Land Use/Growth Management
- Housing
- Economic Development

C.1 Land Use

C.1.1 LAND USE/GROWTH MANAGEMENT

GOAL A: CAREFULLY MANAGE AND CONTROL DEVELOPMENT TO ACHIEVE ORDERLY MUNICIPAL GROWTH

Objective A-1: Allow urban growth only in a planned, orderly manner to encourage high quality development and create a compact, cost-efficient urban development pattern.

Policy A-1a: The Town shall prepare and adopt a Comprehensive Development Guide, including a Land Use element, an attendant updated Zoning Ordinance and an Official Zoning Map, to identify its objectives with regard to land use and development within its corporate limits through the Year 2000.

Policy A-1b: The Town shall establish and follow an orderly plan for the phased extension of public utilities and streets within its corporate limits in order to stimulate quality neighborhood and economic development consistent with the adopted Development Guide Plan.

Policy A-1c: The Town shall require private developers to install all public utilities and facilities to State and municipal standards, as required by their proposed development projects.

Policy A-1d: The Town shall carefully review each proposed development project to insure that all State and municipal standards are met relative to maintaining overall public health and safety (e.g. transportation access for emergency vehicles, proper disclosure of hazardous materials use or production).

Objective A-2: Actively promote the use of undeveloped land, or areas appropriate for development or redevelopment, within the Town and its Planning Area which is already served by public facilities and utilities.

Policy A-2a: The Town shall encourage infill development through an adopted Development Guide Plan that is a component of the Comprehensive Development Guide, a well developed and administered Zoning Ordinance, and public information targeted to the development community emphasizing the advantages and opportunities relative to developing within the Town or its Planning Area.

Policy A-2b: The Town shall work with property owners and others, as appropriate, to resolve any physical constraints (e.g. land use conflicts, removal of condemned structures) on major vacant or under-utilized land parcels within the Original Townsite, or elsewhere within the Town to encourage appropriate development.

GOAL B: ENCOURAGE NEW DEVELOPMENT OF SOUND AND STABLE NEIGHBORHOODS

Objective B-1: Create stable, identifiable residential neighborhoods which contain a full compliment of supportive commercial, institutional and public facilities.

Policy B-1a: The Town shall use as a guideline the adopted Development Guide Plan element of its Comprehensive Development Guide to encourage full, quality development of new neighborhoods, and/or redevelopment as appropriate of its existing neighborhoods.

Policy B-1b: The Town shall refine its Zoning Ordinance and Official Zoning Map, as necessary, and utilize them, in conjunction with its subdivision regulations, a Capital Improvements Program (C.I.P.), and an expeditious Development Review and Approval process to implement the Development Guide Plan to insure neighborhood quality.

Policy B-1c: The Town shall establish on an annual basis, a C.I.P. which identifies and ranks major public improvement projects, estimates costs, establishes timing and identifies revenue sources to carry out the projects in support of residential and economic development.

Policy B-1d: The Town shall establish and enforce neighborhood design standards (e.g. general land use allocation, densities, open space standards, access guidelines, roadway standards, etc.) to encourage the future development of quality residential environments.

Objective B-2: Designate the appropriate land use for all land parcels within the Planning Area.

Policy B-2a: The Town shall use as a guideline its adopted Development Guide Plan and Zoning Ordinance to guide and encourage the use of all major undeveloped land within the Town and Planning Area.

Objective B-3: Reduce and phase out the effects of current land use incompatibilities, and in the future, minimize the creation of new conflicts.

Policy B-3a: The Town shall use as a guideline its adopted Development Guide Plan and Zoning Ordinance to guide land use and site development decisions for both existing and future urban areas.

Policy B-3b: The Town shall investigate the use of regulatory and cost-effective financial redevelopment incentives to resolve critical land use incompatibilities, particularly those located within the Original Townsite.

C.1.2 HOUSING

GOAL C: PROVIDE ADEQUATE HOUSING FOR PRESENT AND FUTURE RESIDENTS OF SURPRISE AT ALL INCOME LEVELS.

Objective C-1: Encourage new housing developments that offer a range of housing types and sizes within the Town of Surprise and its Planning Area.

Objective C-2: Utilize Building Codes and Zoning and Subdivision Regulations to assure quality housing development in Surprise.

Objective C-3: Promote the development and/or rehabilitation of affordable rental housing compatible in scale and character with surrounding neighborhoods.

Policy C-1/2/3a: The Town shall acknowledge that the provision of new housing is primarily the job of the private sector. In responding to market demands, the Town shall encourage development of all types of housing through expeditious and proper application of land use planning, zoning regulations, site design review and building inspections to enhance the quality of life in Surprise.

Policy C-1/2/3b: The Town shall continue to utilize all available local, State and Federal resources to help provide adequate, safe housing for persons of low- and moderate-income.

Policy C-1/2/3c: The Town shall guide the use of mobile homes in strict conformance with adopted development standards (e.g. screening, landscaping, provision of standard streets and utilities) in designated residential areas.

GOAL D: IMPROVE THE SELECTION AND EXPAND THE QUANTITY AND QUALITY OF HOUSING UNITS IN SURPRISE

Objective D-1: Encourage the expansion of residential development in the Town of Surprise and its Planning Area.

Objective D-2: Encourage the development of a wide selection of single-family housing types and sizes in the Town of Surprise and its Planning Area.

Objective D-3: Encourage the development of planned residential neighborhoods in newly developing areas of Surprise and its Planning Area.

Policy D-1/2/3a: The Town shall use as a guideline the adopted Development Guide Plan, as part of its Comprehensive Development Guide, to encourage quality housing development, by designating large residential areas buffered from adjacent uses, and providing a full range of supportive uses (e.g. retail, services, schools, etc.) to these areas.

Policy D-1/2/3b: The Town shall utilize its C.I.P. to identify and prioritize for construction on an orderly basis necessary major public facilities and utilities to support newly developing residential areas.

Policy D-1/2/3c: The Town shall aggressively market itself to the Phoenix Metropolitan Area and regional housing developers as an opportune area in which to develop with its interest in quality planning and development; willingness to work with the developer to insure an expeditious review, approval and development process and aggressive posture relative to expanding its employment base and other economic development activities supportive of residential development.

C.1.3 ECONOMIC DEVELOPMENT

GOAL E: PROMOTE AND MAINTAIN QUALITY COMMERCIAL AND INDUSTRIAL DEVELOPMENT

Objective E-1: Encourage the upgrading and expansion of existing commercial, service and industrial facilities in the Town of Surprise and its Planning Area, to include new employment opportunities for Town residents.

Objective E-2: Create stable, identifiable and functional commercial and industrial districts that contain a full complement of supportive facilities, and are compatible with their neighboring land uses.

Policy E-2a: The Town shall use the Development Guide, Environmental Design, Open Space and Recreation, Circulation, Public Facilities and Services and Redevelopment Plan elements, of its Comprehensive Development Guide, and Zoning Ordinance and Subdivision Regulations to guide the proper land development of non-residential areas in the Town of Surprise and its Planning Area.

Policy E-2b: The Town shall establish and enforce commercial and industrial district design standards to encourage the future development of quality employment, commercial and industrial centers.

Policy E-2c: The Town shall utilize its C.I.P. to identify and prioritize for construction the necessary major public facilities and utilities to support newly developing non-residential areas.

Objective E-3: Actively promote the Town of Surprise as an area that encourages quality commercial and job-based industrial development.

Policy E-3a: The Town of Surprise shall establish an Economic Development Program with appropriate staff and support resources (e.g. marketing brochures, slide show, etc.) to aggressively pursue quality commercial and industrial development projects to Surprise.

Policy E-3b: The Town shall on its own, and in conjunction with such groups as the Phoenix Metropolitan Chamber of Commerce, Northwest Development Group, and others, actively promote itself as an area that is seeking quality, commercial and industrial development, and will work with developers and industry to accomplish this in an expeditious manner.

C.2 Environmental Enhancement and Design

GOAL F: CREATE AND MAINTAIN A HIGH LEVEL OF ENVIRONMENTAL QUALITY IN THE TOWN OF SURPRISE

Objective F-1: Strive to maintain high standards of air quality in the Town of Surprise.

Policy F-1a: The Town shall utilize transportation system management (TSM) techniques, such as improved public transit, synchronized traffic signals, and efficient traffic flow and turning movements to minimize vehicle generated air pollution.

Policy F-1b: The Town shall create a comprehensive transportation system for non-motorized transportation modes (i.e., bicycles, pedestrians, golf carts, etc.) linking both residential, commercial and open space districts.

Policy F-1c: The Town shall encourage mixed use developments that minimize vehicle trips and trip lengths.

Policy F-1d: The Town shall explore viable public transit options that will cost effectively provide local collection/distribution services, as well as linkages to other locations within the Phoenix Metropolitan Area.

Objective F-2: Strive to maintain a high level of water quality and minimize water consumption in the Town of Surprise.

Policy F-2a: The Town shall require the use of public sewer systems in all new development to minimize the potential for groundwater contamination.

Policy F-2b: The Town shall develop an area-wide plan for reclaiming and recycling stormwater and wastewater through a viable tertiary treatment and redistribution program for the irrigation of developed open space, recreation and public roadway and trail rights-of-way.

Policy F-2c: The Town shall encourage water conservation in all new development through the utilization of drought tolerant plant materials, efficient irrigation systems (drip/low flow), and through water conserving fixtures in all new residential and commercial construction.

Objective F-3: Strive to make the Town of Surprise as energy conserving as possible.

Policy F-3a: The Town shall encourage the establishment of recycling centers for recyclable waste products (i.e., paper, aluminum, glass, etc).

Policy F-3b: The Town shall utilize recycled products when and where appropriate in its operations.

Policy F-3c: The Town shall encourage energy conservation in the development approval process through the use of techniques such as:

- Appropriate building orientation and site planning
- Energy efficient building construction techniques
- Use of active and passive solar energy systems
- On-site transportation system management (TSM) for commercial and mixed use developments

Policy F-3d: The Town shall apply energy conservation techniques in all municipal facility operating procedures (e.g. building construction/rehabilitation, equipment operations, etc.).

Objective F-4: Promote the preservation of the natural environment in the Town of Surprise Planning Area.

Policy F-4a: The Town shall, through development review and approval, minimize natural and man-made environmental hazards (i.e., erosion, flooding, excessive noise, etc.) throughout its Planning Area.

Policy F-4b: The Town shall ensure that all commercial and industrial activities are carefully monitored relative to the use, production and disposal of hazardous materials, and that all hazardous materials handling is routed away from residential neighborhoods.

Policy F-4c: The Town shall limit residential development from areas of 65 Ldn noise levels or greater (e.g. Luke Air Force Base, truck routes, airports, highways).

Policy F-4d: The Town shall restrict residential development from future seismic and subsidence areas identified within the Planning Area.

Policy F-4e: The Town shall require that all disturbed land not used for agricultural purposes be revegetated to protect such areas from both wind and water erosion.

GOAL G: ESTABLISH AN ENVIRONMENTAL DESIGN THEME FOR THE TOWN OF SURPRISE

Objective G-1: Set standards of design quality for all new development in Surprise.

Policy G-1a: The Town shall establish environmental design standards for new development in Surprise, including:

- Residential Development
- Commercial Development
- Industrial Development
- Public Buildings, Parks and Rights-of-Way

Specific public right-of-way standards shall include a theme or image for the Town of Surprise, established through landmarks, landscaping and gateway treatments.

Policy G-1b: The Town shall establish a Design Review Committee composed of Town residents, staff and public officials to apply and enforce environmental design standards as part of the rezoning and site plan review process for all new and revitalized development.

Objective G-2: Establish a design theme for the original Surprise Townsite.

Policy G-2a: As part of the Specific Plan to be developed for the Original Townsite, formulate a design theme/image, as well as potential function for this area which respects the history and heritage of the Town of Surprise, and this original central focus for the Town.

C.3 Open Space and Recreation

GOAL H: CREATE A COMPREHENSIVE PARK AND OPEN SPACE SYSTEM TO SERVE THE ACTIVE AND PASSIVE RECREATIONAL NEEDS OF THE TOWN

Objective H-1: Continue to improve, expand and construct new parks and public open space in relation to population growth, population composition and user demand.

Policy H-1a: The Town shall prepare an Open Space and Recreation Plan element of its Comprehensive Development Guide to promote the improvement and expansion of existing parks and recommend the construction of new parks in accordance with the adopted Development Guide Plan to serve the Town's population through the Year 2000.

Policy H-1b: The Town shall establish criteria and standards to upgrade existing parks and provide new parks in accordance with the Open Space and Recreation Plan element.

Policy H-1c: The Town shall begin to develop innovative specialty parks to provide new recreational opportunities and fill gaps in the overall park system.

Policy H-1d: The Town shall work with private developers to insure that adequate open space and recreational facilities are constructed in conjunction with all new development, or that funds are deposited with the Town on a pro-rata basis for such community recreational facility development.

Policy H-1e: The Town, through its C.I.P., shall participate in development of the park and open space system on an orderly basis, within available resources.

C.4 Circulation

GOAL 1: IMPROVE VEHICULAR CIRCULATION THROUGHOUT THE TOWN OF SURPRISE PLANNING AREA

Objective 1-1: Continue to develop and maintain a municipal street system that provides appropriate access to all land uses, protects the integrity of Surprise neighborhoods and non-residential areas, encourages appropriate redevelopment and promotes systematic and orderly municipal growth.

Policy 1-1a: The Town shall prepare a Circulation Plan element as part of the Comprehensive Development Guide that designates the functional classification of all streets in Surprise, recommends design standards for various street classifications, and designates new street segments that should be constructed in accordance with the adopted Development Guide Plan to serve the Town through the Year 2000.

Policy 1-1b: The Town shall implement traffic system management (TSM) techniques (e.g. curb cut access, access onto arterials, traffic signal synchronization) in both existing and newly developing urban areas to alleviate current and future street capacity problems, as appropriate.

Policy 1-1c: The Town shall work with private developers to insure that new street system segments are constructed on an orderly basis in conjunction with new development, and in accordance with the Development Guide and Circulation Plan elements of the Comprehensive Development Guide.

Policy 1-1d: The Town shall encourage creative neighborhood street design in every new subdivision that will service localized traffic and foster neighborhood integrity, while discouraging through traffic.

Policy 1-1e: The Town shall monitor the condition and usage of all existing streets and establish on an annual basis, an assessment which identifies street improvement projects, estimates costs, establishes timing, and identifies revenue sources to carry out improvement projects through its C.I.P.

GOAL J: WORK TO INSURE THE PROVISION OF FUNCTIONAL AND AFFORDABLE PUBLIC TRANSIT SERVICE TO TOWN OF SURPRISE RESIDENTS

Objective J-1: Work closely with Phoenix Transit and the Regional Public Transportation Authority to establish public transit routes that best serve the needs of Surprise residents in terms of location and frequency of service.

Objective J-2: Work closely with all developers of new and revitalized projects to insure that adequate provision is made for future public transit access (e.g. minimum curvature for bus turnarounds, bus pull-out sizing, bus shelter performance criteria, etc.).

GOAL K: DEVELOP AND IMPROVE NON-MOTORIZED CIRCULATION WITHIN SURPRISE

Objective K-1: Encourage pedestrian and bicycle circulation within neighborhoods and to commercial areas and public facilities throughout the Town of Surprise Planning Area.

Policy K-1a: The Town shall develop an area-wide plan for the improvement and maintenance of an overall sidewalk/trailway system throughout the Planning Area, including the provision of appropriate street furniture and fixtures and the installation of handicapped access ramps as required.

Policy K-1b: The Town shall develop an area-wide bicycle system plan which provides access from neighborhoods to commercial areas, parks, schools and other public facilities throughout the Planning Area, within the constraints of pedestrian safety and unrestricted traffic flow.

Policy K-1c: The Town shall work with private developers to insure that adequate pedestrian circulation and bicycle trailways are constructed in conjunction with new development, potentially as part of open space and recreational facilities.

Policy K-1d: The Town, through its C.I.P. can participate in the development of the area-wide pedestrian circulation and bicycle trailway system, within available resources.

Policy K-1e: The Town shall create safe pedestrian/bicycle crossings across the existing Grand Avenue and Santa Fe Railroad right-of-way, and ensure appropriate, safe pedestrian/bicycle crossings across the future Grand Avenue Expressway and Estrella Parkway.

C.5 Public Facilities and Services

GOAL L: PLAN, PROGRAM AND PROVIDE A FUNCTIONAL, EFFICIENT AND COST EFFECTIVE SYSTEM OF PUBLIC FACILITIES AND COMMUNITY SERVICES TO SERVE AN EXPANDING POPULATION AND EMPLOYMENT BASE.

Objective L-1: Extend trunk public utilities and provide other public facilities and services in an orderly, planned manner to support new and revitalized development.

Objective L-2: Prohibit new development where public utilities, facilities and services cannot be established without unduly taxing the existing service provision or users.

Objective L-3: Improve, modify or expand public utilities, facilities and services in conjunction with neighborhood revitalization and other redevelopment activities in the existing urban areas.

Policy L-1/2/3a: The Town shall require private developers to install all public utilities and facilities to State and municipal standards, as required by their proposed development projects.

Policy L-1/2/3b: The Town shall establish on an annual basis, a C.I.P. which identifies and ranks major public improvement projects, estimates costs, establishes timing, and identifies review sources in support of residential and economic development.

Policy L-1/2/3c: The Town shall utilize improvement districts to finance both new and upgraded street and utility improvements.

Policy L-1/2/3d: The Town shall prepare a Water Master Plan that is consistent with the Comprehensive Development Guide, establishes the basis for annual water system C.I.P. projects, and supports anticipated residential and economic development.

Policy L-1/2/3e: The Town shall prepare a Storm Drainage Master Plan that is consistent with the Comprehensive Development Guide, establishes the basis for annual drainage system C.I.P. projects, and supports anticipated residential and economic development.

Policy L-1/2/3f: The Town shall prepare a Sanitary Sewer Master Plan that is consistent with the Comprehensive Development Guide, establishes the basis for annual sewer system C.I.P. projects, establishes the framework for a grey-water system for irrigation purposes, and supports anticipated residential and economic development.

Policy L-1/2/3g: The Town shall prepare and implement an ongoing land acquisition program, or cash-in-lieu-of development program, to obtain property at appropriate locations in new development areas for such public facilities as schools, fire stations, parks, police substations, etc.

Policy L-1/2/3h: The Town shall carefully coordinate its public facilities and services planning, programming and development with nearby municipalities and appropriate related agencies which include:

- Town of Surprise Fire Department
- Town of Surprise Library
- Town of Surprise Police Department
- Town of Surprise Park and Recreation Department
- Dysart Unified School District
- Maricopa County Flood Control District

C.6 Redevelopment/Revitalization

GOAL M: ENCOURAGE APPROPRIATE REVITALIZATION AND REDEVELOPMENT ACTIVITIES IN THE OLDER AREAS OF THE TOWN.

Objective M-1: Work to revitalize the Original Townsite to maintain it as a viable element of the growing community.

Policy M-1a: The Town shall prepare a Specific Plan for the revitalization and continued development of the Original Townsite area. The Specific Plan shall include recommended land uses, densities, a design theme, vehicular and pedestrian circulation concepts and implementation strategies.

Policy M-1b: The Town shall initiate revitalization of the Original Townsite in accordance with the Specific Plan through its C.I.P., land use and zoning review procedures, and negotiations with existing property owners to stimulate area revitalization through public/private cooperation.

GOAL N: ENCOURAGE THE PRESERVATION AND REHABILITATION OF THE EXISTING HOUSING STOCK

Objective N-1: Work to remove all dilapidated, vacant and abandoned structures in the Town, unless they have mitigating historical or architectural significance.

Policy N-1a: The Town shall utilize its resources and the human resources of both community and civic groups in the removal of all substantially dilapidated structures.

Objective N-2: Achieve within the next ten years, the rehabilitation of nearly all severely deteriorated housing in the Town.

Policy N-2a: The Town shall develop a broad-based Neighborhood Revitalization Program which maximizes the use of all local, State and Federal resources to achieve housing rehabilitation, new housing development and the provision of affordable rental housing; and the overall revitalization of older neighborhoods in the Town of Surprise.

Policy N-2b: The Town shall provide necessary public facilities and services as part of overall neighborhood revitalization efforts to compliment publicly-assisted housing rehabilitation and to promote private housing rehabilitation of older neighborhoods.

D. DEVELOPMENT GUIDE

Based on the adopted Goals, Objectives and Policies presented in Chapter C and the comprehensive research of existing conditions throughout the Surprise Planning Area presented in Chapter B, Inventory and Analysis, the Surprise Comprehensive Development Guide has been developed in six elements:

- Development Guide Plan
- Environmental Design Plan
- Open Space and Recreation Plan
- Circulation Plan
- Public Facilities and Services Plan
- Redevelopment Plan

The Development Guide Plan focuses on the preparation of an overall development strategy for the Planning Area. The Environmental Design Plan focuses upon developing urban design themes for various land uses, continuity of architectural forms and prototypical streetscape sections. The Open Space and Recreation Plan addresses the formulation of a comprehensive park classification system including development standards and recommended park improvements. The Circulation Plan focuses on the provision of a functional street classification system including development standards and an integrated pedestrian/bikeway plan. The Public Facilities and Services Plan is composed of recommendations for public utilities, municipal buildings and health and education facilities to serve the Planning Area population through the Year 2000. The Redevelopment Plan is composed of both physical and economic redevelopment/revitalization strategies for the Original Townsite of Surprise.

The Surprise Comprehensive Development Guide was presented to and adopted by the Surprise Planning and Zoning Commission at a public hearing held on 23 December 1986 at the Surprise Town Hall. The Town Council subsequently adopted the Planning and Zoning Commission's recommendations on 14 May 1987. The Comprehensive Development Guide is intended to provide elected and appointed public officials and Town Staff with a framework within which they can guide orderly and planned growth; promote high quality residential, commercial and industrial development; stimulate revitalization/redevelopment of the Original Townsite; and plan to carry out a logical capital programming and budgeting process to implement public improvement projects.

D.1 Development Guide Plan

The Development Guide Plan of the Surprise Comprehensive Development Guide is presented in the following six sub-sections.

- Introduction
- Development Guide Definitions
- Land Use Objectives and Implementation Techniques
- Land Needs for Urban Growth
- Land Use Plan Map
- Development Guide Amendments

D.1.1 Introduction

The Development Guide Plan was prepared in response to issues identified in Chapter B, Inventory and Analysis, and the adopted goals, objectives and policies presented in Chapter C. The Development Guide Plan provides a conceptual framework for community growth with recommended land uses and densities for the approximately 50 square mile Surprise Planning Area. The function of the Development Guide Plan is to provide the means to adopt both the revised Zoning Ordinance and Official Zoning Map, the tools by which the Town may legally enforce the identified land designations. The goals, objectives and policies will serve as a flexible guide that the Town staff and Council can reference in the review of rezoning requests, special use permit applications and future public facility and utility improvements.

In Section B.10, Issue Identification, five key issues were identified by the CDGAC, Surprise residents and Town staff with regard to Land Use and Development. These issues were given a high priority on their resolution and are described below to provide an overall indication of community desires with regard to future land use and community growth.

- The absence of school sites located within the Town and the poor location and condition of existing parks has promoted the need to coordinate the dedication of park/school sites with future residential development.

- The need to revise the existing Zoning Ordinance to maintain flexibility for compatible zoning changes and inflexibility for non-compatible uses will keep the future land pattern consistent with the Development Guide Plan.

- The need to enhance the Town image through architectural and signage control, a cohesive landscape theme and redevelopment efforts could dramatically improve community character.

- The encouragement of economic development to provide employment opportunities for Town residents will improve their disposable income, thereby attracting development of improved housing, commercial and service facilities within the Planning Area.

- Although the existing infrastructure is centered in the Original Townsite, the need to coordinate future land use development with existing infrastructure, or in conjunction with proposed improvements, will be absolutely crucial to promote orderly growth of the Town of Surprise.

- The provision of commercial and industrial land uses should be based on need, sited in areas with adequate access and well buffered from incompatible land uses.

D.1.2 Development Guide Definitions

In order to provide a better understanding of the Surprise Comprehensive Development Guide, it is important that the intent and terminology be defined, especially in view of the fact that the Town does not have an existing General Plan document in which to provide criteria and definitions for the existing land use categories.

The designated land use districts and district boundaries have been established to guide future land use decisions for the Surprise Planning Area. Whenever possible, the district lines have been located along significant natural and man-made features to aid in identification. These features may include natural washes, mountains, canals, roadways and power lines. These features provide a generalized demarcation line that may not always be critical and can be adjusted if the land use is consistent with the intent of the Development Guide Plan. The final demarcation responsibility will rest with the Town staff and Council to determine the validity of land use variations. In order to guide future development that is consistent with the Development Guide Plan, the intent of each district must be easily understood. The following list of land use definitions has been designed to allow ease in use and interpretation of the Development Guide Plan.

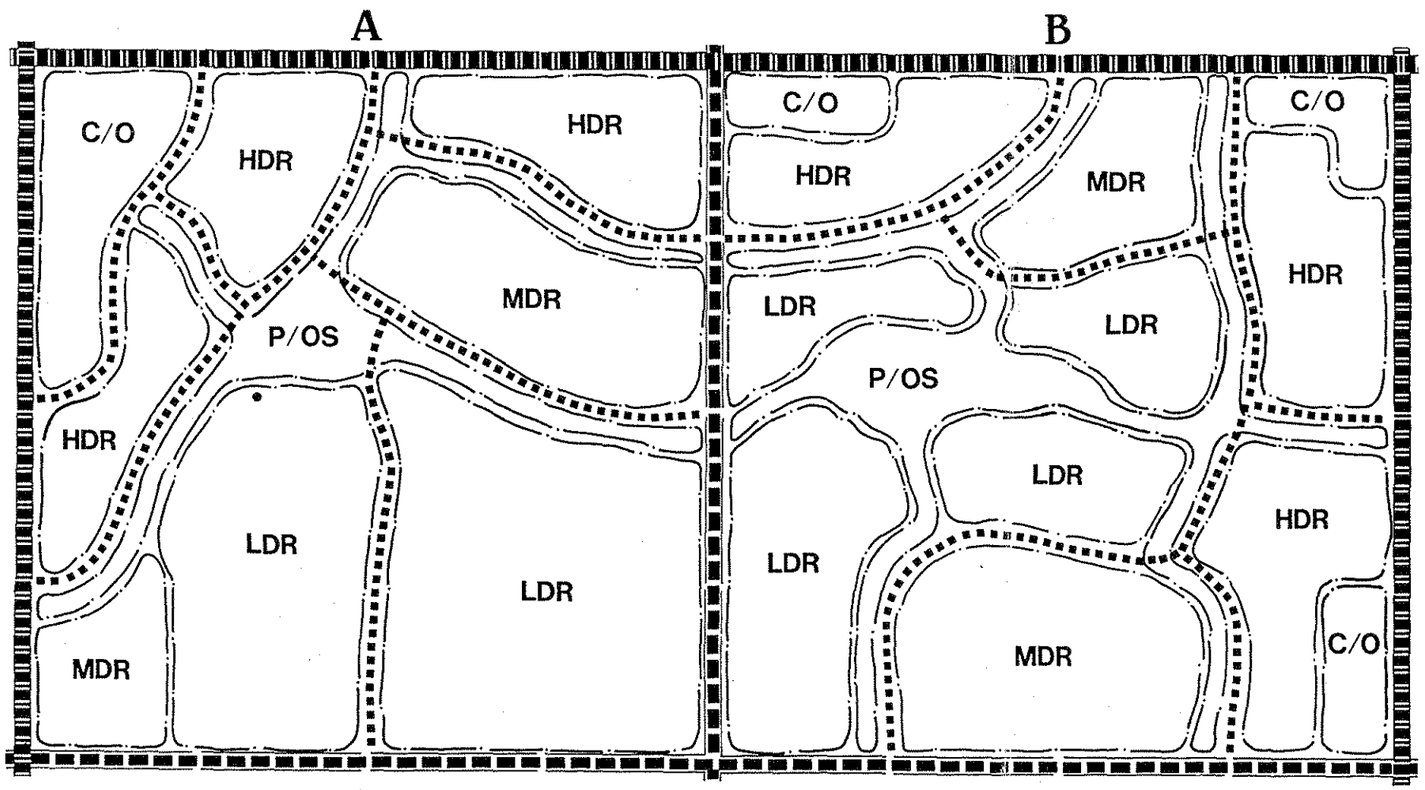
a) Low Density Residential

Denotes areas where both large and medium sized lots (R1-18, R1-8) single-family residential development is suitable, based upon adequate location, improved access and existence of both natural and man-made constraints. Gross residential densities will be limited from two to six dwelling units per acre (2-6 DU/AC).

b) Typical Neighborhood

Denotes specified districts of the Development Guide Plan that are usually bounded by arterial streets and developed in both character and intent that is consistent with the typical neighborhood alternatives shown in Figures 17 and 18. These alternatives could utilize a variety of housing types

Alternatives A/B



Typical Neighborhoods

Land Use Key:

- LDR Low Density Residential
- MDR Medium Density Residential
- HDR High Density Residential
- C/O Commercial/Office
- P/OS Public/Open Space
- Major Arterial Streets (With Median Breaks)
- Minor Arterial Streets (With Median Breaks)
- Major Collector Streets (Limited Arterial Access)

Land Use Acreage/640 Acres		
Low Density Residential	320	(50%)
Medium Density Residential	96	(15%)
High Density Residential	64	(10%)
Commercial /Office	57	(9%)
Parks/Public	64	(10%)
Arterial R.O.W.	39	(6%)
Total Acreage	640	(100%)

Dwelling Units	
Low Density Residential	1,280
Medium Density Residential	768
High Density Residential	896
Total Dwelling Units	2,944

Density(Average Dwelling Units Per Acre)	
Low Density Residential	4.0
Medium Density Residential	8.0
High Density Residential	14.0
NET RESIDENTIAL DENSITY (Does Not Include Commercial Land or Arterial R.O.W.)	6.13

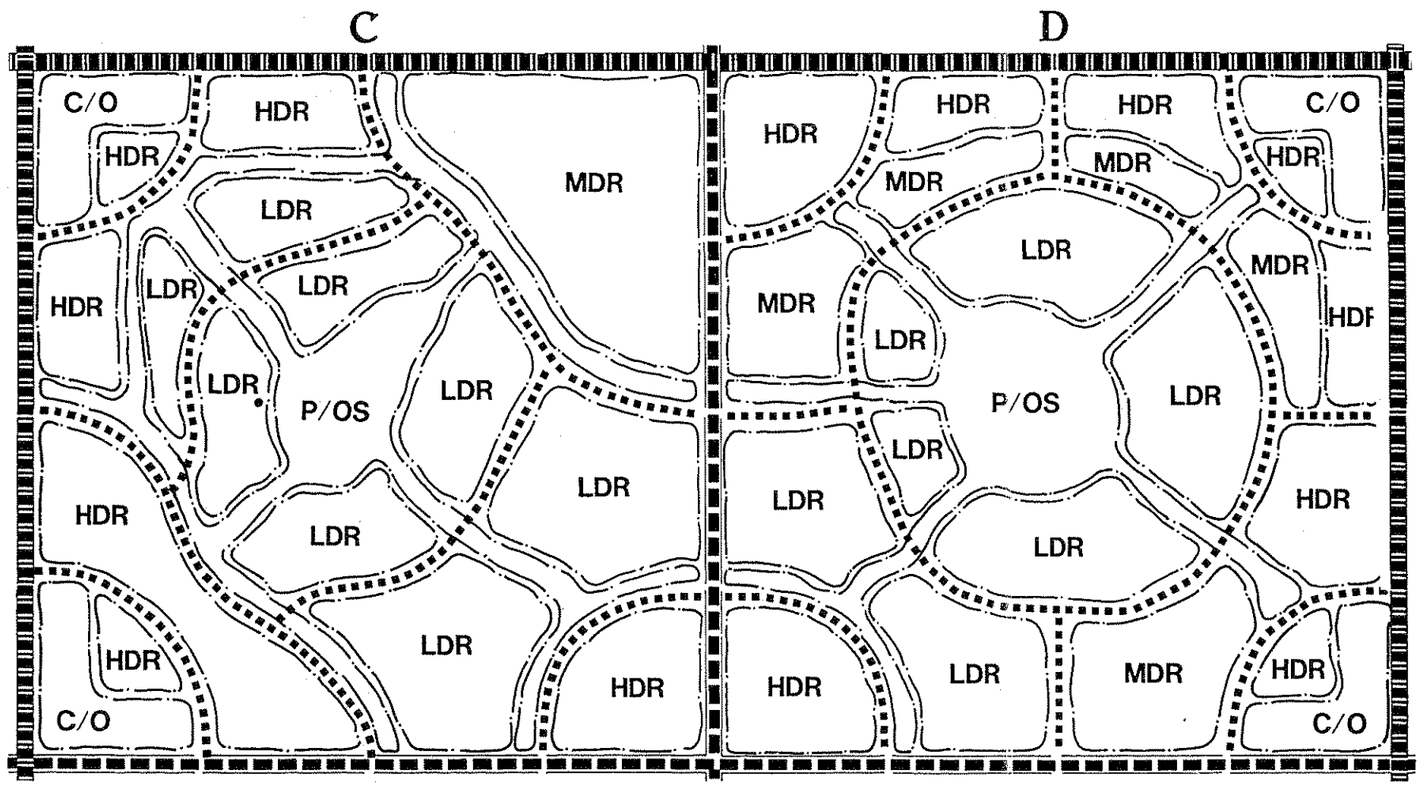
Residential Split:	
Low Density Residential	66%
Medium Density Residential	20%
High Density Residential	14%

SURPRISE
Comprehensive Development Plan

17

BRW

Alternatives C/D



Typical Neighborhoods

Land Use Key:

- LDR Low Density Residential
- MDR Medium Density Residential
- HDR High Density Residential
- C/O Commercial/Office
- P/OS Public/Open Space
- Major Arterial Streets (With Median Breaks)
- Minor Arterial Streets (With Median Breaks)
- Major Collector Streets (Limited Arterial Access)

Land Use Acreage/640 Acres		
Low Density Residential	320	(50%)
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Arterial R.O.W.	39	(6%)
Total Acreage	640	(100%)

Dwelling Units	
Low Density Residential	1,280
Medium Density Residential	768
High Density Residential	896
Total Dwelling Units	2,944

Density(Average Dwelling Units Per Acre)	
Low Density Residential	4.0
Medium Density Residential	8.0
High Density Residential	14.0
NET RESIDENTIAL DENSITY (Does Not Include Commercial Land or Arterial R.O.W.)	6.13

Residential Split:	
Low Density Residential	66%
Medium Density Residential	20%
High Density Residential	14%

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(single-family detached, patio home, townhouse, etc.) but the overall gross density should not exceed seven dwelling units per acre (7 DU/AC), and should maintain the following parameters.

1. Vehicle Intrusion

   Vehicle traffic generated by high intensity development should not intrude into typical neighborhoods and other residential areas (e.g., commercial into multi-family, multi-family into single-family).

2. Development Parameters

NEIGHBORHOOD LAND USE	Acreage	DU/AC	Percentage
Low Density Residential	320	2-6	50
Medium Density Residential	96	6-8	15
High Density Residential	64	8-22	10
Commercial	39	-	6
Office *	18	-	3
Industrial **	-	-	-
Parks/Open Space/Public Facilities	64	-	10
Street Rights-of-Way	39	-	6
Total Acreage	640		100

* Can be utilized in conjunction with commercial development
** Not conducive for Typical Neighborhood Development

NET RESIDENTIAL DENSITY Residential Land Use	Acreage	Average DU/AC	Dwelling Units
Low Density Residential	320	4	1,280
Medium Density Residential	96	8	768
High Density Residential	64	14	896
Total	480	6.13	2,944

GROSS RESIDENTIAL DENSITY Land Use	Acreage	Average DU/AC	Dwelling Units
All Residential Uses	480	6.13	2,944
Parks/Open Space/Public Facilities	64	-	-
Street Rights-of-Way	39	-	-
Gross Residential Density	583	5.05	2,944

c) Medium Density Residential

Denotes areas where medium and smaller lot (R1-5) single-family, townhouse development is suitable. These districts should be located with proximity to schools, shopping and employment, but will utilize a discontinuous street hierarchy to discourage through traffic movements. The gross residential densities will be limited at six to eight dwelling units per acre (6-8 DU/AC) in these areas.

d) High Density Residential

Denotes areas (R-2, R-3) identified to be appropriate for apartments, condominiums and townhomes. These areas should be located on the periphery of "typical neighborhoods" to capitalize on arterial access, adjacent shopping and employment opportunities, discouraging high traffic volume on residential streets. Overall gross densities will range from eight to twenty-two units per acre, (8-22 DU/AC), but will ultimately depend on the orientation, landscaping, amenities and open space contained within the proposed developments.

e) Regional Commercial

Denotes areas where large scale uses associated with retail, office and high density residential districts may be developed. Suitable locations offer proximity to limited access corridors, controlled arterial access, large traffic volume capacity and proximity to high density residential districts.

f) Community Commercial

Denotes areas where smaller scale ancillary commercial uses may be developed. Suitable locations offer controlled arterial or collector access, medium traffic volume capacity and proximity to high and medium density residential districts.

g) Service Node Commercial

Denotes commercial acreage located at the intersection of arterial roadways.

- Community Commercial Service Node
  The intersection of two major arterial roadways is appropriate for the location of a community commercial service node from 48 to 60 acres in size, or 12-15 acres per corner.

- Neighborhood Commercial Service Node
  The intersection of a major arterial and minor arterial roadway is appropriate for the location of a neighborhood commercial service node from 40 to 48 acres in size, or 10-12 acres per corner.

- Convenience Commercial Service Node
  The intersection of two minor arterial roadways is appropriate for the location of a convenience commercial service node from 20 to 28 acres in size, or 5-7 acres per corner.

h) Office

Denotes areas for professional office and service uses with good arterial street access.

i) Industrial

Denotes major employment, wholesale, manufacturing and utility centers located within the community. Industrial districts may be categorized as either general (uses that require rail access and are intensive in nature) or garden (lighter industrial uses that can adequately function in a business park environment). The specific district will be determined based upon site use, adjacent land use impact and intensity of development.

j) Open Space/Public Facilities

Denotes acreage dedicated, or to be dedicated, for public use which can include parks, open space, pedestrian/bicycle trails, churches, police/fire substations and water/sewage facilities. The provision of a linked open space system will be created through the development of the parks and linear open spaces provided in the typical neighborhood alternatives.

k) Special Redevelopment Area

Denotes the area within the Original Townsite that, due to its existing land use pattern, has created the entire range of districts within a limited area. This area will be discussed in greater detail in Section D.6, Redevelopment Plan.

l) Freeway/Expressway

Denotes roadways that function as high volume controlled access roadways. A 300-400 foot right-of-way (R.O.W.) is required to accommodate six travel lanes along with adequate shield and buffer distances.

m) Major Arterial

Denotes roadways that function as high movement, low access vehicular circulation paths. A 130-foot R.O.W. is utilized to contain six travel lanes along with left and right turn lanes.

n) Minor Arterial

Denotes roadways that again function as high volume, low access vehicular corridors. The reduced R.O.W. (110 feet) provides four travel lanes with the capacity for expansion to six lanes, if warranted, and also includes both left and right turn lanes.

o) Residential Density Calculations

Denotes a ratio of the number of dwelling units per acre which includes the residential land, park and open space (net residential density) and street rights-of-way (gross residential density). Density calculations and density bonuses will be based upon gross densities.

p) Buffering

Denotes a technique that is utilized to provide an adequate transition between incompatible land uses (e.g. residential/industrial, commercial/residential). Buffering will be required for an intensive land use that abuts either an existing low intensity land use or a proposed low intensity district that is identified in the Development Guide Plan. A number of buffering techniques can be utilized, depending upon the degree of incompatibility of the abutting land uses. These techniques are identified below:

- Open Space - extra deep yards, public open space, walks, trails and private landscaped areas are acceptable solutions as transitions to low intensity development.

- Walls and Fences - stone, block or masonry walls should be used where visual screening is to be achieved. Wood fences should not be allowed due to their susceptibility to weathering, which results in higher maintenance costs.

- Land Forms - earth berming, utilizing landscaping and grade separations is appropriately used to separate streets and parking lots from residential, commercial and industrial structures.

- Landscaped Roadways - medians and shoulders can be designed to accommodate a cohesive plan utilizing trees, shrubs and groundcover to break up large expanses of asphalt paving, create entry statements and enhance the aesthetic appeal of the road system.

- Combinations - open space, walls and fences, land forms and landscaped roadways can be grouped in any number of combinations to achieve compatibility between land uses.

D.1.3 Land Use Objectives and Implementation Techniques

The following objectives have been derived from the adopted goals, objectives and policies of Chapter C to initially guide the Town in the areas of land use/growth management, housing and economic development. The formulation of implementation techniques are designed to provide a realistic way in which the Town can satisfy the objectives and conform to the intent of the Development Guide Plan.

Objective A-1: **Allow urban growth only in a planned, orderly manner to encourage high quality development and create a compact, cost-efficient urban development pattern.**

The implementation techniques that the Town can utilize to promote planned, orderly growth are:

1. Ensure that the Development Guide Plan provides for an appropriate balance of land use types and acreages.

2. Formulate a Planned Area Development (P.A.D.) process that is streamlined and easy for developers to understand. Require planning, for a minimum five acre area, to illustrate how proposed development will fit within a community context.

3. Provide information to both private and non-profit developers of major circulation, drainage and utility inadequacies existing within the Planning Area, particularly near their proposed development sites.

4. Coordinate infrastructure placement and sizing with the land use capacity at full buildout.

5. Revise the existing Zoning and Subdivision Ordinances to create easily understood documents that conform to the intent of the Development Guide Plan.

6. Allow the flexibility to rezone parcels if inappropriate land use designations exist, and where land uses are compatible or adequately buffered.

Objective A-2: **Actively promote the use of undeveloped land, or areas appropriate for development or redevelopment, within the Town and its Planning Area which is already served by public facilities and utilities.**

The implementation techniques that the Town can utilize to promote the use of undeveloped land are:

1. Actively publicize the Planning Area as a solid development investment.

2. Provide development incentives for the creation of employment-based land uses within the Original Townsite and Planning Area.

3. Create a specific redevelopment/revitalization plan that identifies areas to be revitalized and redeveloped within the Original Townsite.

Objective B-1: **Create stable, identifiable residential neighborhoods which contain a full complement of supportive commercial, institutional, and public facilities.**

The implementation techniques that the Town can utilize to promote the creation of high quality neighborhoods are:

1. Utilize the Development Guide Plan as a flexible guideline to locate neighborhoods in appropriate areas.

2. Create neighborhoods centered around educational, institutional and park facilities to promote a sense of community.

3. Utilize high density residential uses and open spaces as buffers between low- and moderate-density residential and commercial or employment uses.

4. Locate neighborhood commercial zones in areas where adequate access and circulation is available, but will not pose conflicts for pedestrians and bicyclists.

5. Utilize adequate rights-of-way to integrate roadways and pedestrian/bicycle paths within a cohesive landscape theme to promote community identity.

Objective B-2: **Designate the appropriate land use for all land parcels within the Planning Area.**

The implementation techniques that the Town can utilize to insure sound land use planning are:

1. Utilize the elements of the Development Guide Plan to initially provide a conceptual framework to designate appropriate land uses within the Planning Area.

2. As land uses, circulation networks and/or infrastructure planning change over time, the appropriateness of previously designated parcels must be carefully re-evaluated.

3. In areas where inappropriate uses exist, rezoning, buffering or condemnation are methods that can be utilized to correct these incompatibilities.

Objective B-3: **Reduce and phase out the effects of current land use incompatibilities and, in the future, minimize the creation of new conflicts.**

The implementation techniques that the Town can utilize to reduce land use conflicts and minimize them in the future are:

1. Utilize the existing Land Use Map to identify incompatible zones.

2. Utilize the Development Guide Plan to alleviate future incompatibilities through proper land use planning, and utilization of the new Zoning Ordinance.

3. Prepare a Specific Plan for the redevelopment/revitalization of the Original Townsite which will provide the basis to eventually phase out land use incompatibilities.

Objective C-1: Encourage new housing developments that offer a range of housing types and sizes within the Town of Surprise and its Planning Area.

The implementation techniques that the Town can utilize to promote development of a range of housing types are:

1. Encourage the development of employment opportunities within the Planning Area to increase household income.

2. Develop master water, sewer, wastewater treatment, and effluent reuse plans to coordinate with new housing construction.

3. Explore the availability of federal, state and local resources to promote the development of housing for low- and moderate-income residents.

4. Designate appropriate locations and development standards for mobile home/recreational vehicle parks.

Objective C-2: Utilize Building Codes and Zoning and Subdivision Regulations to assure quality housing development in Surprise.

The implementation techniques that the Town can utilize to assure quality housing development are:

1. Utilize a comprehensive set of Building Codes, and follow-up inspections, to assure safe construction methods and quality development.

2. Provide a scheduled review and update of both the Zoning Ordinance and Subdivision Regulations on a regular basis to properly respond to changing conditions in the housing development marketplace.

Objective C-3: Promote the development and/or rehabilitation of affordable rental housing compatible in scale and character with surrounding neighborhoods.

The implementation techniques that the Town can utilize to encourage expanded residential development in Surprise are:

1. Explore the availability of federal, state and local resources to promote the development and/or rehabilitation of rental housing for low- and moderate-income residents.

2. Encourage the development of affordable rental housing as part of large scale P.A.D.s throughout the Surprise Planning Area.

Objective D-1: Encourage the expansion of residential development in the Town of Surprise and its Planning Area.

The implementation techniques that the Town can utilize to encourage a broad base of single-family residential development include:

1. Create a streamlined development review process for developers in Surprise.

2. Actively market the attributes of the Surprise Planning Area to employment-based land uses.

3. Work to develop quality schools, park and recreation facilities, cultural facilities, etc. that indicate Surprise is concerned with developing a quality lifestyle for both residents and industry.

Objective D-2: Encourage the development of a wide selection of single-family housing types and sizes in the Town of Surprise and its Planning Area.

The implementation techniques that the Town can utilize to encourage a broad base of single-family residential development include:

1. Promote the development of a wide range of lot sizes to accommodate a variety of single-family housing types.

2. Promote the development of high quality, yet affordable "starter housing" for young families in Surprise.

Objective D-3: Encourage the development of planned residential neighborhoods in newly developing areas of Surprise and its Planning Area.

The implementation techniques that the Town can utilize to promote large scale, planned developments are:

1. Promote the use of P.A.D.s to plan the large scale landholdings in Surprise.

2. Encourage developers to utilize P.A.D.s for large-scale development in order to achieve overall flexibility in development, while at the same time fulfilling the Town's desire for quality neighborhood development.

Objective E-1: Encourage the upgrading and expansion of existing commercial, service and industrial facilities in the Town of Surprise and its Planning Area, to include new employment opportunities for Town residents.

The implementation techniques that the Town can utilize to promote existing commercial and industrial expansion in Surprise are:

1. Create a realistic and implementable Redevelopment Plan for the Original Townsite that will enhance its image, raise land values and attract employment opportunities for residents.

2. Utilize a surcharge on development fees from planned projects to help finance redevelopment within the Original Townsite.

3. Market the Original Townsite as a unique, viable community to smaller developers of commercial, office and small scale industrial development.

4. Formulate a plan to develop the Mercado Area based on the broad strategies recommended in the Redevelopment Plan.

Objective E-2: **Create stable, identifiable and functional commercial and industrial districts that contain a full complement of supportive facilities, and are compatible with their neighboring land uses.**

The implementation techniques that the Town can utilize to promote development of quality new commercial and industrial districts are:

1. Develop commercial areas based on established need, located on sites with adequate access and compatible with adjacent uses.

2. Create commercial and industrial area identity through the use of a cohesive landscape plan, style of architecture, coordinated signage and other amenities.

3. Reduce the impact of industrial areas on adjacent land uses by the use of buffers (i.e. berms, walls, etc.), vegetative screens to block unsightly views, and adequate circulation and access paths that do not conflict with residential traffic.

Objective E-3: **Actively promote the Town of Surprise as an area that encourages quality commercial and job-based industrial development.**

The implementation techniques that the Town can utilize to promote quality job-based commercial and industrial development are:

1. Locate industrial parcels in areas that will induce private development through lot size, visibility and close proximity to circulation facilities and ancillary services.

2. Provide quality assurance of both commercial and industrial development through the strict adherence to Zoning and Subdivision Ordinances, Building Codes, and the Site Plan Approval process.

3. Utilize the Phoenix Metropolitan Chamber of Commerce and the Northwest Development Group to market the attributes of the Town and Planning Area to prospective commercial and industrial developers.

4. Work closely with the Northwest Development Group in its ongoing effort to formulate a combined economic development strategy with all communities in the northwest Metropolitan Area.

D.1.4 Land Needs for Urban Growth

The land needs for urban growth to the Year 2000 are based upon an estimate of the residential, commercial, industrial and open space acreage required to adequately serve the residents of Surprise. Although a thirteen year projection cannot be considered entirely accurate due to fluctuations in market demand, interest rates and other assumptions, a rough estimate can be generated from the Maricopa Association of Governments (MAG) Population Projections presented in Section B.8, Population. These estimates of both residential and non-residential land needs can then be utilized in a conceptual approach, to project the future development pattern for the various land uses, municipal needs and annexations.

a) Residential Land Need

Residential land requirements for the next thirteen years can be calculated by taking the projected Year 2000 Surprise population (54,329) and subtracting the Year 1985 population (4,355) to arrive at the proposed increase (49,974) within the next thirteen years. Although the current household size is over four people per dwelling unit, the future economic growth of the Planning Area will increase disposable income among residents to bring this figure closer to the U.S. Census Bureau average or 2.65 persons per unit. If the Surprise figure dropped to 3.3 persons per unit, a total of 15,143 housing units would be needed by the Year 2000. The number of household units can then be applied to both a percentage breakdown of residential types along with their respective densities. These percentages resulted from the Town's desire to develop a future residential character based upon the densities and types of housing products presented earlier under typical neighborhoods. Table 9 illustrates that for the thirteen year growth period, the total amount of acreage needed would utilize more than five sections of land at an overall medium density land use.

TABLE 9
Year 2000 Residential Land Need

Type	Desired/ Expected	Number of Households	Average DU/AC	Required Acreage
Low Density	66%	9,994	4.0	2,499
Medium Density	20%	3,029	8.0	379
High Density	14%	2,120	15.0	141
Sub-Totals	100%	15,143	6.13	3,019
Arterial Right-of-Way @ 10%				300
Total Residential Land Need				3,319

Source: BRW, Inc., 1987

b) Non-Residential Land Need

The non-residential land need can be conceptually calculated using the Year 2000 residential land need. Assuming that Surprise will develop the same land use intensities as other Maricopa County communities, residential land use comprise 67 percent of the land within the Planning Area. The remaining 33 percent can then be divided into the remaining land use categories as shown in Table 10.

TABLE 10
Year 2000 Total Land Requirements

Land Use	Needed Acreage	Percentage
Residential	3,319	66%
Commercial	302	6%
Office	151	3%
Industrial	251	5%
Open Space/Parks/Public Facilities	503	10%
Arterial Rights-of-Way	503	10%
Totals	5,029	100%

Source: BRW, Inc. 1987

Although the Town may not develop exactly like other nearby communities, the non-residential land use percentages produce a total Year 2000 land need of more than 5,000 acres. The actual buildout may vary due to the type and timing of economic development, associated residential housing types and needed commercial and office space.

D.1.5 Land Use Plan Map

The Development Guide Plan map shown in Figure 19 illustrates the intent of the Town of Surprise to develop within the identified Planning Area.

a) Land Use Categories

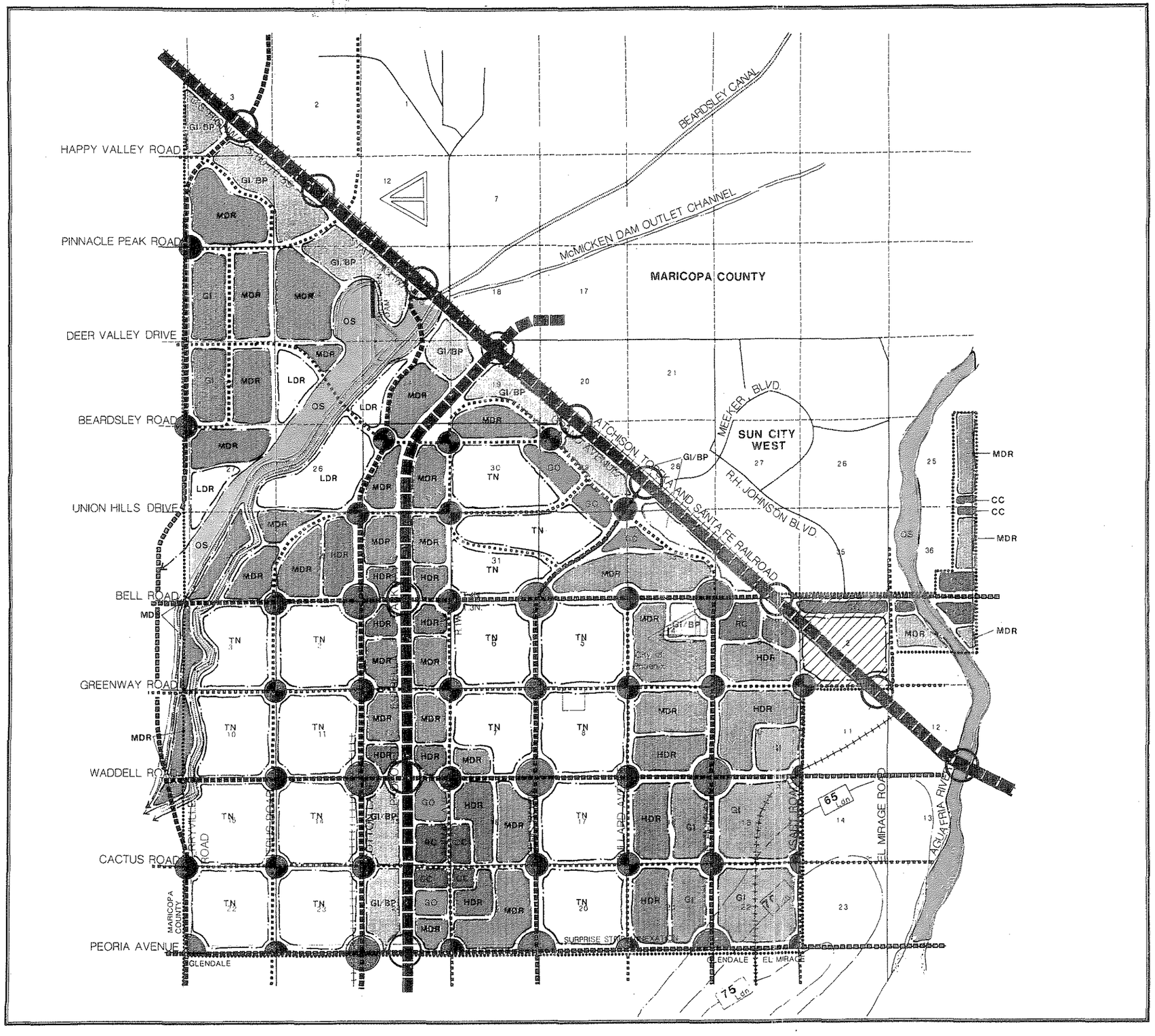
The land uses contained within the Plan represent the five main land use categories of residential, commercial, office, industrial and open space. The Plan also contains one cross hatched area that denotes a specific plan for the Original Townsite. The residential land uses include four categories ranging in density from two to twenty-two dwelling units per acre. Commercial land uses comprise two categories for area-wide development and a series of three service nodes, which identify the recommended intensity of development at arterial intersections. The office land use is contained in one category, but can also be compatibly developed in commercial and garden industrial zones. Industrial land uses are identified as either garden business park or general industrial, based upon rail and arterial access, the overlay of Luke Air Force Base noise contours and adjacent industrial development. The regional open space/recreation linkages are located along the existing Agua Fria River channel and Beardsley Canal/ McMicken Dam interface area, providing active and passive recreational opportunities for Surprise residents. The Special Redevelopment Study Area is located within the square mile of the Original Townsite and will be further addressed in the Redevelopment Plan of the Comprehensive Development Guide. The Estrella Parkway Corridor is located approximately one half mile to the west of Sarival Avenue.

The Development Guide Plan is predicated on accepted land use principles to create a well planned, functional living environment for future residents. Each land use category has been located to capitalize on site potential while mitigating negative environmental and man-made constraints. The five land use categories utilized on the Plan represent the recommended land use intensities and are described below beginning with the low density residential district.

Low density residential districts have been located on the interior of the Planning Area, adjacent to the regional and local open space. These areas are located away from high traffic corridors and incompatible land uses, in order to promote a sense of community and quality family residential environments.

Medium density residential districts have been located adjacent to low density residential areas and within typical neighborhoods to provide a transition between residential zones and employment centers. The vehicular traffic generated by those districts will be directed to the arterial street corridors and away from the low density residential districts.

High density residential districts have been located to provide an adequate buffer between incompatible residential and employment land uses. The high volume of traffic that is generated by this use will not adversely impact adjacent commercial, office and industrial land uses.



Development Guide Plan

Land Uses:

- LDR Low Density Residential (2-6 D.U./Acre)
- TN Typical Neighborhood (6-7 D.U./Acre)
- MDR Medium Density Residential (7-9 D.U./Acre)
- HDR High Density Residential (9-22 D.U./Acre)
- RC Regional Commercial
- C Community Commercial
- Community Commercial/Service Node (12-15 Gross Acres/Corner)
- Neighborhood Commercial/Service Node (10-12 Gross Acres/Corner)
- Convenience Commercial/Service Node (5-7 Gross Acres/Corner)
- General Office
- GI/BP Garden Industrial/Business Park
- GI General Industrial
- OS Open Space
- Special Redevelopment Area (See Specific Plan)
- Estrella Parkway Corridor

Future Transportation System

- Principal Arterial (Freeway/Expressway, Controlled Access, 6 Travel Lanes)
- Major Arterial (6 Travel Lanes Plus Turn Lanes)
- Minor Arterial Travel Lanes Plus Turn Lanes)
- Interchanges

SURPRISE Comprehensive Development Plan

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Two regional commercial sites have been identified to serve the large scale retail needs of future residents. The first site, located at the southeast corner of Bell and Litchfield Roads will develop first, due to its proximity to Grand Avenue and the potential valley-wide continuity of Bell Road. The second potential site is located at the northeast corner of the proposed Estrella Parkway Alignment and Cactus Road. Although the development of this site would not be feasible until the surrounding residential parcels were constructed, conceptual long-range planning can be accommodated to facilitate proper infrastructure planning, adjacent land use and rights-of-way dedication. The location of existing and proposed community commercial sites along Bell Road, within the Original Townsite continues to capitalize on the high traffic volumes that utilize this major arterial roadway. Community commercial sites have also been located adjacent to the regional commercial sites to capture associated small scale retail development. The three commercial/service node types are located at the intersections of major and minor arterials and are sized by the right-of-way widths of both intersecting arterial roadways. These commercial/service nodes are developed in part with the typical neighborhood concepts, which show a variety of alternatives to adequately locate commercial land uses.

General office uses have been located adjacent to residential, commercial and employment districts to buffer residential areas, while promoting living/working environments within close proximity. Office land use also provides an acceptable transition between garden industrial and medium to high residential land uses.

Garden industrial/business park uses have been located along Grand Avenue to capitalize on the visibility of the high volume arterial; to mitigate the noise generated by traffic and to provide a positive image and the potential for a diversified economic base for Surprise. Typical uses in this district would include light assembly, research and development, office/showroom, office/warehousing and high tech facilities developed in a "campus" or "park-like" setting.

General industrial zones are located in the northwest portion of the Planning Area, adjacent to the proposed regional landfill site and at the southeast corner of the Planning Area. The northwest districts have been located to capitalize on the employment opportunities generated by the landfill site and to provide a buffer for the adjacent residential zones. The southeast industrial district has been located and sized with respect to the noise impact of Luke Air Force Base and the existing availability of rail access. The size of this district should be re-evaluated based on the results of the MAG Land Use Compatibility Study for Luke Air Force Base, which was completed in late 1987.

The two open space areas shown on the Plan are composed of the Beardsley Canal/McMicken Dam area and the Agua Fria River. Both corridors can link with the Lake Pleasant Recreation Area and the White Tank Regional Park to provide a regional open space network for Surprise, El Mirage, Sun City, Glendale and Peoria residents.

Due to the historical growth in the Original Townsite and the scale of existing development, a special Redevelopment Plan has been prepared for this area, and is presented in the final section of Chapter D.

The Estrella Parkway Alignment has been located at the mid-section line between Cotton Lane and Sarival Avenue. The freeway will curve north of Union Hills Drive located parallel to and, approximately 4,000 feet south of the Beardsley Canal. At the intersection of the freeway and Grand Avenue, this distance will allow the adequate placement of interchange structures without negatively affecting the potential for a pedestrian/ maintenance crossing where Grand Avenue intersects with both the McMicken Dam and Beardsley Canal.

b) Planning Area Land Use at Buildout

The analysis of required residential and non-residential land need for the Year 2000 showed that more than 5,000 acres were needed to adequately plan for the forecasted thirteen year population increase. The needed acreage comprises approximately fourteen percent of the total acreage contained within the Surprise Planning Area. The long-range analysis for development of the recommended land uses, shown on the Development Guide Plan, is contained in Table 11, Recommended Land Use at Buildout.

Analysis of Table 11 identifies the specific land use categories according to the cumulative acreage and the percentage of the total Planning Area that has been recommended for each land use. The sub-total percentages have been calculated to provide a comparison with other cities located within Maricopa County.

D.1.6 Development Guide Plan Amendments

The Surprise Comprehensive Development Guide Plan constitutes a land use policy statement that was created based upon the existing development pattern, prevailing needs, underlying zoning, natural and man-made development constraints and opportunities, and accepted planning practices. Through the course of time, any of these variables are subject to change. To continue as an effective and accurate document, the Plan must be periodically reviewed and occasionally amended.

The review and amendment process should never be allowed to occur in a haphazard manner. The adoption of revisions will reduce the Plan's effectiveness and may substantially undermine the future legality of all land use decisions made by the Town of Surprise.

Amendments to the Development Guide Plan should occur after careful review of the request, findings of fact that support the revision and a well publicized public hearing. The statutory requirements that guide the adoption of the Surprise Comprehensive Development Guide Plan shall be followed for all amendments as they pertain to the public hearing and the approval process. The term amendments shall apply to both text and map revisions.

The required findings of fact shall include:

1. That the development pattern contained within the Development Guide Plan inadequately provides appropriate optional sites for the amended land use.

TABLE 11
Recommended Land Use at Buildout

Land Use	Acreage	Percentage	Other Cities Percentage
Residential			
• Low Density Residential	800		
• Typical Neighborhood	8,900		
• Medium Density	5,500		
• High Density	2,600		
Subtotal	17,800	56%	50-80%
Commercial			
• Regional	260		
• Community	290		
• Community Commercial Service Nodes	465		
• Neighborhood Commercial Service Node	756		
• Convenience Commercial Service Node	343		
Subtotal	2,114	7%	5-7%
General Office	465		
Subtotal	465	1%	3-4%
Industrial			
• General Industrial	2,444		
• Light Industrial/ Business Park	2,178		
Subtotal	4,622	15%	4-10%
Regional Open Space/Recreation	3,871	12% **	10%
Arterial Rights-of-Way	2,100	7%	7%
Special Redevelopment Study Area	430	1%	-
Dedication for Public Use	316	1%	-
Total	31,718	100%	100%

* General office is an acceptable land use both within the office and light industrial/business park categories.

** Does not include the 10% open space dedication for typical neighborhoods.

Source: BRW, Inc., 1987

2. That the amendment constitutes an overall improvement to the Development Guide Plan and will not solely benefit a particular landowner, or owners, at a future point in time.

3. That the amendment will not adversely impact the public health, safety or welfare through the points listed below:

   - Significant alteration of the accepted land use pattern;
   - Requirement of oversize capacity and costlier improvements to the infrastructure system than is needed to support the existing land uses, which may impact development of other lands;
   - Adverse impact on existing uses due to increased traffic on the existing transportation system; and
   - Affecting the livability of the area.

4. That the amendment is consistent with the overall intent of the Surprise Comprehensive Development Guide and its Land Use Plan.

The burden of proof that the amendment constitutes an overall improvement to the Development Guide Plan shall rest with the party requesting the change. It shall not be the burden of the Town of Surprise to prove that an amendment should be denied.

Development Plan amendments may also be initiated by the Town in accordance with the procedures set forth by Arizona State Statutes.

D.2 Environmental Design Plan

The Environmental Design Plan element of the Surprise Comprehensive Development Guide is presented in the following three sub-sections:

- Introduction
- Environmental Design Objectives and Implementation Techniques
- Recommended Environmental Design Strategies

D.2.1 Introduction

The Introduction provides a brief discussion of the need, intent and framework of the Environmental Design elements. The Original 640-acre Townsite is the only large scale developed area within the nearly 50 square mile Surprise Planning Area. The incorporated land within the Planning Area is presently undergoing intense planning and development pressure. In the past, lack of existing site design criteria has hampered the efforts of Town staff to initiate a design review process to promote quality design as a part of overall community planning. This plan element illustrates the methods in which the community can be linked through a cohesive use of architectural treatments and the use of both natural and man-made elements.

The intent of the Environmental Design element is to provide a basis upon which the Town can evaluate the quality of proposed development through the site plan review process. The undeveloped majority of land within the Planning Area exhibits a prime opportunity for the Town to institute the concepts that are presented in the remainder of this section. The institution of guidelines at this time will allow the Town to enhance the aesthetic quality of the community as it is about to undergo significant development.

The components of this element are comprised of natural features, architectural forms and images, landscape themes and streetscape elements. Natural features are those physical characteristics of a community that make it unique through its location and elevation. Architectural forms and images provide a sense of continuity, as well as a statement relative to climatic response (i.e. building orientation, solar utilization). Landscape themes can also satisfy these goals to increase the aesthetic appeal of Surprise. Streetscape elements are necessary to mitigate pedestrian/auto conflicts, promote functional vehicular circulation and encourage pedestrian circulation and interaction.

D.2.2 Environmental Design Objectives and Implementation Techniques

The following objectives have been derived from the adopted goals, objectives and policies of Chapter C to initially guide the Town in the area of environmental design. The formulation of implementation techniques are

designed to provide a realistic way in which the Town can satisfy the objectives and conform to the overall intent of the Environmental Design element.

Objective G-1: Set standards of design quality for all new development in Surprise.

The implementation techniques that the Town can utilize to set design standards are:

1. Develop minimum design standards for residential, commercial and industrial land uses.

2. Establish a specific design review process to illustrate the design intent of all proposed developments.

3. Establish public street rights-of-way standards that provide a cohesive street and landscape image to unify all portions of the Planning Area.

4. Establish generalized architectural treatment standards for various land uses.

Objective G-2: Establish a design theme for the Original Surprise Townsite.

The implementation techniques that the Town can utilize to set a theme for the revitalization of the Original Townsite are:

1. Conduct a specific inventory of the existing housing stock to determine the feasibility for rehabilitation or demolition.

2. Utilize tree lined streets to link residential, commercial and recreational land uses.

3. Establish a unique Hispanic architectural theme to promote continuity of both rehabilitated and future structures in the Townsite.

4. Develop a unique image statement for the Town to be utilized at all major entry points. Coordinate the design of all signage throughout the community.

5. Develop a pedestrian circulation network linking all land use areas utilizing a common landscape and street furniture theme.

D.2.3 Recommended Environmental Design Strategies

The recommended environmental design strategies are based upon the need to establish urban design criteria to adequately plan and coordinate future development in Surprise. The scenic resources identified in Chapter B illustrate the lack of existing continuity and aesthetic appeal within the interior of the Original Townsite, although the new development occurring on Bell Road is setting a positive example for future development/rehabilitation within the existing community.

The visual assets identified below and illustrated on Figure 20, Environmental Design Elements, represent specific areas where the Town can enhance its attractiveness to create a cohesive community. These natural and manmade characteristics present realistic and implementable opportunities for the Town to promote its pride and unique image.

a) Views and Vistas

The lack of a prominent physical feature within the boundaries of the Planning Area creates the need to artificially channel desired views within the community. The existence of the White Tank Mountain Range, located west of the Planning Area, provides a distant backdrop to frame area development. Future growth within the Planning Area should be oriented to take maximum advantage of these long-range views. The use of architectural massing and streetscape elements (trees, street lights and sculpture) can successfully channel aesthetic views and vistas.

b) Topographical Variation

The location of the Original Townsite and the Planning Area, on a large alluvial plain, further adds to the monotony of the landscape and provides little natural opportunity for land use separations, horizontal and vertical curvature of future street alignments and creative building orientation techniques. The use of creative grading and drainage should be utilized to create artificial topographical relief to add visual interest to the built environment. The use of earth berming, in particular, when combined with significant landscaping, can successfully buffer land uses, screen or channel views and enhance drainage on minimal slopes.

c) Open Space/Natural Features

The agricultural production of the Planning Area has substantially reduced the natural features of land located south of the Beardsley Canal. North of the canal, major washes exist and can be utilized as future open space linkages, while still providing drainage to upland areas. Although the Beardsley Canal and McMicken Dam are man-made elements, an opportunity now exists to develop a regional east-west open space system linking the Lake Pleasant Recreation Area and the White Tank Regional Park and Recreation Area. The regional system could utilize the retention area behind the McMicken Dam for active recreation activities (i.e. Indian Bend Wash) and utilize the land along the canal for a pedestrian/equestrian trail system. A potential north-south regional open space linkage also exists along the Agua Fria River which, when linked with the Beardsley Canal/McMicken Dam Open Space System, could provide large-scale active and passive recreational opportunities for the citizens of Surprise, Sun City and El Mirage.

d) Vegetation Patterns

The lack of existing vegetation, except for the indigenous plant material located within the natural washes, creates the need to add color, texture and form to the built environment. Vegetation can be used to identify seasonal changes, buffer land uses, reduce the scale of large architectural structures and provide relief along large expanses of paved surfaces. The proper placement of deciduous vegetation can also be used in passive energy conservation techniques, to screen the sun during the summer and transmit heat in the winter when the tree has shed its leaves.

e) Architectural Treatments

The lack of a community theme has created a discontinuous mixture of existing building facades. The formulation of appropriate generalized architectural treatment themes for residential, commercial and industrial development should be undertaken to ensure quality development and continued enhancement as the community grows. The elements that constitute the architectural facades of buildings include exterior treatment, building height, window and door placement, signage, window displays and color. These characteristics should be carefully reviewed during the development process to assure project conformity with adopted community standards.

A site plan review process is recommended in the newly developed Zoning Ordinance. The Planning and Zoning Commission should establish and adopt initial design standards as presented herein.

f) Signage

The use of signage is an integral part of any residential, commercial or industrial project. Signage is required to identify streets, neighborhoods, commercial and employment centers. The creation of standardized signage for streets and Town facilities along with signage guidelines for residential, commercial and industrial development will enhance the visual image of the Town. For unrelated land uses, size, type and location should be addressed in signage guidelines adopted by the Planning and Zoning Commission to reduce negative visual impact. In order for signage guidelines to be effective, the Town must be willing to enforce their installation, upkeep and removal.

g) Landmarks

The use of landmarks can create identity for the Town of Surprise. Landmarks can take the form of buildings, major landscape statements, sculpture or signage. Landmarks can provide a positive focal point within the community to enhance its image, identify entry points, provide orientation and set it apart from surrounding communities (particularly those sharing a common major roadway such as Glendale, El Mirage or Sun City). Landmarks should also be sited along Grand Avenue at Perryville and El Mirage Roads to identify the major entry points to the Planning Area. Future landmark locations identifying Surprise could include the intersections of 115th Avenue and Perryville Road at Bell Road; Peoria Avenue and the Estrella Parkway; and the Estrella Parkway at Grand Avenue.

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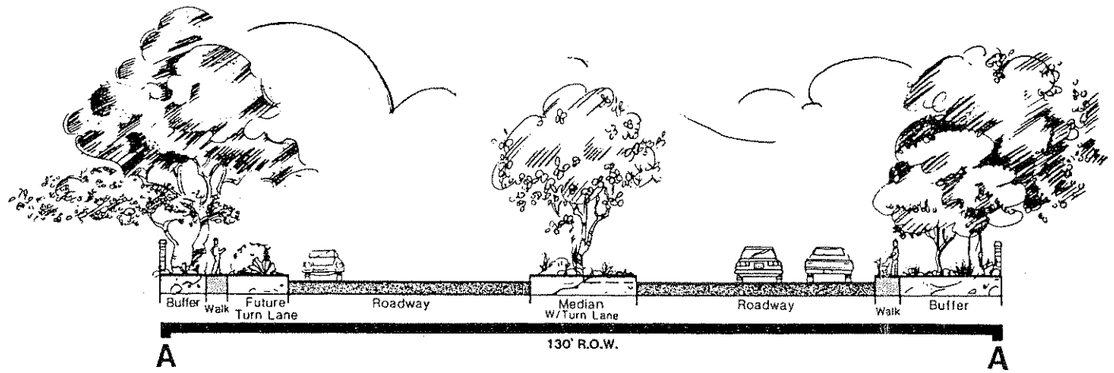

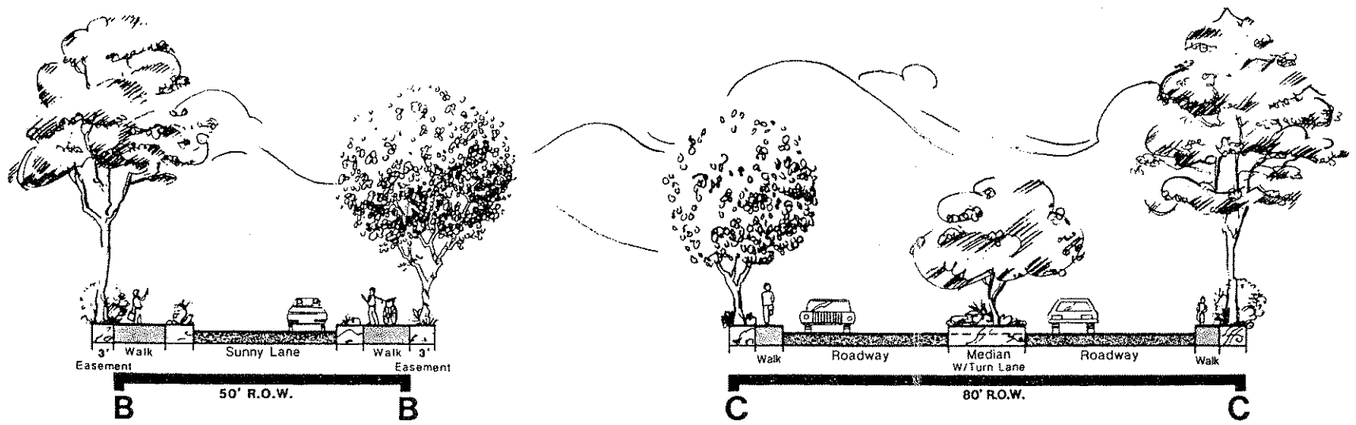

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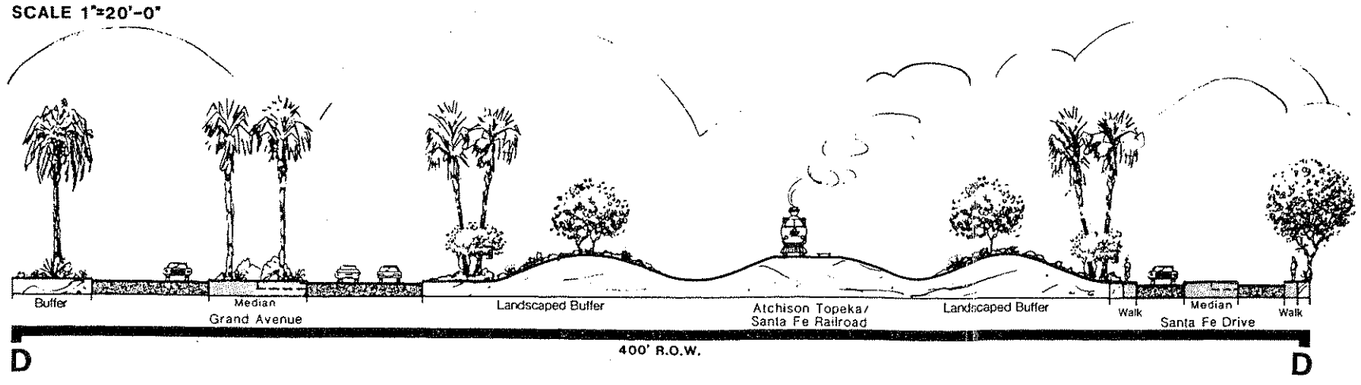

Environmental Design Elements

SECTION A-A
Major Arterial Cross Section

SECTION B-B
Sunny Lane Cross Section

SECTION C-C
Major Collector Cross Section

SECTION D-D
Grand Avenue Cross Section

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Comprehensive Development Plan

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D.3 Open Space and Recreation Plan

The Open Space Plan element of the Surprise Comprehensive Development Guide is presented in the following five sub-sections:

- Introduction
- Open Space and Recreation Objectives and Implementation Techniques
- Existing Park Improvement Recommendations
- Recreational Facility Development Strategies
- Open Space and Recreation Plan Map

D.3.1 Introduction

The Introduction provides a brief evaluation of existing facilities and the identification of a comprehensive park classification system. Parks and open space provide sites for both passive and active recreational pursuits, buffer land uses and add visual and aesthetic relief to the built environment. Because parks are not income-producing property, their monetary value is difficult to determine. Existing development has shown that residential real estate constructed within close proximity to parks enjoy the benefits from increased property value along with the accessibility of nearby recreational space and facilities.

Due to the historical development of Surprise, the four existing park facilities are located within the Original Townsite. The largest park, located at the southeast corner of Nash and Elm Streets is comprised of 12.2 acres and has facilities for softball/baseball (lighted), football, soccer, basketball and restroom facilities. The north central location of this park makes it accessible to all Townsite residents who live northeast of Grand Avenue. The second largest park is located two blocks to the south, at the southeast corner of Nash and Rimrock Streets. This 4.7 acre facility has a lighted softball/baseball field, a basketball court, play equipment, seating and picnic tables. The other park is a 0.9 acre site located at the northeast corner of Jerry Street and Marshall Drive, which contains a limited amount of playground equipment and a gravel playing surface. The only other recreational site in Surprise is the rodeo grounds, an approximately two acre site used once a year for the Town rodeo, located north of the Town Hall on Hollyhock Street.

The three existing parks comprise 17.8 acres and are virtually isolated from the portion of the Original Townsite located to the southwest of Grand Avenue. The use of the National Recreation and Parks Association standard of 10 acres/1,000 people and the existing population for the Town (4,355) produces a Townsite need of approximately 44 acres of recreational and open space. Subtracting the existing park site acreage (17.8) produces a net need of 25.7 acres, part of which should be located in the southwestern portion of the Townsite.

The identification of a comprehensive park classification system provides the basis upon which a hierarchy of park types can be identified for the Town of Surprise. The recreational facility standards, as shown in Tables 12 and 13, identify the space requirements for specific recreational activities as well as the types of recreational areas where these activities may take place. The tables also identify the hierarchy of park types as a proportion to population, site size and service district radius.

D.3.2 Open Space and Recreation Objectives and Implementation Techniques

The first stage in establishing objectives and implementation techniques for the Open Space and Recreation Plan was the identification of issues that are important to the residents of the Town. In public workshops held during the planning process, residents placed a high value on the dedication of park/school sites to be developed in conjunction with new residential development. They also felt that the lack of a park system was a critical issue, although the implementation of linear parks did not rate as high. Along with the development of a park system, the inclusion of easy accessibility was also highly rated. Through the identification of issues, specific objectives and implementation techniques have been developed to guide the formulation of the Open Space and Recreation Plan element.

The following objectives have been derived from the adopted goals, objectives and policies of Chapter C to initially guide the Town in the area of Open Space and Recreation. In association with the goals, objectives and policies, implementation techniques have been created to help the Town conform to the intent of the Open Space and Recreation Plan.

Objective H-1: Continue to improve, expand and construct new parks and public open space in relation to population growth, population composition and user demand.

The implementation techniques that the Town can utilize to insure orderly park and recreation facility development are:

1. Improve existing facilities by adding equipment, acreage and landscaping.

2. Conduct a needs assessment survey to determine a priority list of existing park improvements based upon population composition and user demand.

3. Coordinate future park location and growth with elementary, junior and senior high school location and development.

4. Require appropriately sized park dedication and development, or cash in-lieu-of payments, in conjunction with all new residential development within the Planning Area.

TABLE 12
Recreation Facility Standards

Type of Recreational Activity	Space Requirements for Activity per Population	Ideal Size of Space Required for Activity	Recreational Area Wherein Activity May Be Located
Active Recreation			
1. Children's Play Area (with equipment)	0.5 acre/1,000 population	1 acre	Playground, Neighborhood Park, Community Park, School Playground
2. Field Play Areas for Young Children	1.5 acres/1,000 population	3 acres	Playground, Neighborhood Park, Community Park
3. Older Children-Adult Field Sports Activities	1.5 acres/1,000 population	15 acres	Playfield, Community Park District Park
4. Tennis, Outdoor Basketball	1.0 acres/5,000 population	2 acres	Playfield, Community Park
5. Swimming	1 outdoor pool/25,000 population	Competition size plus wading pool, 2 acres	Playfield, Community Park
6. Major Boating Activities	100 acres/50,000 population	100 acres and over	District Park, Regional Park or Reservation
7. Hiking, Camping, Horseback Riding, Nature Study	10 acres/1,000 population	500-1,000 acres	Large District Park, Regional Park
8. Golfing	1-18 hole course/50,000 population	120 acres	Community Park, District Park
Passive Recreation			
1. Picnicking	4 acres/1,000 population	Varies	All Parks
2. Passive Water Sports(e.g. Fishing, Rowing, Canoeing)	1 lake or lagoon/25,000 population	20-acre water area	Community Park, Special Regional Reservation
3. Zoos, Arboretums, Botanical Gardens	1 acre/1,000 population	100 acres	Large District Park or Special Park Facility
Other			
1. Parking at Recreational Areas	1 acre/1,000 population	Varies	Playfield, Community Park District Park, Regional Park
2. Indoor Recreation Centers	1 acre/10,000 population	1-2 acres	Community Park
3. Outdoor Theaters, Band Shells, Performance Areas	1 acre/25,000 population	5 acres	District Park

Source: Urban Land, Vol. 10, No. 5, 1961

TABLE 13
Recreation Facility Standards

Type of Area	Acreage/ 1,000 Population	Ideal Size of Site (Acres)	Minimum Acreage	Radius of Area Served (Miles)
Playground	1.5	4	2	0.5
Neighborhood Park	2.0	10	5	0.5
Playfield	1.5	15	10	1.5
Community Park	3.5	100	40	2.0
District Park	2.0	200	100	3.0
Regional Park and Reservation	15.0	500-1,000	Varies	10.0

Source: Urban Land, Vol. 10, No. 5, 1961

D.3.3 Existing Park Improvement Recommendations

The improvements for the three existing park facilities can be grouped into categories of water and energy conservation, landscaping, and equipment upgrading.

a) Water and Energy Conservation

Although the twelve acre park is equipped with adequate lighting, the seven acre park's lighting should be replaced with energy efficient high or low pressure sodium or metal halide fixtures. The 0.9-acre park should be equipped with adequate perimeter lighting for better night visibility.

Through the conversion of manual irrigation practices to automatic systems, the Town can reduce water waste and alleviate high maintenance costs in all three existing parks.

b) Landscaping

All three parks could benefit from the development and implementation of a landscape plan to promote a continual program to provide shade, color and aesthetic appeal to the Original Townsite. The program would also evaluate existing park vegetation to provide staking, pruning and removing inappropriate trees and shrubs. A cohesive palette of trees and shrubs should be identified that maximizes color, shade and drought tolerance while mitigating poisonous leaves or fruit, pollen production and thorns or spikes. The use of drought tolerant groundcover should be actively promoted to inexpensively cover large areas, erodable slopes and areas where low growing color is needed.

c) Equipment Upgrading

The twelve acre park has an adequate amount of equipment at the present time, although play structures for pre-school children could be added to the existing facilities. The seven acre park needs a full complement of equipment to upgrade the park for more intensive use. The 0.9-acre park

site has a swing, slide and merry-go-round, but could use equipment designed for pre-school users. The inclusion of both a tennis court and basketball court could easily be accommodated to increase the park's use and appeal.

The existing park equipment, although very durable, is extremely dated. In the future, consideration should be given to integrating contemporary wooden or rope structures along with exercise stations (par course) for the two larger parks. Throughout the improvement process, consideration of enhanced handicapped access must also be addressed.

D.3.4 Recreational Facility Development Strategies

a) Regional Linear Park System

The locations of both the Agua Fria River and the Beardsley Canal/McMicken Dam (Trilby Wash) Wash Open Space System within the Planning Area presents a prime opportunity to develop two major open space linkages with neighboring municipalities. The system would function to provide virtually unrestricted pedestrian, bicycle and equestrian trail systems for Planning Area residents.

The creation of a five-year municipal open space and recreation plan should begin with the identification of easements, rights-of-way and land ownership that abut these corridors. The initial priority of the plan should focus on the development of the Beardsley Canal/Trilby Wash Corridor, comprising 1,570 acres, with recommendations for phased improvements as adjacent residential parcels are developed. In the course of development negotiation, the Town of Surprise may be in a position to exact the dedication and improvement of these identified lands. Another alternative is to establish a non-profit park/open space corporation to receive donations, enabling donors to qualify for tax deductions. The Agua Fria River Corridor, totaling forty acres, only flows through a half mile of the incorporated area of Surprise, creating recreational access points for Planning Area residents. Through coordination and cooperation with the City of El Mirage, access points could be located through the El Mirage Planning Area to add nearly 3.5 miles of corridor to the existing area located within Surprise.

b) Community Parks

The location of community parks should be sited in conjunction with junior and/or senior high schools. They should also be linked to both the regional and neighborhood parks through the use of regional parkways and the neighborhood trail system. The minimum size of a community park is approximately forty acres and can accommodate a wide variety of both active and passive uses.

Community parks can act as mid-destination points within the open space network, offering concession areas, seating and picnic sites for trail users.

c) Neighborhood Parks

The location of five to ten acre neighborhood parks are to be sited within the interior of areas identified as typical neighborhoods. These central areas are also to be developed in conjunction with elementary school sites to maximize the amount of open/recreation space, provide ease in observation for security and to alleviate conflicts for school children crossing arterial roadways. As presented later in the Redevelopment Plan element, of Chapter D, a new 2.4-acre neighborhood park is specifically proposed for development in the southwestern portion of the Original Townsite to serve adjacent residents.

d) Regional Parkways

The development of regional parkways has been initiated with the creation of the Reems/Meeker Improvement District and the associated roadway cross-sections, which includes designated trails and extensive landscaping. The parkway should be continued to the south edge of the Planning Area at Peoria Avenue where easements, rights-of-way and land ownership must be identified so that needed land may be dedicated. The identification of Bell Road and Peoria Avenue (major arterial roadways) as regional parkways creates two east-west parkways to link the Reems/Meeker Parkway with the Beardsley Canal/Trilby Wash and Agua Fria River Open Space Systems. The development of these roadways should be similar to that of the Reems/Meeker Parkway to provide continuity within the Planning Area.

e) Local Neighborhood Trail System

The local neighborhood trail system was developed to provide a secondary linkage between existing parks and regional parkways and to provide linkages between the residential areas and the elementary schools/neighborhood parks within the Planning Area. The trail system has also been located to provide secondary access to the regional linear park system and utilizes natural drainage channels whenever possible. The local neighborhood trail system would include two parallel paths (eight to ten feet in width), one each for pedestrians and bicycles with appropriate street furniture (e.g. low scale lighting, benches, trash receptacles, etc.) located within a 35-45 foot landscaped right-of-way or easement.

f) Public Participation

The Town should identify methods to encourage private sector involvement in the improvement, development and maintenance of both existing and future parks within the Planning Area. The Town can also solicit the help of various civic organizations (e.g. Lions Club, Kiwanis Club, Boy Scouts) to provide funding sources and manpower to upgrade the entire park system.

Public participation in the form of community meetings should be conducted during the planning stage of any recreational facility to solicit resident input into the planning and design process.

D.3.5 Open Space and Recreation Plan Map

The Open Space and Recreation Plan Map, as shown at Figure 21, illustrates the proposed locations of park and recreational facilities, pedestrian/bicycle circulation facilities and educational facilities throughout the Planning Area. The location of these facilities is not intended to be precise, but to recommend general sites and alignments to be serviced by new open space/recreational development.

The creation of the Beardsley Canal/McMicken Dam (Trilby Wash) Open Space System could provide a unique opportunity to develop, what is presently considered a negative developmental constraint, into an active recreational, and potentially tourist-oriented facility, (e.g., resort, golf course, sports and health clubs) within the retention and canal area. Its location, between the White Tank Regional Park and the Lake Pleasant Recreation Area, makes it optimal for a mid-destination point for horseback riders and bicyclists. The Agua Fria River will provide access to the White Tank Regional Park via the Peoria Avenue Regional Parkway and the local neighborhood trail system. The only negative constraints for this system are the future vehicular crossings that will be needed at the intersections of Bell Road and Grand Avenue, which can be alleviated by advance planning, and locating the Estrella Parkway so that it will not conflict with the crossing area.

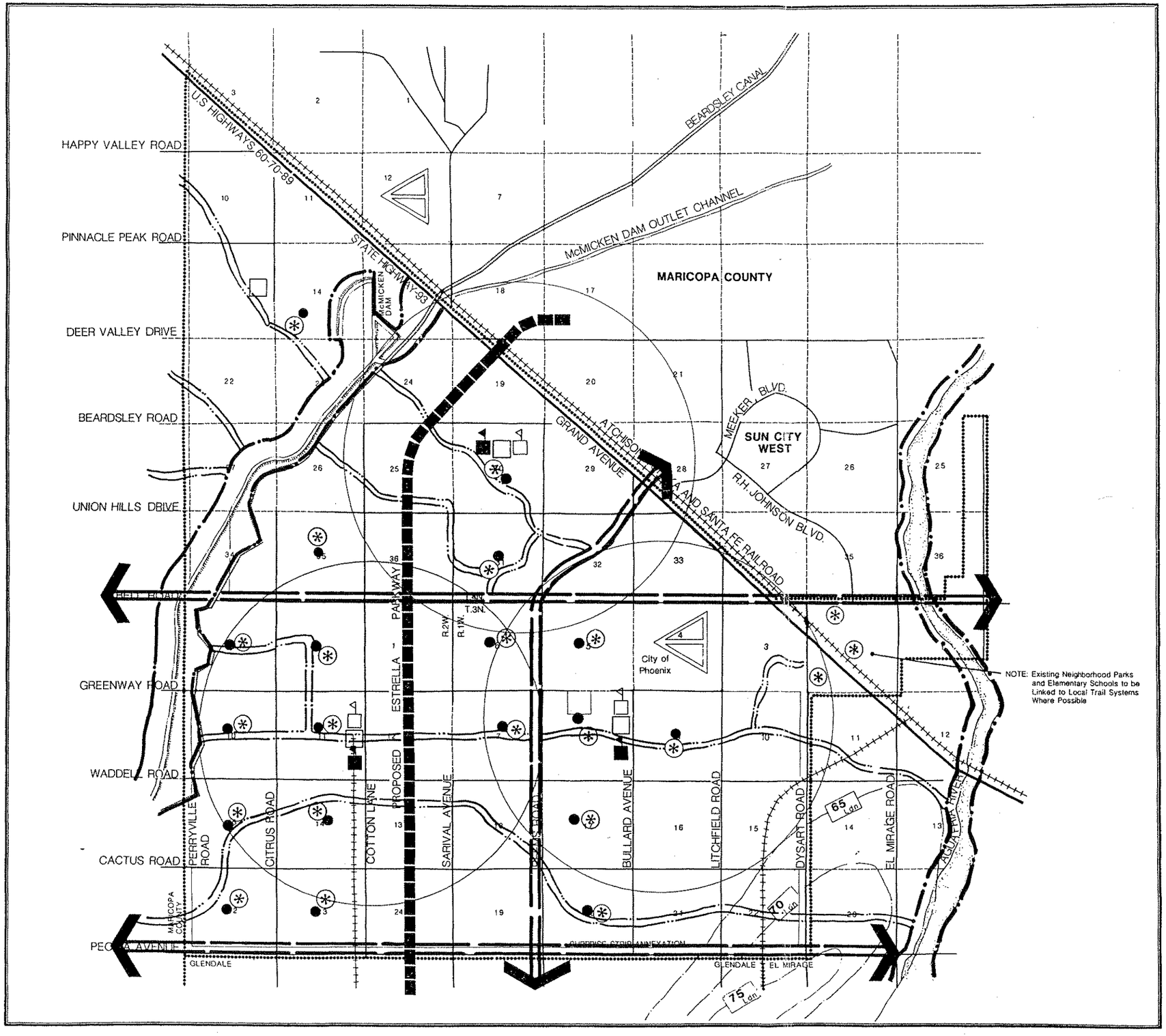
The four community parks contained within the Planning Area have been located to link with the local neighborhood trail system. The three community parks located south of the Beardsley Canal have also been located in conjunction with future junior and senior high school sites to combine recreational space and uses for area residents. The community park located northwest of the Beardsley Canal is not currently planned to include any school facilities due to the recommended land use of the area and the long term forecasted industrial development of the region. If the area were to contain a higher intensity of residential land use, then secondary educational facilities would be warranted.

The nineteen new neighborhood parks have been conceptually located in the center of all of the typical neighborhoods to coincide with elementary school development. These, combined with the existing parks located within the Original Townsite, produce a total of 22 neighborhood parks within the Surprise Planning Area at full buildout.

The three regional parkways located within the Planning Area provide both north-south and east-west linkages with the regional linear park system. Reems/Meeker Boulevard provides north-south access for Sun City West, Surprise and Glendale residents. Bell Road and Peoria Avenue provide east-west access and link the Beardsley Canal/McMicken Dam (Trilby Wash) Open Space System with the Aqua Fria Regional Park. All three of these regional parkways should be dedicated now and developed jointly with major transportation corridors.

The local neighborhood trail system is located throughout the Planning Area to provide localized access to the regional parkways and regional linear parks. This trail system will utilize the natural topography and drainage in undeveloped areas and will link elementary schools and neighborhood parks throughout the Planning Area with adjacent residential areas.

The future educational facilities are composed of senior and junior high schools, which have been located on arterial roadways to provide proper access, and are sited on overlapping two mile radii to provide adequate service areas for residential land uses. Elementary schools have been located on the interior of residential neighborhoods to provide approximate one mile service radii, to prevent school children from crossing high volume arterial roadways.



Open Space Plan

Park and Recreational Facilities

- Regional Linear Parks (Agua Fria River, Beardsley Canal)
- Community Parks (40+ Acres)
- Neighborhood Parks (5-10 Acres) (Facilities to be Centrally Located within the Open Space of the Typical Neighborhood Alternatives)

Pedestrian/Bicycle Circulation Facilities

- Regional Parkways (Bicycle and Pedestrian Pathways Developed Jointly with Major Transportation Corridors)
- Local Neighborhood Trail System (Developed Jointly with Neighborhood Parks, School Sites and Adjacent Neighborhood Development Utilizing Natural Drainage Channels When Possible)

Educational Facilities

- Senior High School (Conceptual Location Only)
- Junior High School (Conceptual Location Only)
- Elementary Schools (Facilities to be Centrally Located within the Open Space of the Typical Neighborhood Alternatives)
- School Service Area

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D.4 Circulation Plan

The Circulation Plan element of the Surprise Comprehensive Development Guide is presented in the following eight sub-sections:

- Introduction
- Summary of Functional Classification System
- Circulation Objectives and Implementation Techniques
- Recommended Circulation System
- Roadway Design Guidelines
- Access Control Guidelines
- Intersection Planning and Design
- Plan Requirements and Traffic Impact Assessment Policies

D.4.1 Introduction

In order to plan a roadway network for the future, it is useful to understand that all land in the community will not have the same intensity of development. High density land uses will attract and produce more trips than lower density areas, thereby increasing the amount of traffic between destinations. Therefore, the future roadway network should be able to accommodate forecasted increases in traffic volumes based upon the recommended land uses.

A wide variety of local and long distance trip generation within the community facilitates the need for a hierarchical road system. A classification of roads, designed and constructed based on their function, will attract specific users based upon the type and length of the trip. In addition, the functional classification system is distinguished by such key features as facility spacing, continuity and access control.

For transportation planning, as well as specific design purposes, highways are most effectively classified by function. They are primarily intended to provide mobility from point to point, but also provide access to adjacent land uses. The first category, Principal Arterial (e.g. freeway), is designed to safely carry large traffic volumes at high speed. The last category in the hierarchy, Local Streets (e.g. residential), carries lower volumes at slower speeds providing more maneuverability and access to adjacent land uses.

The original 640-acre Townsite of Surprise is the largest developed parcel within the approximate 50-square mile Planning Area. Therefore, the Town has a great opportunity to lay out a future transportation system equivalent to the functional classification roadway system.

D.4.2 Summary of Functional Classification System

In Surprise, seven basic functional categories can be used to classify roadways. These categories include:

- Principal Arterials
- Major Arterials
- Minor Arterials
- Major Collectors
- Primary Collectors
- Secondary Collectors
- Local Streets

These groups comprise the hierarchy of functional roadway classes which directly relate to the types and lengths of generated trips. Each category is discussed below.

a) Principal Arterials

The Principal Arterials consist of both freeways and expressways, which link the major centers of activity throughout the Planning Area. They also handle significant levels of urban travel between central business districts, outlying residential areas and major inner-city communities and major suburban centers.

Principal arterials are high traffic volume transportation facilities and carry a high proportion of the total urban traffic on a minimum of mileage. Optimally, principal arterials are fully or partially controlled access facilities and their spacing is dictated by either designated major state highways or key access points located on other inter-regional facilities. The Estrella Parkway/Northwest Loop Freeway are examples of this category and are generally spaced four to five miles apart.

b) Major Arterials

The Major Arterial network connects and augments the principal arterial system, provides unity throughout the urban area and can form logical perimeter boundaries for neighborhoods. Major arterials emphasize mobility, and service motorists who travel moderate distances through the Planning Area.

Major arterials are median-divided facilities characterized by major access control; channelized intersections; prohibition of on-street parking; locations on section lines; and approximate two mile spacing. Major arterials also have a greater carrying capacity than minor arterials due to their increased right-of-way.

In Surprise, Perryville Road , Cotton Lane, Reems Road, Litchfield Road, Peoria Avenue, Waddell Road and Bell Road are designated as Major Arterials, with six-lane cross-sections, consisting of three lanes in each direction and separated by a landscaped barrier median. Left-turn lanes are provided within the median and right-turn lanes can be provided where high traffic volumes necessitate right in/out movement.

c) Minor Arterials

Minor Arterials function as necessary connections to principal and major arterials. They provide functional service to retail, commercial and industrial land uses and have been located at two mile intervals. Their use still places more emphasis on travel mobility, but access is more frequent than principal or major arterials. These roadways also distribute traffic to smaller geographic areas than those served by principal and major arterial streets.

In Surprise, Cactus Road, Greenway Road, Union Hills Drive, Sarival Avenue, Bullard Avenue, and Dysart Road will initially have four-lane cross-sections, two in each direction, which can be upgraded to a six-lane roadway. Left-turn lanes are provided within the median and right-turn lanes will be incorporated at high volume locations. In some cases, a painted median will be utilized to allow continuous left turn movements.

d) Major Collectors

Major Collectors function as interior circulation elements to provide traffic movement between minor collector and arterial streets. They carry a relatively high volume of traffic within larger neighborhoods and can accommodate minor retail and other commercial establishments along their alignments. Major collectors are intended to provide discontinuous, convenient traffic movement within residential, commercial and industrial areas.

Major Collectors are located at or in the vicinity of mid-section lines. They are typically continuous throughout neighborhoods and may be extended to connect sub-areas of the community. Major collectors carry neighborhood generated traffic to the most accessible arterial roadway.

e) Primary Collectors

These facilities are located in the vicinity of quarter-section lines or at entrances to large mixed-use developments. They are designated as required and are continuous through neighborhoods. Primary collectors are used in residential and high volume areas where on-street parking is prohibited and developers of adjacent land are required to layout lots with reverse frontage. Secondary collectors and local streets connect primary collectors with minor arterial roadways.

f) Secondary Collectors

Secondary collectors are also generally located on quarter-section lines; serve large mixed uses; and are required to provide continuity through neighborhoods. They connect primary collectors and local streets where on-street parking is allowed and adjacent land use developments also front on the street. The secondary collectors are typically used in industrial areas where mobility is balanced with frequent access points.

g) Local Streets

This roadway category comprises the facilities utilized in residential areas where frequent access points cause a reduction in vehicle speed. Local streets serve abutting land uses and also provide access to higher level roadway categories.

Local streets are designed where slow speed and discontinuous travel are needed and will consist of one or more of the following types:

- Local street with on-street parking
- Reduced-width residential streets with increased off-street parking
- Cul-de-sacs

Local streets with on-street parking are primarily utilized in single-family detached residential communities. In higher density developments, the residential street widths may be reduced, but off-street parking must be increased to allow adequate stall space. The use of cul-de-sacs eliminates through traffic, slows traffic speed and is used in single-family residential communities.

D.4.3 Circulation Objectives and Implementation Techniques

The objectives and implementation techniques for Circulation were created as a result of the issues that were identified in public workshops by Town residents, staff and the Planning Team. The issues that ranked high included the development of a functional transportation system, the need to evaluate the proposed Grand Avenue Corridor alternatives, the future dedication of adequate rights-of-way and the evaluation of public transit alternatives.

The following objectives have been derived from the adopted goals, objectives and policies of Chapter C to provide the basis for the implementation techniques, which provide a realistic means to satisfy the intent of the Circulation Plan.

Objective I-1: **Continue to develop and maintain a municipal street system that provides appropriate access to all land uses, protects the integrity of Surprise neighborhoods and non-residential areas, encourages appropriate redevelopment, and promotes systematic and orderly municipal growth.**

The implementation techniques that the Town can utilize to develop a comprehensive street system are:

1. Formally adopt the Future Transportation System as graphically depicted. The Plan illustrates the proposed functional role each major roadway should fill as the Town grows to the Year 2000.

2. Formally adopt design standards for arterial, collector and local streets as illustrated in this Development Guide. The proposed design standards for all new streets have been prepared utilizing accepted transportation criteria.

3. Develop a monitoring program to gauge changes in land use, travel demand, financial requirements and resources, as well as periodically update the Circulation Plan. The Town should also modify the transportation policies and programs in accordance with the desired plan.

Objective J-1: **Work closely with the Regional Public Transportation Authority (RPTA) to establish public transit routes that best serve the needs of Surprise residents in terms of location and frequency of service.**

The implementation techniques that the Town can utilize to establish public transit are:

1. Analyze the Original Townsite and Planning Area for appropriate bus stop locations and timing.

2. Provide bus turn-outs at these locations to promote through traffic movements.

Objective J-2: **Work closely with all developers of new and revitalized projects to insure that adequate provision is made for future public transit access (e.g. minimum curvature for bus turnarounds, bus pull-out sizing, bus shelter performance criteria, etc.).**

The implementation techniques that the Town can utilize to insure future adequate public transit access are:

1. Formally adopt the Traffic Impact Assessment Policy as shown in draft form in the final section of the Circulation Plan element. Develop an internal review process to analyze the traffic impact of future development. Provide specific responses to assessment submittals to properly guide planning and development within the Planning Area.

2. Review and update existing ordinances concerning traffic signal locations with regard to the Arterial Access Guidelines. Formally adopt the Traffic Signal Warrants as contained in the Arterial Access Guidelines to serve as evaluation measures of acceptability of traffic signal installation.

3. Prepare and adopt development objectives related to transportation facilities. These objectives will address major traffic generators such as a commercial shopping mall or mixed use (e.g. combining commercial, office, industrial and residential development). Objectives include: (1) establishment of comprehensive traffic management plans encompassing several square-mile sections or along major roadway segments; (2) defining ring roads around major intersections; (3) assessing traffic generation levels and, if necessary, corresponding reductions in land use intensity; and (4) assessing the use of travel demand management techniques.

4. Retain sufficient manpower and resources, either in-house or on a contractual basis to review development requests, monitor traffic flows, develop plans and programs and perform comprehensive coordination between Town departments, developers and other agencies.

5. The Town's Zoning and Subdivision Ordinances should present transportation planning requirements to guide all zoning classifications, including Planned Area Developments (P.A.D.s). A sample provision is shown in draft form at the conclusion of this section. Such provisions require the presentation of important information at the time of filing preliminary P.A.D.s, final P.A.D.s and the individual subdivision and site plans. They would provide assurance to the Town that the proposals are consistent with their overall future transportation system. In addition, the developer would be offered flexibility to develop a detailed transportation system that satisfies the developer's needs. However, it would have to be consistent with the Circulation Plan of the Town and address traffic impact issues as outlined in the Plan's requirements.

Objective K-1: **Encourage pedestrian and bicycle circulation within neighborhoods and to commercial areas and public facilities throughout the Surprise Planning Area.**

The implementation techniques that the Town can utilize to encourage pedestrian and bicycle circulation are:

1. Dedicate adequate rights-of-way to promote the placement of pedestrian/bicycle paths.

2. Ensure proper construction of sidewalks to safely transport pedestrians/bicyclists within the Planning Area.

3. Provide adequate pedestrian/bicycle linkages between existing and proposed parks, schools and commercial areas.

D.4.4 Recommended Circulation System

The development of a recommended transportation system for the Town of Surprise consisted of formulating a new functionally classified road network that meets the future needs of the community. Other special concerns relating to land development and transportation are also covered in this section.

a) Overview of Existing Transportation Network

The Original Townsite is the major land area currently developed in the Town of Surprise. In the past, the Town has developed their transportation system on the traditional grid pattern, which has the advantage of being readily expanded in any direction and can easily tie into the existing street pattern in adjacent communities. With such a large amount of undeveloped land, the Town has a great opportunity to plan and actively implement sound transportation and land use development principles.

The only exceptions to the grid pattern occur in the area north of Bell Road to Grand Avenue. The major routes are curvilinear, and comprise a suitable network that functions in a general grid pattern. The internal street system, made up of collector and local roadways, forms an irregular pattern that provides aesthetic appeal, discourages through traffic movements, and channels traffic onto arterials.

Other major at-grade transportation facilities that affect the Town's development include rail lines. Currently the AT & SF Railroad operates a trunk line along Grand Avenue. The three and one-half mile spur line that parallels Cotton Lane is apparently abandoned and does not constitute a traffic problem. Another spur line traverses north and south from Grand Avenue to Luke Air Force Base between Dysart and Litchfield Roads, causing vehicular and pedestrian conflicts. Rail spur lines and lead tracks should be judiciously located in industrial parks or among industrial parcel developments so that sufficient track is provided, which will avoid traffic conflicts on both arterial and collector roads.

b) Future Roadway Network

The future roadway network, as illustrated on Figure 22, Future Transportation System, is based on several important factors. The roadway network was developed on the assumption that the proposed Estrella Parkway/ Northwest Loop Freeway will be constructed approximately one-half mile west of Sarival Avenue. Grand Avenue, which runs northwest/southeast, will be upgraded to a high volume expressway, presenting a potential barrier to cohesive development within the divided sections of the Original Townsite.

The Grand Avenue Expressway forms a common municipal boundary between Surprise and unincorporated Sun City West. Movement between the communities will be facilitated by the construction of interchanges/overpasses in conjunction with the expressway at Reems/Meeker and at R. H. Johnson Boulevard.

The future roadway network is primarily based on the existing locations of regional/area-wide transportation facilities, and the following spacing criteria for major and minor arterials:

- Minor arterials - 1 mile interval spacing
- Major arterials - 2 mile interval spacing

Other future roadway considerations include:

- Maintaining a logical network that accommodates tie-ins to other routes.
- Providing continuity to and connections between larger neighborhoods and major activity centers.
- Using the network configuration to provide a separation or buffer between land uses.
- Attempting to reduce the need for major structures or exhorbitant capital investments.
- Attempting to minimize the number of conflict points, thereby enhancing safety.
- Avoiding any unnecessary funneling of additional traffic into the Original Townsite.
- Attempting to promote direct and convenient access to the proposed relocated Municipal Complex site.
- Providing a skeleton roadway network that offers both the Town and development community opportunities for flexible design of collector and local roads.
- Accentuating and supporting the development of other elements of the community's Comprehensive Development Guide Plan.

c) Preserving the Future Roadway Network

The majority of the Original Townsite is stop sign controlled. Such signs have a useful function until traffic volumes increase and signals are warranted. Initial placement of stop signs should favor travel on all successively higher level streets. This placement establishes driver habits and promotes travel patterns in accordance with the functional roadway system.

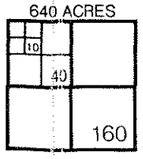
One way to ensure proper development of a functional community circulation network within the Planning Area is to purchase or require, through developer dedication, adequate rights-of-way. Actual construction of roadways and appurtenances (e.g., associated improvements such as bike paths) will accommodate the build-out design of the planned transportation facilities. These facilities can be staged, but sufficient rights-of-way should be acquired so that the network can accommodate future traffic as the intensity of land use is upgraded.

Future Transportation System

- Principal Arterial (Freeway/Expressway, Controlled Access, 6 Travel Lanes)
- Major Arterial (6 Travel Lanes Plus Turn Lanes)
- Minor Arterial (4-6 Travel Lanes Plus Turn Lanes)
- Proposed Interchange Locations

SURPRISE
Comprehensive Development Plan

640 ACRES



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BRW

d) Treatment of Other Roadway Network Issues

1. River and Canal Crossings

The Agua Fria River and Beardsley Canal present limited barriers to expansion of the transportation system. The development of the Future Transportation Plan calls for a minimal number of crossings at Bell and Waddell Roads which will reduce the number of pedestrian/vehicle conflict points for open space users.

2. Rail/Highway Barriers

The existing AT & SF Railroad right-of-way, paralleling Grand Avenue, presents a significant barrier to north-south and east-west movements between neighborhoods within the Town of Surprise. Travel should be allowed to continue between areas separated by the Grand Avenue Expressway, including the Original Townsite and other newly developing neighborhoods. The future placement of interchanges at Bell and Greenway Roads will discourage through traffic movements within the Original Townsite, enhancing the opportunities for neighborhood revitalization.

3. Geometric Improvements

Intersection improvements should be completed at R. H. Johnson Boulevard, Nash Street and Bell Road. Moreover, improving the street pattern at Greenway Road should also be completed to facilitate efficient traffic flow.

4. Rail/Highway Crossing Protection

Minimum railroad crossing protection is exhibited by the presence of cross-buck signage. Key crossing areas (e.g. Sunny Lane, Grand Avenue, Factory Street) of the AT & SF Railroad should be monitored for upgrading and flashers should be installed, if warranted.

5. Variation in Pavement Conditions

It is recommended that the Town adopt improved standards for pavement types to upgrade overall conditions and to provide uniformity to the street system.

6. Heavy Traffic on Community Streets

Complaints of excessive traffic on Greasewood, Cottonwood and Nash Streets were identified by Town residents at public workshops. These streets should be stop sign controlled in order to discourage the anticipated increase in traffic volume. Extending north from Elm Street, Nash Street now provides a logical extension to R. H. Johnson Boulevard, but is inducing higher traffic volumes destined for Grand Avenue and the future Greenway/El Mirage Interchange.

Once Grand Avenue is upgraded as a high volume limited access arterial, Dysart Road, through lack of continuity will function as a collector, providing access to existing landowners.

7. Lack of Transit and Bicycle/Pedestrian Facilities

The low population base of the Surprise Planning Area results in an absence of prominent transit service, bicycle and pedestrian facilities for Town residents. Detailed planning for these facilities should be coordinated with phased residential, commercial and industrial development as growth continues to occur.

e) Sensitive Treatment of Development Areas

If two or more incompatible land uses are contiguous or in close proximity to each other, buffering or transitional uses may be required. Buffering consists of placing neutral space between two incompatible uses (e.g., industrial next to residential). The transportation network (e.g., arterials and collectors) and appurtenances, along with spatial separation, earth berms and landscaping can be used to achieve environmentally acceptable buffering of incompatible land use types.

f) Transit Development Opportunities

Three levels of transit service were considered in the long-range transportation planning for the Town of Surprise. As the population base grows, a high speed express bus service should be considered and incorporated as a key item in order to serve the effective rider market. A park-and-ride service should also be provided along the proposed Grand Avenue Expressway to capture riders travelling into the heart of the Phoenix Metropolitan Area.

A medium-level service should use arterial streets and transit corridors to provide a framework within which primary destination points are located. For example, major commercial areas, community facilities (i.e. Town Center) as well as cultural, educational, civic, institutional, recreational and industrial uses should also be linked with these transit facilities. A relatively wide buffer could be located between clusters of concentrated development at one-quarter mile intervals to benefit transit service.

A low-level neighborhood type transit service should be encouraged among planned area developments where implementation and financing could be provided by individual developers or neighborhood associations. Development of such systems should be linked to any community-wide or regional system with key transfer points located at common activity centers or other convenient access areas.

g) Pedestrian Mobility and Circulation

The movement of pedestrians should be considered on a Planning Area basis. Sidewalks should be provided along major and minor arterials, collectors and local streets. Multi-purpose pathways inside rights-of-way provide a viable option to transport both pedestrians and bicyclists within the community.

The following are guidelines to aid in the future provision of safe, convenient and aesthetically pleasing pedestrian mobility:

- Prepare design and landscape standards for pedestrian corridors;
- Conduct a study to determine sidewalk improvement areas, standards, widths, materials, street/sidewalk separation and handicapped access;
- Concentrate pedestrian crossings at street intersections rather than mid-block locations; and
- Reverse frontage residential lots on arterial streets to produce an interior local street system, thereby reducing pedestrian/vehicular conflicts.

h) Integrating Bicycle Facilities

Bikeways are facilities that provide reduced-conflict bicycle travel lanes and are grouped into the following three classes.

- Class I facilities are exclusively designated for bicycles to use separate rights-of-way.
- Class II facilities are restricted rights-of-way designated for exclusive or semi-exclusive use where through-vehicular and pedestrian travel are not allowed, but parking may be permitted.
- Class III facilities share rights-of-way with motor vehicles and are designated by posted signs or pavement markings.

The roadway rights-of-way shown in conjunction with the road cross-sections do not identify bikeway right-of-way needs. These will be determined and incorporated with the rights-of-way used for the roadway sections. Typically, 12-18 feet (total) of additional right-of-way (R.O.W.), if added to the cross-sections, should accommodate a Class I Bikeway. Therefore, advance reservation of right-of-way will accommodate a planned bikeway on each side of major and minor arterials and collectors. Bikeways that are built within the right-of-way afford added safety, but are more costly than using the vehicular roadway.

A separate eight-foot pavement could be provided along minor arterials which are designated 110-foot rights-of-way. For example, in Kingswood Parke, a bike path is planned on one side of the roadway and along all collectors. An electric cart path may also be located along Reems Road to facilitate use by senior citizens.

The Beardsley Canal provides an opportunity to combine a conflict-free bicycle path within the proposed recreational corridor. This path could provide recreational bicycle access from Lake Pleasant to the White Tank Regional Park. However, since state gas tax funds cannot be used for bicycle facility construction, some other funding source must be identified to finance this regional bikeway system.

A bikeway will be considered along the Agua Fria River on the east side of Town. Coordinated planning for such facilities should be carried out with adjacent communities as well as the Town, so that the Beardsley Bikeway will link with the Agua Fria Bikeway.

Bike use on local streets should also be adequately accommodated. Where storm water drainage grates do exist, lattice covers should have small perpendicular openings to avoid tire punctures, bent rims or injuries. Sufficient "shy-clearance" should also be provided to prevent conflict with automobiles using the shared roadway.

A Bicycle Plan should be formulated by the Town to delineate specific bicycle routes and to establish standards for these pathways in conjunction with the Open Space and Recreation Plan element of this Comprehensive Development Guide.

D.4.5 Roadway Design Guidelines

The design requirements of a given roadway depend upon the function of the facility as well as the magnitude and characteristics of the projected traffic volumes. The design guidelines have been developed for at-grade intersection approaches for both roadway widths and right-of-way widths of all roadway classifications contained in the Circulation Plan. The recommended standard roadway cross sections are illustrated on Figures 23, 24, and 25 for the arterial, collector and local roadway categories.

The recommended design standards, as presented in Table 14, depict the minimum design standards for undivided roadways while Table 15 illustrates those roadways characterized by a divided median. The key element in these cross sections is the minimum right-of-way widths. The precise physical requirements of an intersection approach are extremely difficult to predict over an extended period of time and the flexibility to construct an additional turn lane can result from a relatively small increase in land use intensity or travel pattern. Although unique circumstances may arise, requiring right-of-way modification, maximum flexibility can be retained through proper design, spacing and planning.

D.4.6 Access Control Guidelines

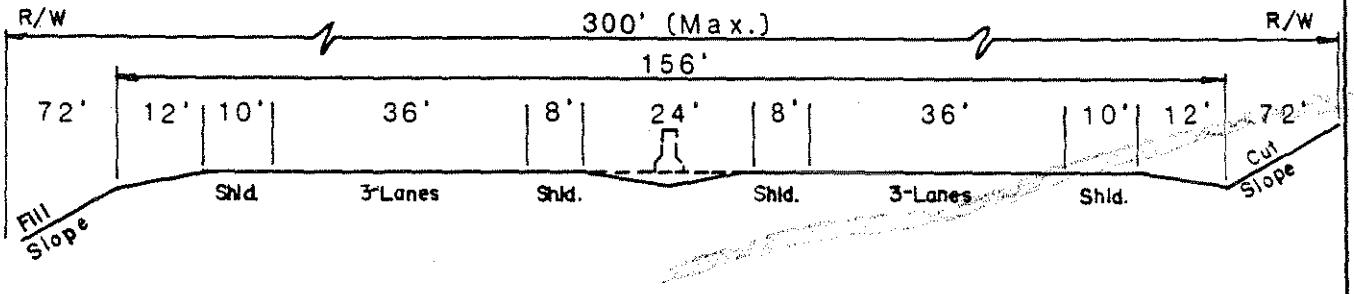
The lack of access control along arterial roadways is the largest single factor of functional obsolescence of roadway facilities. Frequent driveways and curb cuts increase points of conflict resulting in increased accidents and speed reduction. The Town of Surprise should strive to achieve stable access restrictions that provide permanent protection for all major and minor arterial roadways.

One of the most effective ways to maintain the functional integrity of the arterial system is to manage the access needs of adjoining land uses. Traffic should be directed to points where it will be controlled reducing conflicts between turning vehicles and through traffic.

ARTERIAL ROADWAYS

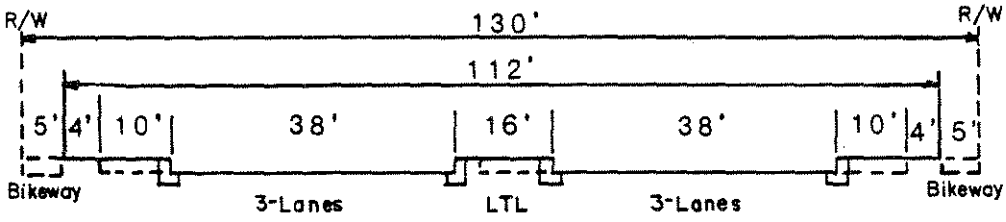
PRINCIPAL

FREEWAY/EXPRESSWAY



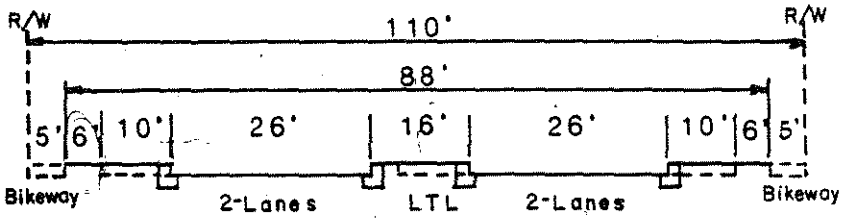
MAJOR

MULTI-LANE ROADWAY
Divided- 6 Travel Lanes
(6-Plus with Right Turn Lanes)



MINOR

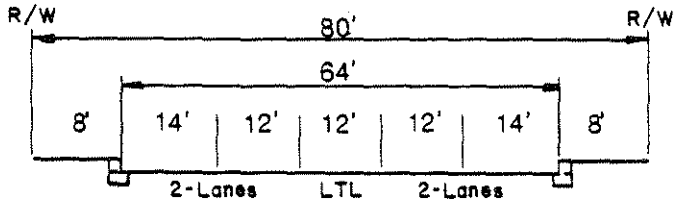
MULTI-LANE ROADWAY
Divided- 4 Travel Lanes
(4-Plus with Right Turn Lanes)*



COLLECTOR ROADWAYS

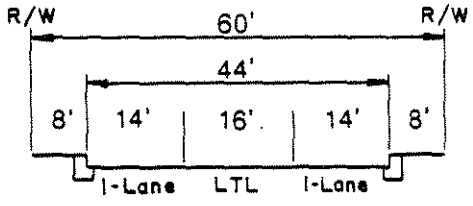
MAJOR

MULTI-LANE ROADWAY
Undivided - No Parking
(Commercial areas, Restricted access)



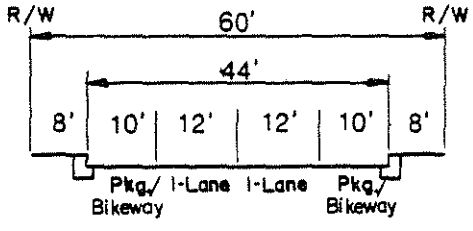
PRIMARY

TWO-LANE ROADWAY
Undivided - No Parking
(Residential areas with backage)



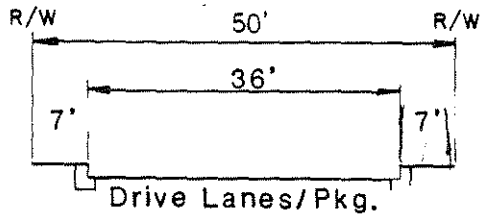
SECONDARY

TWO-LANE ROADWAY
Undivided with Parking
(Residential areas with frontage)



LOCAL ROADWAYS

TWO-LANE ROADWAY
Undivided with Parking



TWO-LANE ROADWAY
Undivided with Increased Off-Street Parking

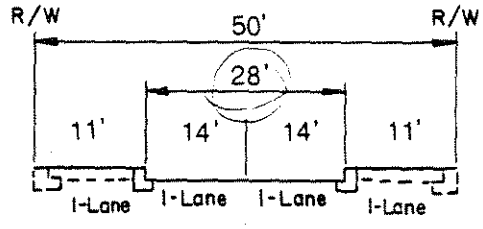


TABLE 14
Minimum Design Standards At-Grade Intersections - Undivided
(Table Values in Feet)

Cross Section Element	Element Width	Facility Description											
		T-L-R 6-2-2	6-1-2	6-0-2	6-2-0	6-1-0	6-0-0	4-2-2	4-1-2	4-0-2	4-2-0	4-1-0	4-0-0
Through Lanes (T)	12	72	72	72	72	72	72	48	48	48	48	48	48
Left Turn Lanes (L)	10	20	10	-	20	10	-	20	10	-	20	10	-
Right Turn Lanes (R)	10	20	20	20	-	-	-	20	20	20	-	-	-
Lateral Clearances	2	6	6	4	6	6	4	6	6	4	6	6	4
Curb/Curb Width	-	118	108	96	98	88	76	94	84	72	74	64	52
R/W Clearances (Min.)	3	12	12	14	12	12	14	6	6	8	6	6	8
R/W Width (Min.)	-	130	120	110	110	100	90	100	90	80	80	70	60
R/W Width (Des.)	-	130	130	130	130	130	130	110	110	110	110	110	110

NOTE: Facilities are described according to the number of through lanes (T), left turn lanes (L), and right turn lanes (R). Minimum R/W widths provide roadside areas sufficient only for sign poles, and other traffic control devices. Desirable R/W widths provide roadside areas that are sufficient for future expansion and the addition of other roadside facilities such as transit stops, pedestrian elements, etc. After an appropriate transition back from an intersection as shown in the "Uniform Standard Details for Public Works Construction" distributed by the Maricopa Association of Governments, all turn lanes may be tapered out of the cross-section, in which case the dimensions for L=0 and R=0 would apply.

Source: BRW, Inc., 1986

TABLE 15
Minimum Design Standards At-Grade Intersections - Divided
(Table Values in Feet)

Cross Section Element	Element Width	Facility Description																	
		T-L-R 8-2-2	8-1-2	9-0-2	8-2-0	8-1-0	8-0-0	6-2-2	6-1-2	6-0-2	6-2-0	6-1-0	6-0-0	4-2-2	4-1-2	4-0-2	4-2-0	4-1-0	4-0-0
Through Lanes (T)	12	96	96	96	96	96	96	72	72	72	72	72	72	48	48	48	48	48	48
Left Turn Lanes (L)	10	20	10	-	20	10	-	20	10	-	20	10	-	20	10	-	20	10	-
Right Turn Lanes (R)	10	20	20	20	-	-	-	20	20	20	-	-	-	20	20	20	-	-	-
Lateral Clearances	2	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8	8
Median (No Turn Lane)	14	-	-	14	-	-	14	-	-	14	-	-	14	-	-	14	-	-	14
Median (Turn Lane)	4	4	4	-	4	4	-	4	4	-	4	4	-	4	4	-	4	4	-
Curb/Curb Width	-	148	138	138	128	118	118	124	114	114	104	94	94	100	90	90	80	70	70
R/W Clearances (Min.)	3	12	12	12	12	12	12	6	6	6	6	6	10	10	10	10	10	10	10
R/W Width (Min.)	-	160	150	150	140	130	130	130	120	120	110	100	100	110	100	100	90	80	80
R/W Width (Des.)	-	170	160	160	150	150	150	130	130	130	130	130	130	110	110	110	110	110	110

NOTE: Facilities are described according to the number of through lanes (T), left turn lanes (L), and right turn lanes (R). Minimum R/W widths provide roadside areas sufficient only for signs, signal poles, and other traffic control devices. Desirable R/W widths provide roadside areas generally sufficient for future expansion and adding other roadside facilities such as transit stops, pedestrian elements, etc. After an appropriate transition back from an intersection as shown in the "Uniform Standard Details for Public Works Construction" distributed by the Maricopa Association of Governments, all turn lanes may be tapered out of the cross-section in which case the dimensions for L=0 and R=0 would apply.

Source: BRW, Inc., 1986

a) Access by Facility Functional Classification

General access to the arterial network is provided by intersections with collector and local roadways, and major driveways to developments. The spacing of general access intersections will vary between the arterial functional classes, according to the level of land access which may be allowed.

b) Spacing Access on Principal Arterials

U.S. Highway 60/89 (Grand Avenue) traverses diagonally through the Town of Surprise. Upon completion of the Grand Avenue Expressway, access to the facility will be available only at interchanges located at minimum one mile spacings. Similarly, access to the Estrella Parkway/Northwest Loop Freeway will have grade separated interchanges at approximately two mile intervals which can be upgraded to one mile intervals as the land use intensity of the Planning Area increases.

In short, section line arterial intersections should be designed with the flexibility to separate the roadways as demand warrants. Access should be based on appropriate traffic signal spacing to ensure two-way progression. Through a specific corridor, intersections should be located at consistent intervals.

Direct land access onto an expressway should be restricted and access points limited to special cases which must be justified by a Traffic Impact Assessment and subject to review and consent of the Town of Surprise and the Arizona Department of Transportation (ADOT).

c) Spacing Access on Other Arterials

Access spacing on both major and minor arterials is reduced compared to principal arterials. Major and minor arterial streets intersect at grade and in some cases above grade with principal arterials.

Intermediate intersections with collector and local roadways and major driveways should be limited to a maximum of five per mile with access allowed based on traffic flow efficiency. Intersections needing traffic signals should be located based on the appropriate traffic signal spacing to ensure proper progression.

Intermediate intersections (median breaks) should be located a minimum of one-eighth mile (660 feet) from the nearest major intersection. Optimal intersection spacing is at quarter-mile (1,320 feet) intervals to allow adequate two-way traffic signal progression.

Direct land access should be controlled utilizing right-in, right-out access points, which may be allowed based on traffic generation. Minimum distances between access points is discussed below under Driveway Access.

f) Driveway Access Points

Driveways (access points) directly affect the safe operation and service level of through roadways, and are an important mechanism to provide access to adjacent land uses. The primary function of arterial streets, which is to move traffic, should be protected through the use of access restrictions.

Principal arterial access points shall not be allowed. On other arterial streets, driveway access points to any single standard land parcel shall be limited to one two-way driveway or one pair of one-way driveways for each parcel. Access points should conform to Table 18, Arterial Street Driveway Dimensions, concerning the recommended spacing between access points. Additional driveways may be permitted based on the following guidelines:

1. Daily driveway two-way volume exceeds 5,000 vehicles per day.

2. Traffic volumes would exceed capacity of stop sign controlled intersections during:

   a. Peak hour of street; or
   b. Peak hour of parcel.

3. Traffic Impact Assessment determines that two driveways are required to safely and efficiently accommodate demand.

Large developments should seek to consolidate access points at appropriate arterial street intersection/median break locations. Such consolidation may assist in meeting traffic signal warrants and providing acceptable signal progression on through streets.

Driveway/access point locations should be coordinated along all roadways. Where possible, driveways on opposite sides of the roadway should be aligned to facilitate cross travel and take advantage of appropriate median breaks. Where this is not possible, driveways on opposite sides of arterials with barrier medians should be offset to provide sufficient storage for left-turning vehicles.

TABLE 18
Arterial Street Driveway Dimensions

	Commercial	Industrial
Width*		
Minimum	15	20
Maximum	35	40
Right-Turn Radius**		
Minimum	10	15
Maximum	20	25
Angle***	45°	45°

* The minimum width of commercial driveways is intended to apply to one-way operation. In high pedestrian activity areas, such as central business districts or in the same block with an auditorium, school, or library, the maximum basic width should be thirty feet. The width is intended to be measured along the right-of-way line, in most instances, at the inner limit of a curbed radius or between the line of the radius and the near edge of a curbed island at least fifty square feet.

** Measured on the side of a driveway exposed to an entry or exit by right-turning vehicles. In high pedestrian activity areas, the radii should be half the values shown. The maximum radii for major generator driveways (above 5,000 Average Daily Traffic) should be much higher than the values shown and similar to actual intersection designs.

*** Based upon the minimum acute angle measured from the edge of pavement, and generally based on one-way operation. For two-way driveways, and in high pedestrian activity areas, the minimum angle should be seventy degrees. In all cases, ninety degrees is the preferred angle of alignment.

Source: Institute of Traffic Engineers, 1984

g) Driveway Spacing

Spacing between driveways/access points must allow safe and efficient execution of all movements including turns and crossing flows. The degree of driveway spacing control should be consistent with the through traffic speeds and land development intensity along the through roadway.

Desirable driveway spacing for major arterial streets is a minimum distance of 200 feet. Desirable spacing for minor arterial streets is 185 feet or more. Where these dimensions cannot be achieved, Table 19, Minimum Driveway Spacing, presents minimum spacing requirements for arterial roads.

TABLE 19
Minimum Driveway Spacing
(Center-Line to Center-Line)

Facility	Land Use	Minimum Spacing (ft)
Major Arterial		
	Commercial; High Density/High Activity	200
	Industrial/Office Park; Low to Moderate Activity	275
Minor Arterial		
	Commercial; High Density/ Activity	150
	Industrial/Office Park; Low to Moderate Activity	230
	Multi-Family Residential; Low to Moderate Activity	150

Source: Adapted from "Guidelines for Control of Direct Access to Arterial Highways;" FHWA, 1975

The spacings shown in Table 20 are between two-way driveways. Between one-way drives, the spacing dimensions may be reduced by one-half, provided the inbound drive is upstream on the through roadway.

Where driveways are to be signalized, a minimum spacing of 1,200 to 1,500 feet to any other signalized intersection should be maintained. If the signalized driveway is a tee-intersection with a remote possibility of future extension of the fourth leg, a minimum spacing of 660 feet from the nearest signalized intersection may be acceptable, based on traffic signal warrants and local signal system capabilities. In any event, driveway signals are to be directly coordinated with any existing or planned signals within one-half mile of the signalized driveway.

D.4.8 Plan Requirements and Traffic Impact Assessment Policies

a) Sample Planned Area Development (P.A.D.) Circulation Requirements

- Preliminary P.A.D.

  A generalized plan of the Future Transportation System (Figure 22) is to be used in creating an adequate means of access within the P.A.D. and adjacent areas. The P.A.D.'s Circulation Plan should be submitted at the time of initial filing and should include the following elements:

  1) General location and rights-of-way for principal, major and minor arterials, and major collectors, both internal and external to the P.A.D.; and

2) General analysis of transportation system requirements including approximate roadway cross-sections, impact of P.A.D. phasing on size and timing of improvements, major improvements such as bridges or interchanges, and approximate costs for transportation improvements.

- Final P.A.D.

A Circulation Plan is required to be submitted with the initial filing of the final P.A.D. The Circulation Plan shall consist of the following elements:

A Traffic Impact Study to include:

1) Projection of traffic volumes within the final P.A.D. and volumes generated by the final P.A.D. added to the major streets within one mile of the final P.A.D. at the twenty year point;

2) Analysis of intersection operations at arterials and major collectors; investigation of traffic signal warrants and examination of traffic operations at other access points based on information in the above; and

3) Proposed roadway improvement cross-sections, intersection, access point and traffic signal locations; and other methods to mitigate potential traffic impacts resulting from the final P.A.D.

A Master Street Plan to include:

1) Location of horizontal and vertical alignment of major streets (freeways, parkways, arterials, major collectors) as identified above;

2) Required cross-sections of major streets at buildout of the development as identified above;

3) Location and layout of major intersections and, if known, access points as identified above; and

4) Notes pertaining to the Master Street Plan in general, or pertaining to specific transportation improvements.

Additional actions which should be carried out by the Town relative to large scale planned development coordination include:

1) Monitoring the Grand Avenue Expressway to promote development along the Expressway as desired by the Town;

2) Utilizing minimum access standards along all arterial streets provided in this Circulation Plan;

3) Monitoring the planning, selection of alignment and optimum access locations of the proposed Estrella Parkway;

4) Reviewing local developments with regard to their accommodation and treatment of transit facilities;

5) Conducting a study to determine sidewalk improvement areas and sidewalk improvement standards (e.g. widths, materials, street/sidewalk separation, handicapped access);

6) Developing an annual status report on key transportation issues facing the community and a review of accomplishments during the past year;

7) Reviewing new development proposals to consider the integration of bikeways and bike paths that could serve major generators and users; and

8) Developing an overall community-wide Bicycle Plan, which covers such items as: off-street lanes and paths, signage, lighting, parking, riverbank trails, innovative bikeway designs, etc. and incorporating the Plan as part of the Surprise Comprehensive Development Guide.

b) Policy on Traffic Impact Assessments for Project Development

In order to ensure consistent preparation of traffic studies throughout the Town of Surprise, the following criteria have been established.

- Planning Review Process

  Arterial street access is a major element in any potential development and will be considered by the Town of Surprise within established procedures utilized for plan review and approval.

  Prospective requestors of arterial access will be required by the Town to submit a Traffic Impact Assessment (TIA) report detailing the proposed project and potential impacts to the adjacent arterial streets. TIAs must be prepared and submitted to the Town as a part of the plan review process for the following types of projects:

  - Single Family Residential - in excess of 100 units
  - Multi-Family Residential - in excess of 100 units
  - Commercial - in excess of 10,000 gross square feet of floor area and including all new convenience shopping, service stations, convenience food enterprises or similar facilities, regardless of size, except if specifically included as an element of an overall development plan
  - Office - in excess of 100,000 gross square feet of floor area
  - Industrial - in excess of 200,000 gross square feet of floor area

- Traffic Characteristics

  Peak Hour Traffic = 8% of daily traffic for non-site traffic
  Directional Split = 60/40 if local data is not available for off-site traffic
  Pedestrian Times = 4'/second plus 7 second walk (minimum)

- TIA Report Contents

  All traffic reports shall contain, as a minimum, the following information:

  1) A summary table listing each type of land use, the units involved, the trip rates used (daily as well as peak period), and the resultant trip generation.

  2) A site map that shows the location within the site of each land use listed above.

  3) Traffic graphics illustrating:

     a. A.M. peak-hour site traffic
     b. P.M. peak-hour site traffic
     c. A.M. peak-hour total traffic
     d. P.M. peak-hour total traffic
     e. Total daily traffic (site traffic shown in parenthesis)

  4) A capacity analysis should be conducted for all major driveways that intersect collector or major streets, and at all major-major arterial, major-minor arterial or major arterial-collector and minor arterial-collector intersections within one mile of the site or as directed by the Town Engineer's office. The applicant shall test both peak hours to determine the critical movements.

  5) TIA reports should be prepared in the following format:

     - Trip Generation - per the Institute of Transportation Engineers (ITE) Trip Generation Manual, or other suitable substantiated trip rates per land use approved by the Town of Surprise Engineer
     - Trip Distribution
     - Traffic Assignment
     - Capacity Analysis
     - Evaluation
     - Recommended Access Plan - including access points, modifications and mitigation techniques, if applicable

D.5 Public Facilities and Services Plan

The Public Facilities and Services Plan element of the Surprise Comprehensive Development Guide is presented in the following five subsections:

- Introduction
- Public Facilities and Services Objectives and Implementation Techniques
- Public Facility Recommendations
- Public Facilities Plan Map
- Public Utility Recommendations

D.5.1 Introduction

The Introduction provides a brief explanation of the sections within the Public Facilities and Services Plan. The Public Safety Services and Facilities in Surprise include the Surprise Police Department, Maricopa County Sheriffs Department and the Surprise Fire Department. The Public Administration Facilities include the Town Hall and the Community Center/Library. The school facilities include the five schools located within the Dysart Unified School District. The health facilities include local hospitals, such as Valley View, Walter O. Boswell and Del Webb, which provide health care needs for Surprise residents. The public utilities and services include the water, sanitary sewer, wastewater treatment, solid waste disposal, natural gas, electrical and telephone services necessary to service the incorporated area, as well as the Planning Area.

D.5.2 Public Facilities and Services Objectives and Implementation Techniques

The first stage in establishing objectives and implementation techniques for the Public Facilities and Services Plan was the identification of issues at the public workshops conducted during the planning process. The issues that rated high among Surprise residents included siting future land uses based on existing infrastructure, alleviating overcrowding in schools, constructing adequate crosswalks and sidewalks, coordinating public service growth to match residential growth, constructing community centers for children, constructing a sanitary sewer system, developing a senior social program and promoting public service activities. Through the identification of these issues, specific objectives and implementation techniques have been developed to guide the Public Facilities and Services Plan element.

The following objectives have been developed from the adopted goals, objectives and policies in Chapter C to initially guide the Town in the area of public facilities and services. The formulation of implementation techniques are designed to provide a realistic way in which the Town can satisfy the objective and conform to the overall intent of the Public Facilities and Services Plan element.

Objective L-1: Extend trunk public utilities and provide other public facilities and services in an orderly, planned manner to support new development.

The implementation techniques that the Town can utilize to insure the proper provision of public facilities and services to support new development are:

1. Create individual master plans for water, sewer and stormwater to improve public health conditions in the Town and to promote orderly, planned growth.

2. Initiate an annual Capital Improvements Program (C.I.P.) and improvement districts to finance needed improvements.

3. Utilize the Public Facilities and Services Plan to conceptually locate future public safety, educational, health care and public administrative facilities.

4. Establish the development of public facilities based on a "needs" analysis of the surrounding area.

Objective L-2: **Prohibit new development where public utilities, facilities and services cannot be established without unduly taxing the existing service provision or users.**

The implementation techniques that the Town can utilize to properly channel growth are:

1. Establish a growth management program that coordinates new development with existing public utilities and facilities.

2. Allow new development only where utility extensions can be both economically and adequately constructed.

Objective L-3: **Improve, modify or expand public utilities, facilities and services in conjunction with neighborhood revitalization and other redevelopment activities in the existing urban area.**

The implementation techniques that the Town can utilize to stimulate urban revitalization are:

1. Create a comprehensive plan for the coordinated revitalization of the Original Townsite which will include both infrastructure and building improvements.

2. Construct a sanitary sewer system and wastewater treatment facilities to serve the Original Townsite.

3. Work with local citizen groups to plan for and carry out the revitalization/redevelopment of the Original Townsite.

D.5.3 Public Facility Recommendations

The generalized recommendations for each public facility element are the result of the analysis of the existing public facility and service data presented in Chapter B, Inventory and Analysis, and accepted facility standards which will be used to show present adequacy and future facility needs for the Town of Surprise.

The facility standards illustrated in Table 20, Public Facilities Planning/ Space Standards, are a composite of accepted municipal standards and have been modified as necessary to reflect the needs of Surprise. Each standard is identified by category, space requirement and literary source. These standards are meant to be used only as a planning guide and are based on the future population growth of the Town. In the future, it may become necessary to deviate from these recommendations as Town growth patterns, needs and character change.

Based upon the standards presented in the table, which have been calculated on a ratio of 1,000 persons, a conceptual figure of future facility needs of Surprise can be calculated for the Year 2000 population forecast. The following sub-sections describe the anticipated public facility and service needs for the Town in the next fourteen years.

a) Surprise Police Department

The Surprise Police Department currently utilizes 1,000 square feet of space. Comparing the existing square footage to the police facility space standard produces an existing need of 600 square feet, which will be alleviated with the new 900 square foot addition located next to the Town Hall. If the Town of Surprise grows to its forecasted Year 2000 population (54,329) nearly 20,000 square feet of space will be needed to adequately provide police protection. The existing manpower can adequately patrol the incorporated area, but as future development occurs to the west, more manpower and more centralized facilities will be needed.

TABLE 20
Public Facilities Planning/Space Standards

Type	Space Requirements/1,000 Persons	Source
Public Safety Services and Facilities		
Police	400 square feet (does not include garage space)	Colorado Division of Impact Assistance
Fire *	800 - 1,000 square feet (four-minute response time - local)	Colorado Division of Impact Assistance
Public Administration Facilities		
Administrative	800 square feet	Colorado Division of Impact Assistance
Library	700 square feet (1,000 square feet minimum)	National Library Association

*Dependent upon factors of water availability, storage and flow; trained personnel; equipment response time; building types, prevailing building codes, etc.

Source: BRW, Inc., 1986

b) Surprise Fire Department

The Surprise Fire Department currently operates out of the Town Hall and utilizes the associated storage yard for equipment storage. The lack of fire hydrants within the Original Townsite and the lack of facilities within the incorporated area contribute heavily to the high underwriters insurance rating (8). This figure may be reduced to a six rating based upon the certification of full-time fire department personnel and the future construction of fire hydrants, producing increased fire insurance premiums for Town residents and businesses. The Town will need almost 50,000 square feet of space by the Year 2000 if the Town is to be adequately served. These future fire facilities should optimally be located to provide overlapping four minute response time "diamonds" for the future service area.

c) Surprise Town Hall

The Surprise Town Hall is currently 11,650 square feet short of having enough space for existing operations. The facility is extremely crowded with all of the Town administrative functions located under one roof. The future administrative facilities should total approximately 40,000 square feet to adequately serve the forecasted Year 2000 population. Optimally, these facilities should be centralized within the Planning Area to be equi-

distant for all residents. A tentative 25-acre site has been conceptually located at the intersection of Reems and Bell Roads, which could accommodate the Town Administration, Public Safety Services and the Town Library.

d) Surprise Library

The Surprise Library, located with the Community Center, comprises less than 1,000 square feet. Based on the National Library Association Standard, the facility should total approximately 2,800 square feet to adequately serve the existing population. If the Planning Area receives its forecasted population growth within the next thirteen years, library facilities should be increased to approximately 35,000 square feet. When the Town Hall is relocated within the Planning Area, the library should be located within close proximity and thus be centralized within the Planning Area.

e) School Facilities

The absence of existing school sites in the Planning Area will be alleviated by the proposed large-scale residential developments currently in various planning stages. The school facility standards illustrated in Table 21, School Facility Standards, can be utilized as general guidelines to plan for the location of school facilities in conjunction with major developments. The Town of Surprise should work closely with the Dysart Unified School District to prepare a master plan identifying the criteria to site, construct and administer the growth of educational facilities within the Surprise Planning Area.

Table 22, Population Based School Criteria, shows in a conceptual framework, the number of schools that should be constructed to maintain adequate facilities, based on overall area population stastistics. The required acreage is also shown to give a conceptual site size so that future school sites can be properly located when large land parcels are subdivided. Using the anticipated population of Surprise in the Year 2000 of 54,329 and Table 22, Population Based School Criteria, utilizing the median values in the 25,000-100,000 range, results in a total required land need of nearly 125 acres, which could be allocated to construct approximately one senior high school, one junior high school and five elementary schools. These educational facilities should be conceptually located and dedicated in conjunction with the criteria presented in the School Master Plan and coordinated with future development.

f) Health Care Facilities

The existing population of Surprise could not sustain a full-care hospital at the present time, but the existence of both Valley View and Walter O. Boswell Hospitals can provide adequate service for Town residents. The future opening of Del Webb Hospital (1988) will also preclude the need for a hospital located within the Planning Area. When the Town does have the need for a hospital facility, the structure should be sited in a centralized location with respect to existing and future growth.

TABLE 21
School Facility Standards

	Nursery School	Elementary School	Junior High	Senior High
Population Served:	1,000 to 3,000	2,000 to 7,000	10,000 to 20,000	10,000 to 35,000
Students Served:	70 to 90	700 to 900	800 to 1,000	900 to 2,500
Age Groups Served:	2 to 5 years old	6 to 11 years old	12 to 14 years old	15 to 18 years old
Number of Students Per Classroom:	20	30	30	30
Optimal Square Footage Per Student:	40	70	90	110
Number of Classrooms:	4	27	40	57
Building Size in Square Feet:	3,200	56,000	108,000	187,000
Building Site in Gross Acres:	1 to 3	7 to 14	14 to 30	18 to 40
Off-Street Parking:	1 space per two classrooms	1 space per classroom plus three additional	1 space per class- plus six additional	1 space per teacher plus staff and students
Service Radius:	One Quarter Mile	One Half Mile	One Mile	Two Miles

Source: DeChiara, Joseph and Koppleman, Lee. Manual of Housing Planning and Design Criteria, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1975).

TABLE 22
Population Based School Criteria

Educational Facility Type	Community Population 10,000 or Less	10,000-25,000	25,000-100,000	50,000-100,000	100,000 or Above
Nursery Schools	2-5	5-10	10-25	25-40	40+
Required Acreage	4-10	10-20	20-50	50-80	80+
Elementary Schools	1-2	1-3	3-7	7-14	14+
Required Acreage	10-20	10-30	30-70	70-140	140+
Junior High School	1	1	1-2	2-5	5+
Required Acreage	22	30	30-60	60-80	80+
Senior High School	1	1	1-2	2-4	4+
Required Acreage	30	30	30-60	60-80	80+
Total Acres Required	66-82	72-102	102-224	224-410	410+

Source: DeChiara, Joseph and Koppleman, Lee. Manual of Housing, Planning and Design Criteria, (Englewood Cliffs, N.J.: Prentice-Hall, Inc., 1975).

D.5.4 Public Facilities Plan

The Public/Semi-Public Facilities Plan, as illustrated on Figure 26, illustrates the generalized locations for educational, public safety, open space and health care facilities within the Surprise Planning Area.

A total of nineteen elementary schools and neighborhood park sites have been conceptually located within the Planning Area to coordinate with the land uses recommended in the Development Guide Plan. Based upon future population forecasts to the Year 2000, roughly eight of these facilities could be needed within the next thirteen years. A total of three junior and senior high school/community park sites have been located within the

Planning Area to adequately service the total build-out population. Only one of these secondary educational sites will be needed in the next fourteen years if development follows the recommended land use designations.

The existing public safety facilities, composed of police and fire protection, will combine with future conceptual satellite locations to total seven facility sites at Planning Area build-out. If the Town Center relocates from the Original Townsite to the intersection of Reems and Bell Roads, the move would centralize not only the main public safety facilities, but the municipal offices, main library and possibly a secondary health care facility within a municipal complex or campus. The main facilities, now located within the Original Townsite, would be reduced to a satellite facility to provide adequate service to existing Town residents. A two-mile radius has been used at each conceptual site to facilitate optimum public safety response times and to illustrate the needed overlap of service districts.

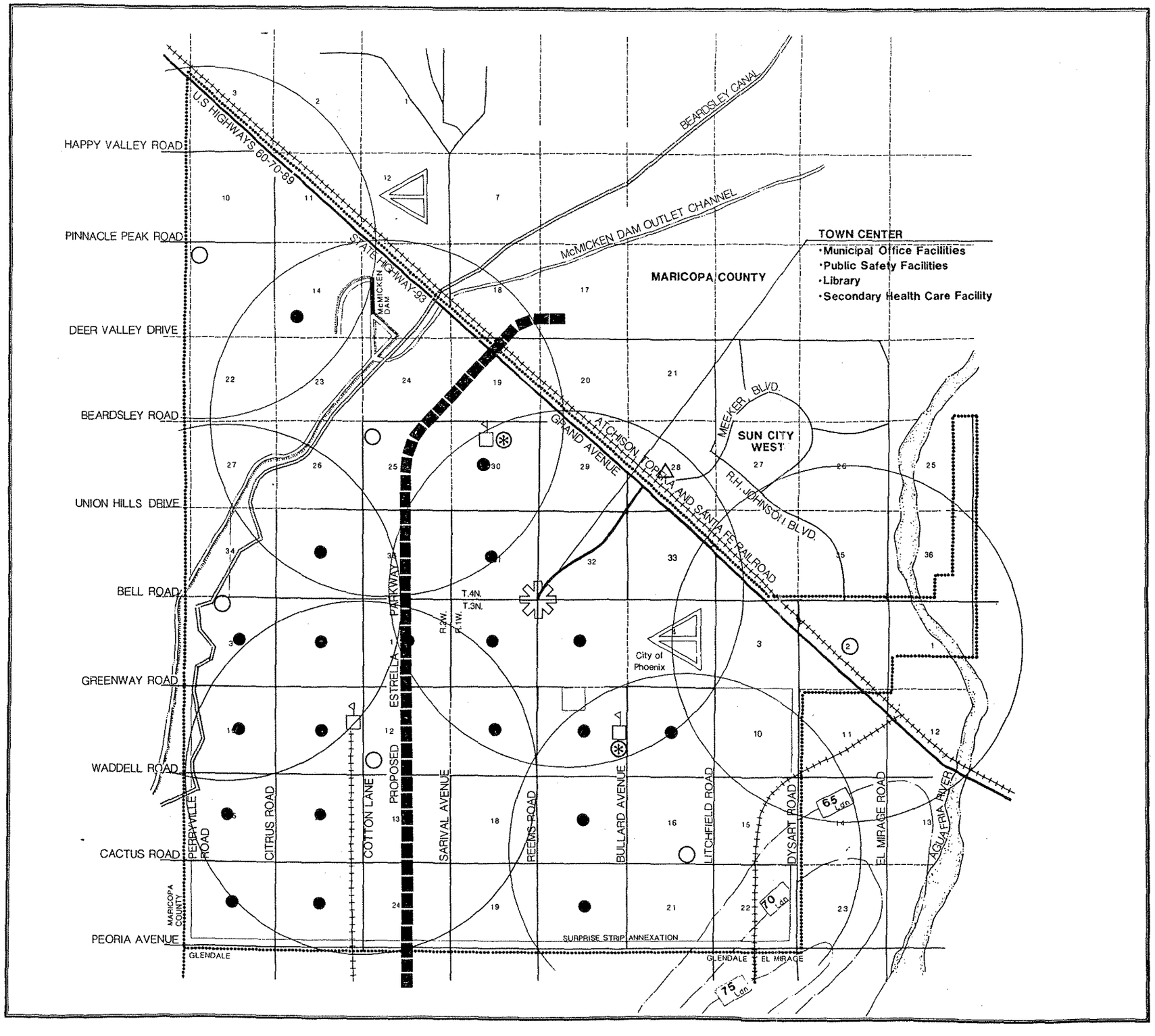
D.5.5 Public Utility Recommendations

a) Water

Although the Town does not have an existing Master Water Plan in place, a private consultant has prepared a conceptual study that would locate wells at overlapping one mile radii points. Twelve inch trunk lines would be constructed within section line arterial rights-of-way, with mid-section lines constructed as either eight or twelve inch trunk lines, depending upon the intensity of future land development.

b) Sanitary Sewer and Wastewater Treatment

The recent development pressure exhibited within the Planning Area will preclude the existing use of septic tank facilities. The Town is now in the process of designing a de-centralized sewage treatment system that would form districts to provide a gravity flow network to adequately treat sewage, and generate effluent which can then be pumped as grey water throughout the district for reuse within the open space system. The sewage system would utilize fifteen to eighteen inch trunk lines connected to each treatment plant and twelve inch trunk lines located within section line arterial rights-of-way to transport the sewage for processing. Depending upon the intensity of development, eight to ten inch lines would adequately serve residential, commercial, office and industrial land uses located within each section of land.



Public/Semi-Public Facilities Plan

- Elementary School/Neighborhood Park Sites
- Secondary School
- Satellite Public Safety Facilities
- Community Park Sites
- Health Care Facilities
- Satellite Public Safety Service Area

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D.6 Redevelopment Plan

The Redevelopment Plan element of the Surprise Comprehensive Development Guide is presented in the following four sub-sections:

- Existing Conditions
- Redevelopment Issues
- Redevelopment Objectives and Implementation Techniques
- Specific Townsite Revitalization Plan

D.6.1 Existing Conditions

This section of the Redevelopment Plan identifies those existing conditions within the Original Townsite of Surprise which will determine the type of projects recommended for area revitalization/redevelopment, and which will have an impact on the strategies recommended for their implementation. Existing conditions examined within this section include:

- Present Land Use Concerns
- Housing Conditions
- Population and Socio-Economic Characteristics

a) Present Land Use Concerns

Section B.3, Land Use and Zoning, identifies special locations of concern which must be addressed in formulating a Redevelopment Plan for the Original Townsite. These concerns include:

1. Incompatible Land Uses

   The Townsite is predominately single-family in character, interspersed with manufactured housing and small multi-family developments. Within these residential areas exist small pockets of industrial and commercial uses which are detrimental to residential character and neighborhood stability.

   Single-family residential uses fronting Grand Avenue are mixed with predominately commercial and industrial uses, and are being negatively impacted by existing noise and traffic volumes.

   Isolated pockets of mobile homes exist within single-family neighborhoods, affecting the land values of both types of residences.

   Multi-family developments are scattered throughout single-family neighborhoods, creating high traffic volumes on interior residential streets.

2. Lack of Parks in the Southwest Corner of the Original Townsite

The southwest corner of the Townsite lacks open space and recreational areas. Pedestrian and bicycle pathways do not presently cross Grand Avenue to link this section of the Town with existing recreational facilities within the Original Townsite.

3. Heavy Traffic Through Residential Areas

The use of Greasewood and Nash Streets as throughways, linking Greenway and Bell Roads, presents safety hazards for those residing on these streets and hinders pedestrian circulation through the Townsite.

4. Vacant and Underutilized Land

Vacant lots are scattered throughout residential neighborhoods and major vacant parcels zoned for residential development are located in the northeast quarter of the Townsite.

b) Housing Conditions

- Housing Inventory

According to the 1985 U.S. Special Census, there were 1,121 dwelling units within the Townsite of Surprise. Approximately 71 percent of these units are single-family detached dwellings, fifteen percent are in mobile home units and the remaining fourteen percent are located in multi-family structures. The 1980 Census indicated that a majority of the Townsite's occupied units were owner occupied (69.3%) in 1980. The 1985 County Assessor tax records show a decrease in the percentage of owner occupied units over a five year period to 49 percent. Table 23, Housing Tenure Changes, illustrates these percentage changes over the last five year period.

TABLE 23
Housing Tenure Changes

Tenure	1980 Census	1985 Tax Records
Owner Occupied	69.3%	48.7%
Renter Occupied	30.7%	51.3%

Source: BRW, Inc., 1986

The Townsite experienced a 6.1% vacancy rate in 1980. If this rate is applied to only renter occupied units identified by the tax records, the percentage of owner occupants of totally occupied units would increase to 51.9 percent, but would still be significantly less than reported five years earlier.

- Housing Conditions

Surveys of the existing housing stock in the Townsite were conducted in 1979 by Willdan Associates for the Original Maricopa County Community Development Agency's **Urban County Housing and Socio-Economic Study** and in 1985 by Dynamic Program Planning, Inc. for the Maricopa County's **Fair Housing Problem Area Analysis.** The Willdan Associates' 1979 survey indicated approximately 60 percent of the existing housing stock in the Townsite was substandard, with 50.3 percent suitable for rehabilitation, and 11.2 percent not suitable for rehabilitation. The Town of Surprise had one of the highest levels of housing deterioration within the Urban County (excluding the Phoenix Metropolitan Area) according to this 1979 survey. The Dynamic Planning 1985 survey illustrates the continued deterioration of the Townsite housing stock with one-third of the units considered no longer suitable for rehabilitation. Table 24, Housing Condition Survey Findings, details the results of these two studies.

TABLE 24
Housing Condition Survey Findings

Date of Study	Standard	Suitable For Rehabilitation	Not Suitable For Rehabilitation
1979	38.5%	50.1%	11.2%
1985	28.6%	37.1%	34.3%

Source: Urban County Housing and Socio-Economic Study, Willdan Associates, 1979; Field Survey by BRW, Inc., 1986

The deteriorated condition of the Townsite's dwelling units may be directly related to the decrease in owner occupancy experienced from 1980 to 1985. Deteriorated physical conditions encourage residents with the financial means to relocate to standard housing outside the community, discourage those who do remain from upgrading their property and retard development of new units by outside investors. Physical deterioration of a community often results in decreased community pride which further accelerates a community's decline.

Overcrowding is another factor which impacts housing conditions. According to the 1980 Census, 17.6 percent of the Townsite's occupied units housed 1.01 to 1.50 persons per room, and 13.6 percent housed 1.50 or more persons per room. A dwelling is considered overcrowded by federal standards when there are 1.10 or more household members per room. Overcrowding often occurs in households with five or more members. Surprise has relatively large households when compared to the total County with an average

a) Redevelopment Plan

The Specific Townsite Plan is illustrated on Figure 27, Redevelopment Plan, and includes the area bounded by Bell Road on the north, Greenway Road on the south, Dysart Road on the west and El Mirage Road on the east. Detailed recommendations in the areas of land use, pedestrian and vehicular circulation and community image are made based on the existing conditions section of the Redevelopment Plan which was presented earlier and consistent with the goals, objectives, and policies presented in Chapter C of the Surprise Comprehensive Development Guide.

- Land Use

1. Residential

Medium density housing and mobile home parks are recommended in the northern portion of the Townsite to create a transitional residential buffer between the new and developing commercial uses along Bell Road and the low density residential Townsite core.

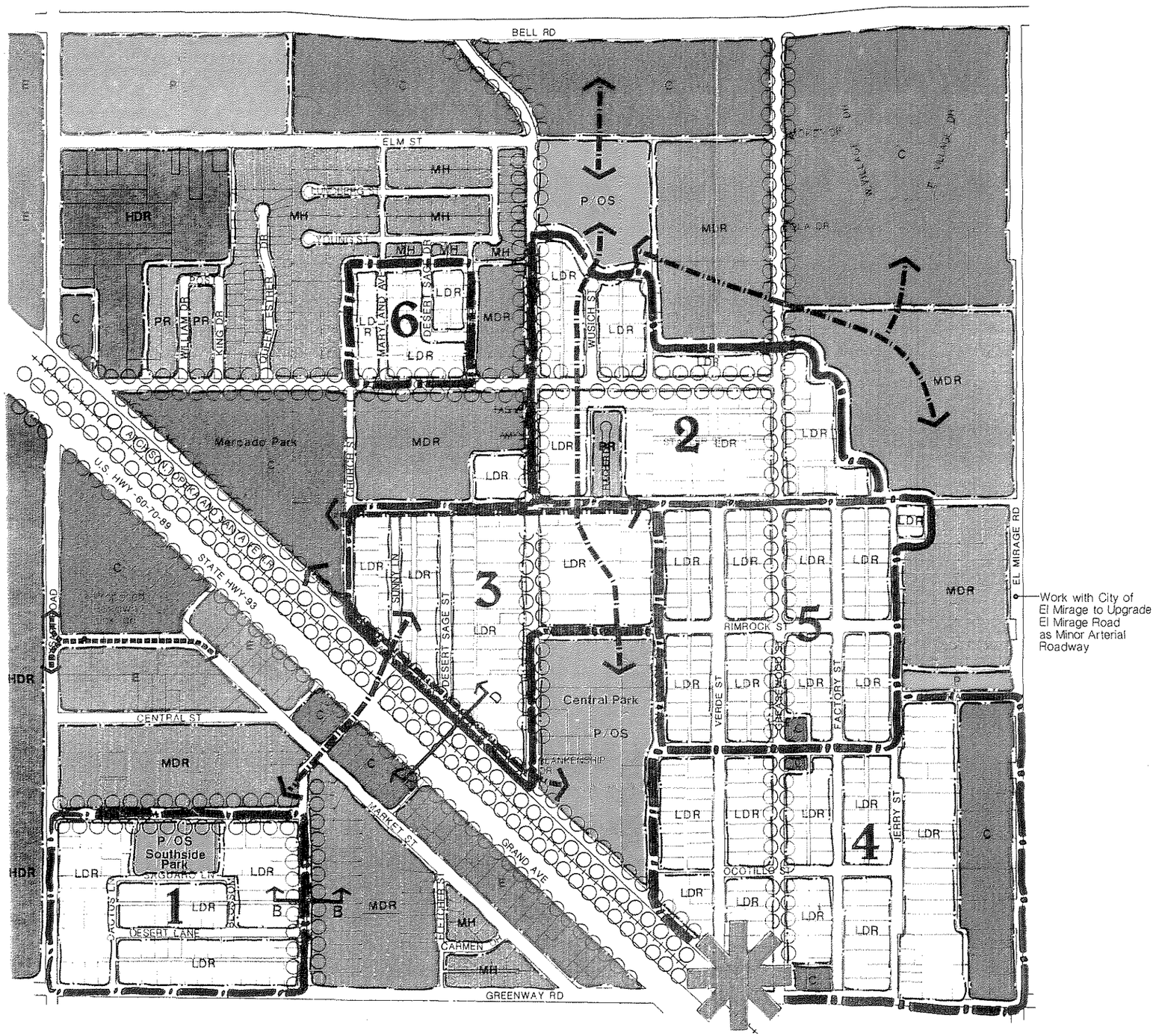
Retention of low density residential use of the Townsite interior is recommended through substantial rehabilitation of existing dwelling units and infill development of single-family and duplex units on vacant lots. The rehabilitation of existing housing is proposed in six phases, beginning in the southwestern portion of the Townsite.

2. Commercial

As the volume of traffic on Grand Avenue increases, it will become more difficult to access the small businesses currently lining this corridor. Once Grand Avenue is upgraded to an expressway, with access limited to Bell and Greenway Roads, current frontage access will be eliminated. In order to preserve property value and take advantage of the high visibility afforded these parcels along the corridor, it is recommended that the south Grand Avenue frontage be converted to commercial and employment uses, such as professional offices, office and business services and small light manufacturing facilities. Parcels must be consolidated to achieve buildable lots and proper access to frontage roads to achieve such redevelopment.

It is further recommended that the northwest segment of Market Street be eliminated and rerouted to Dysart Road to provide an area north of Central Street for expansion of employment uses complimentary to those along Grand Avenue, and to allow development of a major community commercial node, east of Dysart Road and south of Grand Avenue, to serve nearby neighborhoods.

The future development of a Mercado is proposed as a long-range addition to the commercial base of the Townsite in the area bounded by Cottonwood Street on the north, Church Street on the



Redevelopment Plan

- LDR Low Density Residential
- MDR Medium Density Residential
- HDR High Density Residential
- MH Mobile Home
- PR Public Residential
- C Commercial
- E Employment
- P Public
- P/OS Park/Open Space
- Pedestrian/Bicycle Linkages
- Tree Linkages for Residential, Commercial and Parks
- Entry Landmark
- 2 Phasing Sequence of Rehabilitation Target Area

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east and Santa Fe Drive on the southwest. The Mercado is recommended to provide an opportunity for the development of community-based commercial and retail space to serve Town residents, as well as to provide a theme destination shopping area to attract residents and seasonal visitors from surrounding communities.

The Mercado will be developed in a Hispanic theme and will provide opportunities for community events, as well as exhibitions and transient retail activity such as farmers markets, craft shows, etc. In effect, the Mercado could act as the Town's civic center or focal point for cultural, civic and social events.

Future community commercial parcels locating on Bell Road will also provide both retail and service commercial facilities for Townsite residents, as well as future Planning Area residents.

3. Parks and Recreational Facilities

It is anticipated that the municipal complex located at Santa Fe and Hollyhock Street will outgrow its present facilities and be conceptually relocated to the intersection of Reems and Bell Roads. Upon relocation of this facility, it is recommended that the existing municipal site, rodeo grounds, community center and existing park facility and the land immediately adjacent to the municipal site be acquired to accommodate development of a large Central Park for the Townsite. This Central Park, and the proposed Mercado, will provide two major focal points within the Townsite and significantly improve the image of the Town of Surprise along Grand Avenue.

Within the next five years the Regional Public Transit Authority (RPTA) will be examining the potential for a fixed guideway transit system to serve the Phoenix Metropolitan Area in the 21st Century. The Grand Avenue/AT & SF Railroad corridor may be a prime candidate for such a facility, due to its existing access to Glendale and the Phoenix Central Business District. A future Central Park facility on the former municipal office site could provide an excellent opportunity for a station stop along this fixed guideway route with attendant park-and-ride facilities, and could serve as a "pulsing point" to interface with local bus routes.

The location of a small neighborhood park of approximately 2.4 acres in the southwest portion of the Townsite is also recommended. The proposed site is centrally located within the neighborhood on both vacant lots and lots occupied by substandard structures. This park is intended to provide recreational opportunities for the southwest corner of the Townsite which is currently devoid of any recreational facilities.

The Town can promote the development of infill housing by:

- Encouraging the development of affordable townhomes on large vacant parcels to provide opportunities for young neighborhood families and increased neighborhood stabilization.

- Encouraging the construction of single-family homes on scattered vacant lots within residential areas through the rehabilitation of existing housing and the removal of dilapidated and vacant structures. If private developers cannot be enticed to build within the townsite, consideration should be given to the establishment of a non-profit development corporation for land acquisition and construction of infill housing for resale to private owner occupants.

- Promoting the construction of low density rental units on vacant parcels to increase the townsite's supply of family rental housing, which would be eligible for participation in the federal Section 8 Rental Assistance Program.

Economic Development

Economic Development projects can be pursued along with the housing activities if sufficient resources exist to promote such activity. The Town should encourage the development of the proposed Mercado and employment and commercial uses along Grand Avenue by:

- Completing all proposed public improvements within these designated areas.

- Working with the present property owners and potential developers to secure Urban Development Action Grants (UDAG) and private financing for these projects.

- Working with the Department of Economic Security (DES) and the County Community Action Program to develop job training and job placement programs which could interface with the Town's economic development efforts.

east and Santa Fe Drive on the southwest. The Mercado is recommended to provide an opportunity for the development of community-based commercial and retail space to serve Town residents, as well as to provide a theme destination shopping area to attract residents and seasonal visitors from surrounding communities.

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Within the next five years the Regional Public Transit Authority (RPTA) will be examining the potential for a fixed guideway transit system to serve the Phoenix Metropolitan Area in the 21st Century. The Grand Avenue/AT & SF Railroad corridor may be a prime candidate for such a facility, due to its existing access to Glendale and the Phoenix Central Business District. A future Central Park facility on the former municipal office site could provide an excellent opportunity for a station stop along this fixed guideway route with attendant park-and-ride facilities, and could serve as a "pulsing point" to interface with local bus routes.

The location of a small neighborhood park of approximately 2.4 acres in the southwest portion of the Townsite is also recommended. The proposed site is centrally located within the neighborhood on both vacant lots and lots occupied by substandard structures. This park is intended to provide recreational opportunities for the southwest corner of the Townsite which is currently devoid of any recreational facilities.

The Town can promote the development of infill housing by:

- Encouraging the development of affordable townhomes on large vacant parcels to provide opportunities for young neighborhood families and increased neighborhood stabilization.

- Encouraging the construction of single-family homes on scattered vacant lots within residential areas through the rehabilitation of existing housing and the removal of dilapidated and vacant structures. If private developers cannot be enticed to build within the Townsite, consideration should be given to the establishment of a non-profit development corporation for land acquisition and construction of infill housing for resale to private owner occupants.

- Promoting the construction of low density rental units on vacant parcels to increase the Townsite's supply of family rental housing, which would be eligible for participation in the federal Section 8 Rental Assistance Program.

Economic Development

Economic Development projects can be pursued along with the housing activities if sufficient resources exist to promote such activity. The Town should encourage the development of the proposed Mercado and employment and commercial uses along Grand Avenue by:

- Completing all proposed public improvements within these designated areas.

- Working with the present property owners and potential developers to secure Urban Development Action Grants (UDAG) and private financing for these projects.

- Working with the Department of Economic Security (DES) and the County Community Action Program to develop job training and job placement programs which could interface with the Town's economic development efforts.

east and Santa Fe Drive on the southwest. The Mercado is recommended to provide an opportunity for the development of community-based commercial and retail space to serve Town residents, as well as to provide a theme destination shopping area to attract residents and seasonal visitors from surrounding communities.

The Mercado will be developed in a Hispanic theme and will provide opportunities for community events, as well as exhibitions and transient retail activity such as farmers markets, craft shows, etc. In effect, the Mercado could act as the Town's civic center or focal point for cultural, civic and social events.

Future community commercial parcels locating on Bell Road will also provide both retail and service commercial facilities for Townsite residents, as well as future Planning Area residents.

3. Parks and Recreational Facilities

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4. Pedestrian and Vehicular Circulation

Both Nash and Greasewood Streets are currently acting as informal collector streets, carrying through traffic from Grand Avenue to Bell Road. This through traffic possesses significant safety problems for current residents and discourages neighborhood stability. It is recommended that stop signs be installed at approximate two block intervals and 25 mile per hour speed limits be posted and enforced to discourage through traffic on these neighborhood streets, thereby encouraging the use of Dysart Road, until Grand Avenue is upgraded to a high volume expressway, and an upgraded El Mirage Road for through traffic capability.

In conjunction with the efforts to discourage through traffic on residential streets, it is recommended that the Town of Surprise work with the City of El Mirage to upgrade El Mirage Road to a minor arterial street with intersections at Grand Avenue and Bell Road, thereby relieving the present bottleneck in the Grand Avenue/Factory Street/Greenway Road area. The Factory Street linkage with Grand Avenue can then serve as the local access point to the northern portion of the Townsite.

As currently planned, Grand Avenue will be upgraded to a limited access expressway in 1995 providing fully directional interchanges at Bell and Greenway Roads. This will focus regional access to the Townsite at the Bell and Greenway Road interchanges and direct major traffic flow to the arterial perimeter streets of Bell, Greenway and El Mirage Roads. Dysart Road may not have continuity across Grand Avenue, but will still function as a neighborhood collector for Townsite residents. This traffic flow will complement the overall Specific Revitalization Plan of the Townsite by encouraging access via the perimeter streets and utilizing Greasewood, Nash and Cottonwood Streets as internal circulation/distribution routes.

An internal pedestrian circulation network is recommended to provide alternative means of pedestrian and bicycle circulation with minimal automobile traffic conflicts. As proposed, the network links both the north and south portions of the Townsite, residential to commercial and recreational/open space areas, and integrates with the pedestrian circulation network proposed for the entire Planning Area of Surprise.

The pedestrian bicycle paths are intended to be sidewalks of eight to twelve feet in width which can accommodate both pedestrian and bicycle traffic. Street furniture (e.g. benches, trash receptacles, low level lighting) will be located at convenient intervals, and handicapped ramps will be provided at all street intersections along with pedestrian striped crossings with appropriate caution signs. The sidewalks will be

heavily landscaped with appropriate street trees, shrubs and groundcover which will provide shade for pedestrians and bicyclists, as well as attracting potential users to the network.

A pedestrian crossing located at the intersection of Grand Avenue and Sunny Lane is recommended as an interim measure until Grand Avenue is upgraded to a limited access expressway. This crossing should be accommodated through the provision of a demand-activated pedestrian crossing signal and appropriate crosswalk designations. In conjunction with the proposed 1995 upgrading of Grand Avenue, a pedestrian overpass should be constructed which can accommodate pedestrian, bicycle and handicapped circulation between the two portions of the Townsite.

5. Image Enhancement

The substantial rehabilitation and new construction of residential units should promote a Hispanic theme which would include the use of stucco and masonry finishes, tile roofs, wooden trellises and timber features. Colors for exterior treatment should be selected from a variety of earthtones compatible with the desert environment.

The use of arid and semi-arid plant materials requiring minimal maintenance, high efficiency (i.e. low water use) irrigation systems should be encouraged. Strong consideration should be given to the use of trees, shrubs and ground cover that provide continual foliage, as well as seasonal color.

The establishment of a tree planting program is recommended to enhance street images, to provide a pleasing edge to public rights-of-way and to establish individual themes for residential streets. Primary circulation corridors which include Cottonwood, Nash and Greasewood Streets, Tara and Sunny Lanes and Santa Fe Drive should be landscaped with a consistent theme of large-scale street trees that define these corridors as interior circulation distribution routes.

Lower scale tree plantings which provide a shaded canopy effect are suggested for neighborhood streets. Recommended species for this purpose include African Sumac, Evergreen Elm and Arizona Ash.

Development of a gateway or landmark statement for the Town of Surprise is recommended on Grand Avenue at Greenway Road. This could include major signage/landscape features or public art features which make a distinct statement and evoke the Hispanic design theme to be developed throughout the Townsite. The proposed Mercado and Central Park will also enhance the Townsite's image along the Grand Avenue Corridor, and will utilize plant materials, signage and public art features consistent with that of the corridor.

b) Approach to Redevelopment

Implementation of the Specific Revitalization Plan is proposed in five program phases to promote an orderly approach to the redevelopment process and to identify individual tasks which can be successfully completed by the Town Council and community residents. This approach suggests a series of activities to be initiated within a five year time period, which build upon each success in an effort to encourage and guide increased redevelopment within the Townsite. Individual activities recommended within each phase are meant only as a general guide and would be enhanced by additional projects generated by participants in the redevelopment process. The categories of activities are recommended for implementation in the following order:

1. Community Involvement
2. Image Building
3. Housing Rehabilitation
4. Housing Infill Development
5. Economic Development

- Community Involvement

  Community involvement in support of the Specific Revitalization Plan is critical to its successful implementation. Establishment of a Townsite Redevelopment Steering Committee, representing both community residents and institutions is recommended. This committee would promote activities which foster community pride, enhance the community image and encourage resident participation in the redevelopment process. Suggested activities to be initiated by the Committee include:

  - Sponsorship of a community-wide clean-up program to be carried out on a block-by-block basis. Dumpsters and other trash receptacles deemed appropriate should be provided by the Town and a volunteer core of workers assisting residents in their clean-up efforts should be organized.

  - Initiation of an abandoned vehicle identification program. Town residents should work with the Town to identify abandoned vehicles so that the Town may arrange for their removal from vacant and residential neighborhood lots.

  - Sponsorship of community events to foster a sense of community pride and identity, and to encourage interaction among Townsite residents. The Committee should organize Town fiestas, park events or local craft shows to bring residents together in an informal atmosphere.

- Image Building

  In conjunction with the Committee's community involvement efforts, the Town should initiate image building projects within neighborhoods of the Townsite to acquire the cooperation and support of residents. Suggested projects include:

- Acquisition and construction of the southwest park site. The Town should establish a neighborhood advisory committee to provide input into the design of the park and provide volunteer labor for its construction and/or landscaping.

- Construction of the pedestrian/bicycle network in the southwest Townsite area. The Town should work with the neighborhood advisory committee to notify residents of the improvements being made and enlist their support through "adopt-a-tree" programs for street tree plantings. Instituting a volunteer landscaping program for residential lots should also be promoted by the Townsite Redevelopment Committee. Information regarding the recommended types of plant materials and their required maintenance should be distributed to neighborhood residents to promote the use of arid and semi-arid species.

- Housing Rehabilitation

  The initiation of a housing rehabilitation program is recommended within small target areas to concentrate the impact of limited public resources and build upon the community participation vehicles already established in the public improvement process. The Specific Revitalization Plan identifies six target areas for housing rehabilitation beginning with the southwest section, where resident committees would already be taking an active role in the redevelopment process through park and landscape improvement activities. The Town should continue to involve the residents in its rehabilitation efforts by:

  - Utilizing the neighborhood advisory committee to distribute information on the rehabilitation programs and sponsor neighborhood workshops to educate residents on the rehabilitation process.

  - Emphasizing the availability of self-help grants to complete exterior improvements and yard landscaping.

  - Assisting the Townsite Redevelopment Committee in sponsoring "hands-on" home repair workshops which demonstrate repairs and improvements that homeowners can complete by themselves.

  Other suggested methods for achieving the rehabilitation of housing units within the Townsite are included in the Objectives and Implementation Techniques section presented earlier in this plan element.

- Infill Housing Development

  Once an ongoing housing rehabilitation program has been instituted, the Town should pursue the development of infill housing on vacant parcels designated for housing development. Target Area 2 was designated for rehabilitation early in the redevelopment process to address the substandard housing conditions adjacent to the vacant parcels in the northeast section of the Townsite and thus make these lots more attractive for private development.

The Town can promote the development of infill housing by:

- Encouraging the development of affordable townhomes on large vacant parcels to provide opportunities for young neighborhood families and increased neighborhood stabilization.

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ROSEVIEW

Planned Area Development

VOL. II APPENDICES

City of Surprise, Arizona

Original Submittal: June 12, 1997
Second Submittal: November 25, 1997
Third Submittal: February 16, 1998

FINAL SUBMITTAL: APRIL 17, 1998

CITY OF SURPRISE
PLANNING AND ZONING DEPARTMENT
APPROVED
Case No.: PAD97-069
P&Z Comm. Approval:
City Council Approval: 5/28/1998
B.O.A. Approval:
Stipulations:

Submitted by
Surprise 320 L.L.C.
3200 North Central Avenue, suite 2100
Phoenix, Arizona 85012
(602) 954-6300

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APPENDIX A

ENVIRONMENTAL SITE ANALYSIS

SPEEDIE
AND ASSOCIATES
GEOTECHNICAL/ENVIRONMENTAL/MATERIAL ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391

RECEIVED
FEB 16 1998
DMJM

REPORT ON PHASE I ENVIRONMENTAL SITE ASSESSMENT

DESIGNATION: Proposed Arena

LOCATION: West of Dysart Road, from Greenway to Waddell Roads
Maricopa County, Arizona

SPEEDIE AND ASSOCIATES
GEOTECHNICAL / ENVIRONMENTAL / MATERIALS ENGINEERS

11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029 • (602) 997-6391 • FAX (602) 943-5508

HENRIETTA SPEEDIE, C.E.O.
JAMES A. SPEEDIE, P.E.
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BRETT P. CREASER, P.E.
DONALD L. CORNELISON, P.E.

REPORT ON PHASE I ENVIRONMENTAL SITE ASSESSMENT

Registered Professional Engineer (Civil)
CERTIFICATE NO
14724
STEVEN A.
GRIESS
Date Signed 5-30-96
ARIZONA, U.S.A.

DESIGNATION: Proposed Arena

LOCATION: West of Dysart Road, from Greenway to Waddell Roads Maricopa County, Arizona

CLIENT: Phoenix Holdings II, L.L.C.

PROJECT NO: 960514EA

DATE: May 30, 1996

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- B. VISTA Information System, Site Assessment Report
- C. Project Personnel Credentials

Registered Professional Engineer (Civil)
CERTIFICATE NO
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STEVEN A.
GRIESS
Date Signed 5-30-96
ARIZONA, U.S.A.

SPEEDIE AND ASSOCIATES
GEOTECHNICAL / ENVIRONMENTAL / MATERIAL ENGINEERS
11029 N. 24th AVE., SUITE 805 • PHOENIX, ARIZONA 85029

..0 INTRODUCTION

1.1 Purpose and Scope of Report

This report presents the results of a Phase I Environmental Site Assessment conducted in conformance with ASTM Standard Practice E 1527 - 94 (herein denoted ASTM 1527) dated June 1994 to reflect a commercially prudent and reliable inquiry for the subject Property, with respect to the range of contaminants within the scope of Comprehensive Environmental Response, Compensation and liability Act (CERCLA) and petroleum products. The subject Property is located west of Dysart Road from Greenway Road to Waddell Road in Maricopa County, Arizona (as identified in Figure 5.1.1). Per ASTM 1527, this report is intended to satisfy one of the requirements of the Innocent Landowner Defense to CERCLA liability. The work was authorized by Mr. Russ Shasky, and is being performed in accordance with our proposal (number 1546e) dated May 6, 1996.

The objective of a Phase I Environmental Site Assessment is to identify, to the extent feasible pursuant to ASTM 1527, Recognized Environmental Conditions in connection with the Property. A Recognized Environmental Condition is defined as "the presence or likely presence of any hazardous substances or petroleum products on a Property under conditions that indicate an existing release, a past release, or a material threat of a release of hazardous substances or petroleum products into structures on the Property or into the ground, groundwater, or surface water of the Property. This term includes hazardous substances or petroleum products even under compliance with laws. The term is not intended to include De Minimis conditions that generally do not present a material risk of harm to public health or the environment and that generally would not be the subject of an enforcement action if brought to the attention of appropriate government agencies." (ASTM 6)

The scope of work for the assessment is in accordance with our above noted proposal and ASTM 1527 and included the following:

- All services were performed by an environmental professional under the direction of a registered professional engineer in the state of Arizona.

- Interviews were attempted with owners, occupants, key site managers, and local government officials, as necessary, regarding Recognized Environmental Conditions for the Property.

- Federal and State Standard Environmental Record Sources as well as selected Additional Environmental Record Sources, were reviewed regarding Recognized Environmental Conditions for the Property.

- Standard Historical Sources were reviewed as necessary to develop a history of the previous uses of the Property and surrounding area in order to identify those uses that are likely to have led to Recognized Environmental Conditions in connection with the Property.

- A Site Reconnaissance was conducted to obtain information indicating Recognized Environmental Conditions in connection with the Property. The Site Reconnaissance included a Site Visit, an observation of adjoining sites, and an observation of the surrounding area.

- This final report was written to describe indications of Recognized Environmental Conditions observed during this assessment, our professional opinion thereto, and any recommendations for further investigation, as needed.

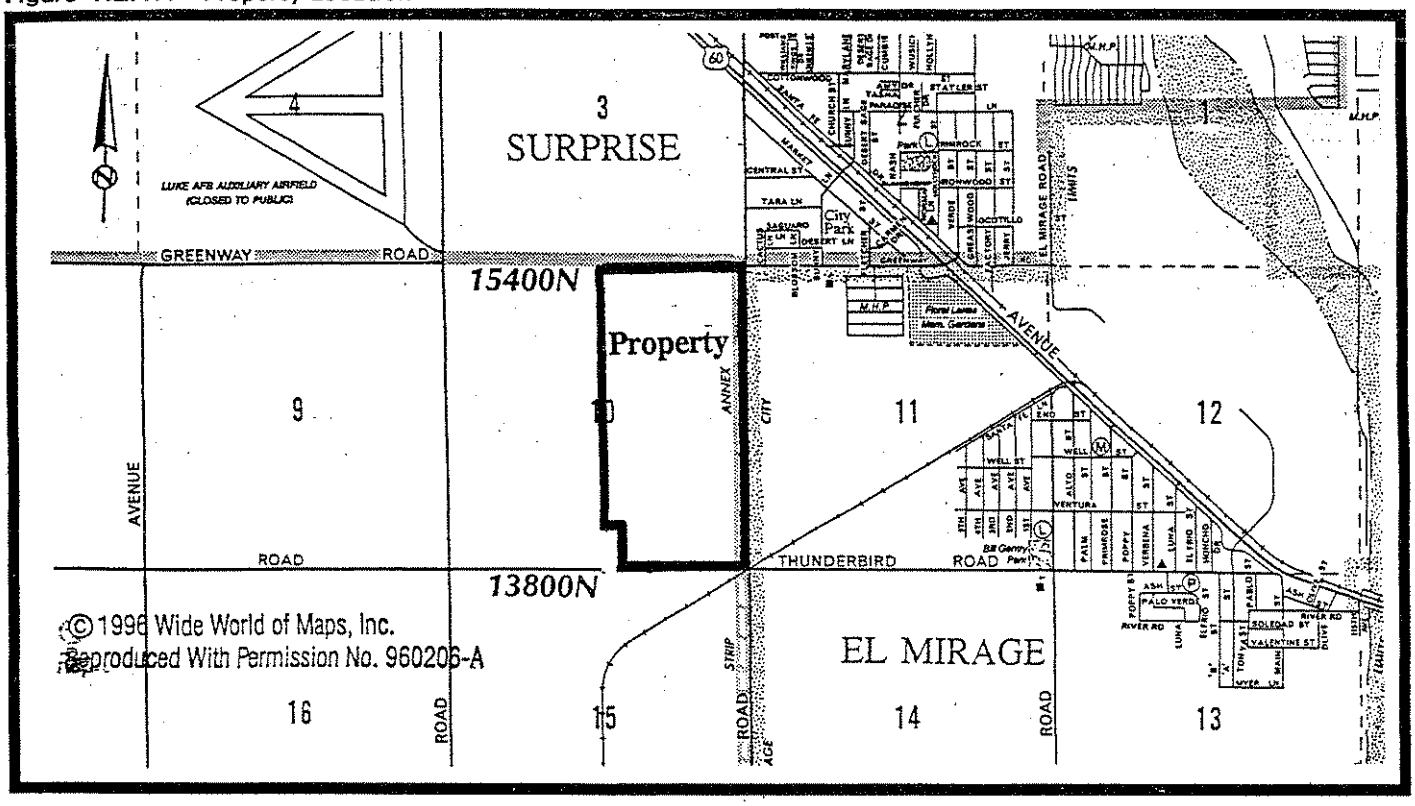
The scope of work did not include chemical analyses of Property soils or groundwater, Chain-of-Title search, on-site surveys for radon gas, physical sampling and testing for the presence of asbestos or lead, or analysis of regulatory or health and safety compliance issues. This report may mention items that are not Recognized Environmental Conditions per ASTM 1527. These items are mentioned due to their importance to safety or health concerns at the subject Property, and are of no consequence regarding Appropriate Inquiry (CERCLA liability) per ASTM 1527.

1.2 Property Background

1.2.1 Property Location

The subject Property is located in the eastern half of Section 10 of Township 3 North, Range 1 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona. The Property can be further identified as 310 acres of land, adjacent to the west of Dysart Road extending from Thunderbird Road (Waddell Road) to Greenway Road, Maricopa County, Arizona. The Property is located just west of El Mirage City Limits and just south of Surprise Town Limits. (See Figure 1.2.1.1)

Figure 1.2.1.1 - Property Location



1.2.2 Property Description

The subject Property consists of an approximately 310 acre rectangular shaped parcel of agricultural land. The Property was cultivated with cotton, wheat, onions, and roses at the time of the site visit.

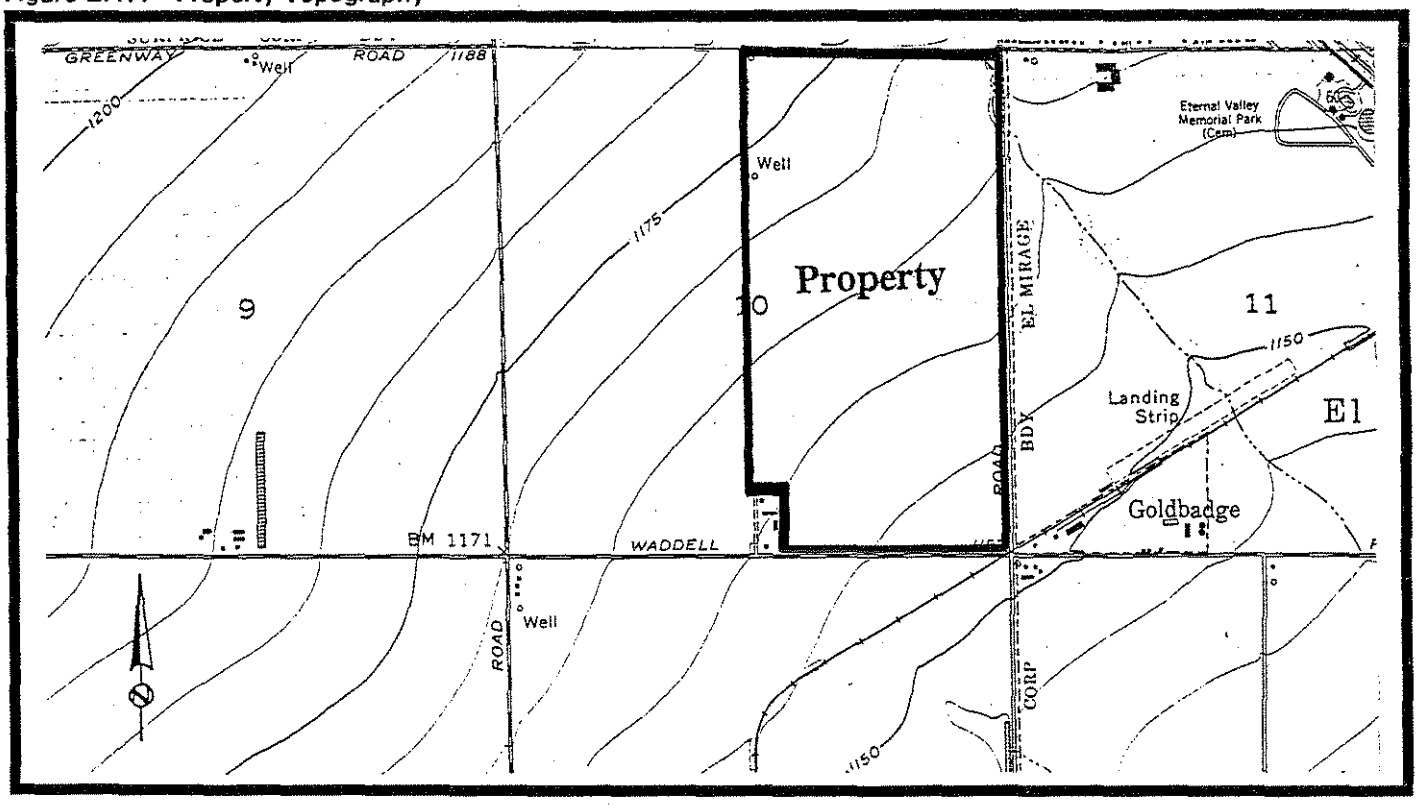
2.0 PHYSICAL SETTING

2.1 Topography (See Figure 2.1.1)

Approximate site elevation: approximately 1,163 feet above mean sea level. (USGS)

General down slope contour: Southeast. (ibid)

Figure 2.1.1 - Property Topography



2.2 Geology

Local soils: Property soils are part of four soil types including the Antho sandy loam (AbB), Agualt loam (Aa), Estrella loam (Es), and Gilman loam (GgA). Permeability is moderately rapid for AbB, moderate to very rapid for Aa, moderate for GgA, and moderately slow for Es. Runoff is slow to medium for AbB, and slow for Aa, Es, and GgA. Erosion hazard is slight to moderate for AbB and GgA, and slight for Aa and Es. (USDA)

Site specific conditions: Determination of site-specific geologic conditions was not within the scope of work for this phase of the study.

2.3 Surface Water Hydrology and Hydrogeology

Average regional temperatures: 75 °F to 105° F in July, 37.5 F to 67.5 F in January. (Anderson, qtd. In Hammett and Herther)

Average regional precipitation: 8 inches. (ibid)

Average regional evaporation: 70 inches. (ibid)

Regional groundwater conditions: Approximately 771 feet above mean sea level (397 feet below ground surface) with a southerly groundwater flow direction. However, groundwater

flow resulting from local groundwater gradients may vary considerably in the area due to surface recharge, groundwater pumping and local subsurface geology. (Hammett, Sheet 1)

On-site water wells: Two water wells were identified along the western boundary of the Property. These wells, and the associated irrigation canals, were utilized to irrigate the Property. The Arizona Department of Water Resources (ADWR) indicated that these wells were registered to Arena Investments, and have depths of 996 and 1016 feet. (Herther)

Potable water source: None identified.

On-site surface water: Concrete and earthen irrigation canals were located along the boundaries of the Property and between crops. During the site visit, water was flowing in most of the canals.

3.0 HISTORICAL USE

Standard Historical Sources were reviewed as necessary to develop a history of the previous uses of the Property and surrounding area in order to identify those uses that are likely to have led to Recognized Environmental Conditions in connection with the Property. These sources were reviewed in five (or less) year intervals in an attempt to identify all obvious uses of the Property from the present until 1940 or until the Property's first obvious developed use, whichever is earlier. Standard Historical Sources include Aerial Photographs, USGS 7.5 Minute Topographical Maps, Zoning/Land Use Records, Building Department Records, Local Street Directories, Fire Insurance Maps, Property Tax Files, Recorded Land Title Records, Previous Site Studies and Other Historical Sources. No information prior to the year 1957 were identified during this assessment. The specific sources used to identify the historical use of the subject Property are described in the following sections.

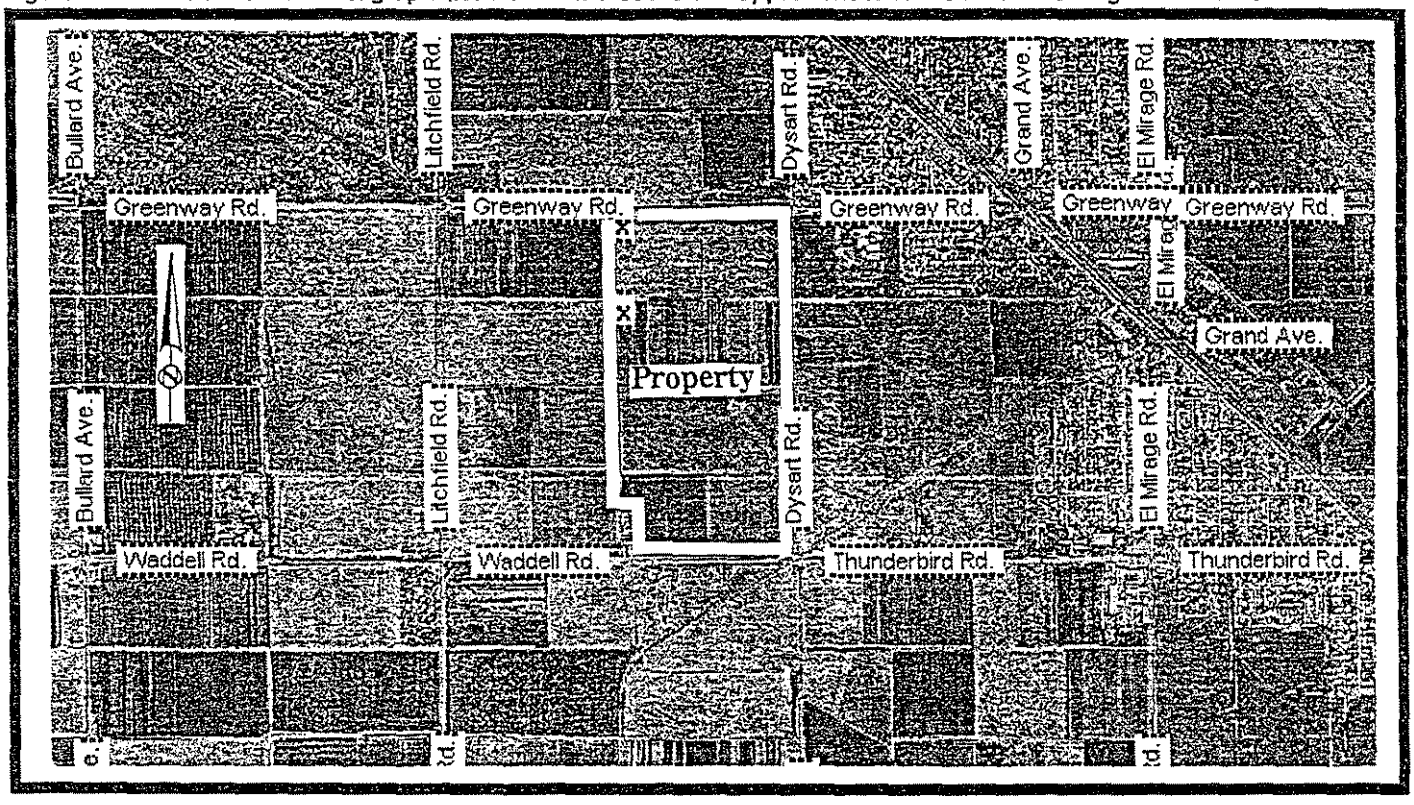
3.1 Aerial Photographs

A review of selected aerial photography from 1967 to 1996 was conducted to identify past uses and characteristics of the Property, and to determine and evaluate the nature of previous activities existing on-site, on adjacent sites or within the adjacent area. A description of the photographs reviewed is presented below.

The subject Property appeared as agricultural land from 1967 to the present (see Figure 3.1). No buildings were observed on the property during this period. However, two water wells and associated irrigation systems were identified on the Property in the earliest photographs. The area adjacent to the southwest of the Property appeared as a farming operations facility, including barns and equipment. The

remainder of the areas adjacent to the Property, also appeared as cultivated agricultural land from 1967 to the present. (Landiscor)

Figure 3.1 - 1995 Aerial Photograph (Note: "X" indicates the approximate location of the irrigation wells)



3.2 United States Geological Survey-7.5 Minute Topographic Map

Topographical maps may identify structures, roads and general use of a Property for the year determined by the date of the map. A review of the topographical map encompassing the Property revealed two water wells on the western portion of the subject Property in 1957. In 1957, small structures were identified on the map in the southwest adjacent area. (USGS)

3.3 Recorded Land Title Records

Recorded land title records are various documents regarding past use of a property such as fee ownership, leases, land contracts, easements, liens and other relative documents that are potentially descriptive of former site use. A document entitled: Commitment for Title Insurance, and issued by First American Title Insurance Company was provided by the client. This document was reviewed and no environmental liens and no indications of Recognized Environmental Conditions, were identified on the Property. (First)

4.0 INTERVIEWS

Interviews were attempted with owners, occupants, key site managers, and local government officials as necessary, regarding Recognized Environmental Conditions for the Property. These interviews were attempted in person, by telephone, or in a written questionnaire.

4.1 Local Government Officials

Interviews were conducted with local agency personnel and other persons who are noted in this and other appropriate sections of this report. A telephone interview was conducted with the Rural Metro Fire Department regarding underground storage tank and hazardous materials activities at the subject Property and at the facility adjacent to the southwest corner of the Property. As of the writing of this report, Rural Metro has not provided the requested information. (Troy)

4.2 Clients, Owners, and Occupants

A Client Questionnaire is provided to the User as part of the Phase I Environmental Site Assessment process, to obtain necessary data about the subject Property prior to the site inspection. When this questionnaire is completed by the client and returned, it contains information that allows better use of site inspection time, expedites the completion of the report, and provides a better overall assessment. This Questionnaire was sent to Mr. Russ Shasky of Phoenix Holdings II, L.L.C. Mr. Shasky did not complete the questionnaire, however, he verbally indicated that he did not have information in regards to the questionnaire.

5.0 CURRENT CONDITIONS

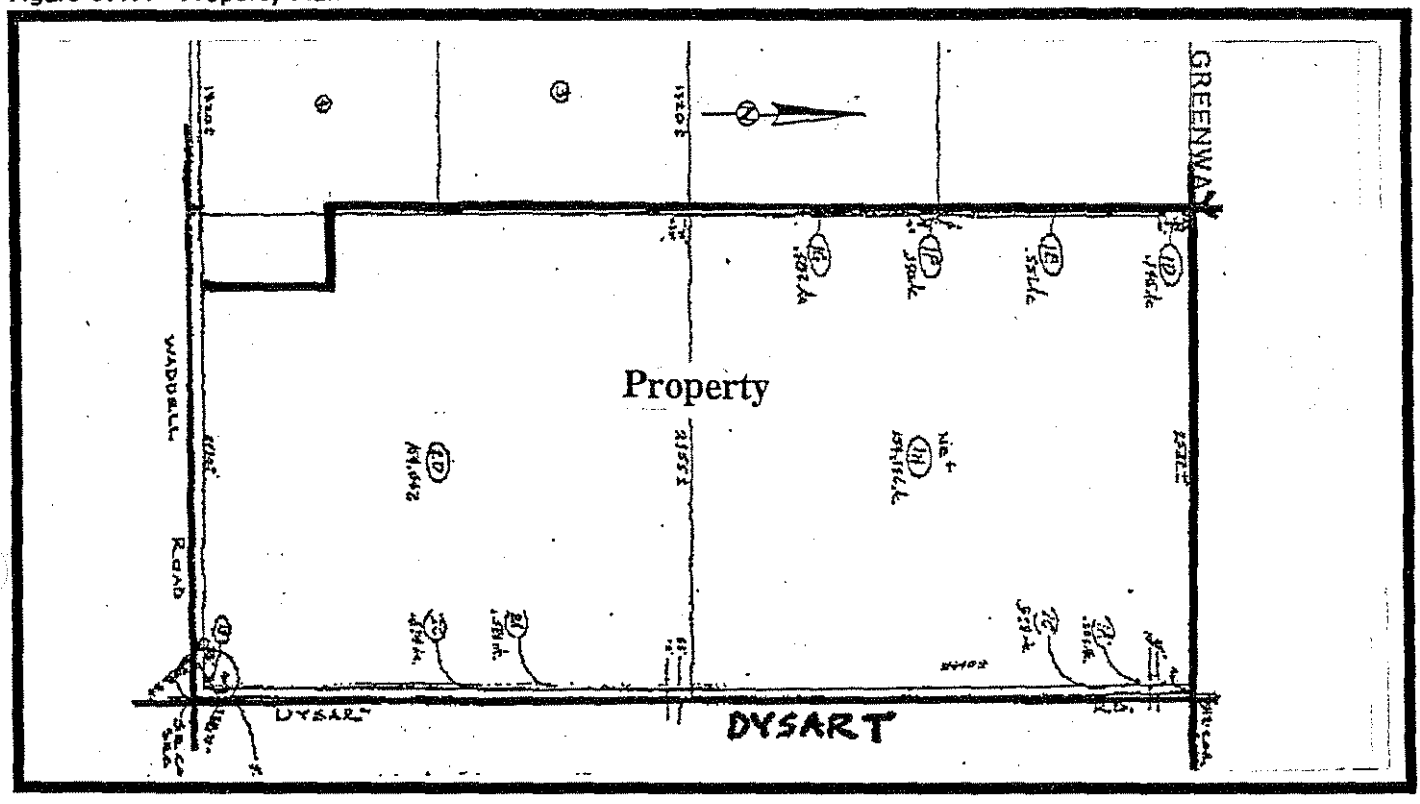
5.1 Current Property Use

A Site Reconnaissance was conducted to observe and record information concerning present site development, use, and conditions. A visual and physical survey of the existing Property and adjacent sites was conducted on May 23, 1996 by Mr. Ray Younathan of Speedie & Associates. Complete visual assessment of the Property was hindered by cultivated vegetation. Selected photographs, taken during the site visit, are included in Appendix A (Surface Photographs). Figure 5.1.1 identifies Property boundaries.

The subject Property consisted of approximately 310 acres, which was observed to be entirely under cultivation at the time of the site visit. The Property was accessed from Waddell Road via a partially improved road trending in a northerly direction. Concrete lined, and unlined, irrigation canals were observed on all four boundaries of the Property. The Property was divided into several parcels, separated by soil berms trending in an east-west direction. These berms were observed to be utilized as access roads. Irrigation water was observed to be flowing on either side of these roads. At the time of the site visit, the Property was

observed to be under cultivation with various crops including wheat, cotton, onion, and roses. Additionally, two irrigation wells were identified on the western boundary of the Property. At the time of the site reconnaissance, there were no significant staining observed in connection with the water well pumps.

Figure 5.1.1 - Property Plan



5.2 Asbestos

The use of asbestos in friable building materials was phased out during the early to mid 1970's, and the use of asbestos fibers in other building materials was generally phased out during the mid 1970's to early 1980's. Lacking structures and/or significant building materials, no suspected asbestos containing materials were identified on the subject Property at the time of our site visit.

5.3 Adjacent Land Use

The Property was bounded on the north by the alignment of Greenway Road and fallow land, on the east by Dysart Road and agricultural/fallow land, on the south by Waddell Road and Agricultural/fallow land, and on the west by a partially improved road and agricultural land, which appeared to be currently utilized to grow: cotton, watermelons, and roses. A operation and maintenance facility was located in the southwest adjacent area where farming management in the vicinity was apparently conducted.

Hazardous materials and petroleum products including agrichemicals, related to farming activity, were observed to be stored and used at this facility. Several above ground storage tanks and 55-gallon drums were also observed at this facility.

5.4 Transformers

In the past, oil found in electrical transformers contained Polychlorinated Biphenyls (PCBs), which have been found to be a human carcinogen. Since 1984, manufacturers of transformers have been certifying them "non-PCB", containing less than 50 parts per million (ppm). During the site reconnaissance, H-frame mounted transformers were observed at each well site. These transformers appeared in good condition, with no observed staining. These transformers were privately owned by Arena Investments. The PCB content of the transformers was not identified during this assessment, however, the Environmental Protection Agency (EPA) does not consider PCB Status-Unknown transformers a dangerous health risk, and allows the continued use of untested transformers as long as procedures for service, inspection, and handling satisfy EPA guidelines.

6.0 FEDERAL AND STATE ENVIRONMENTAL RECORDS

Federal and State Standard Environmental Record Sources were reviewed by VISTA Information Solution Inc. regarding Recognized Environmental Conditions for the Property. The specific records reviewed as well as the search parameters are identified in Appendix B (Site Assessment Report). The following summarizes records of potential concern.

- Six (6) Leaking Underground Storage Tank (LUST) incidents were identified approximately one-half mile from the Property. Since the migration of contaminants from releases due to fuel from Underground Storage Tank (UST) facilities is primarily vertical in unsaturated soils, and since local groundwater is relatively deep (approximately 397 feet below ground surface), no contamination of the soils/groundwater beneath the Property is likely from these incidents.

7.0 FINDINGS AND CONCLUSIONS

At the time of the site visit, the subject Property consisted of approximately 310 acres of cultivated agricultural land. The Property has been utilized for agicultural purposes, at least from the early 1960's and has remained in agricultural use through the present.

We have performed a Phase I Environmental Site Assessment in conformance with the scope and limitations of ASTM Practice E 1527 for the subject Property located west of Dysart Road from Greenway Road to Waddell Road in Maricopa County, Arizona (as identified in Figure 5.1.1). Any exceptions to, or deletions from, this practice are described in Section 1.1 of this report. This assessment has revealed no evidence of Recognized Environmental Conditions in connection with the Property except for the following:

- The property is currently and has historically been utilized for cultivated agriculture. Typically, agricultural sites utilize agri-chemicals in normal farming practices. However, during our assessment we observed no indication of procedures or practices (such as crop dusting operations or pesticide/herbicide staging or storage areas) which would indicate an enhanced potential for applications or discharges of pesticides/herbicides to the subject property other than normal agricultural use. Although residual concentrations of these compounds may remain in the site soils, our experience with similar sites indicates that any residual pesticides/herbicides are likely not present in concentrations sufficient to pose an increased risk to human health or the environment during normal site use.

- A farming operation and maintenance facility was located in the southwest adjacent area. From this facility, farming management in the vicinity is apparently conducted. Hazardous materials and petroleum products including agrichemicals, related to farming activity, were observed to be stored and used at this facility. Several above ground storage tanks and 55-gallon drums were also observed at this facility. This facility was not identified on records reviewed in Section 6.0 of this report. However, most underground storage tanks (USTs) utilized for farming purposes are exempt from regulation by the ADEQ, and thus would not appear on the UST or leaking UST databases. The Rural Metro fire department was contacted regarding UST and hazardous materials activities at the subject Property and at this adjacent facility. As of the writing of this report, the fire department has not provided the requested information and any such information obtained after this report is issued will be included in an addendum to this report, if the information is pertinent to Recognized Environmental Conditions at the subject Property. No visual indications of environmental impact from this facility to the subject Property was observed during the site visit.

8.0 RECOMMENDATIONS

Based on information collected during Phase I Environmental Site Assessment procedures and analysis, we recommend the following in regards to Recognized Environmental Conditions at the subject Property:

- Our experience with similar sites historically used for agricultural purposes indicates that any residual concentrations of agri-chemicals residing in the site soils are likely not a significant threat to human health or the environment. However, should future use of the subject property include sensitive receptors such as residential use, day care centers, schools, or hospitals, further investigation should be undertaken to ascertain the potential for residual concentrations of pesticides/herbicides commonly associated with agricultural practices to persist in the site soils.

9.0 LIMITATIONS

Our investigation has been carried out with diligence and detail consistent with prevailing standards and engineering practice. The scope of this investigation was limited to visual and physical observations made during the site visit, interviews with public agency personnel and a review of reasonably ascertainable records and literature. As a result, our conclusions are based largely on information supplied by others. We as environmental professionals are not required to verify the information, but may rely on the information unless actual knowledge concerning the validity of the information is known or is obvious to the professional, based on other collected information. The assessment focus was on identifying the presence or likely presence of any hazardous substances or petroleum products on a Property under conditions that indicate an existing release, a past release, or a material threat of a release of any hazardous substances or petroleum products into structures on the Property or into the ground, groundwater, or surface water of the Property. We are unable to predict events which may occur after our site visit and result in Property contamination, such as "midnight" dumping or accidental spillage.

No environmental site assessment can wholly eliminate uncertainty regarding the potential for Recognized Environmental Conditions in connection with a Property. Performance with ASTM Practice E 1527 is intended to reduce, but not eliminate uncertainty, in connection with a Property while recognizing reasonable limits of time and cost. It should not be concluded or assumed that an inquiry was not appropriate inquiry merely because the inquiry did not identify Recognized Environmental Conditions in connection with a Property. Additionally, it cannot be assumed that any Recognized Environmental Conditions identified during the assessment are the only conditions to exist for the Property. Any conclusion should not be

construed as a guarantee for absence, or an attempt at quantification of materials creating Recognized Environmental Conditions, but merely the results of the assessment.

We have performed our services for this project in accordance with our proposal and the report is solely for the use of Phoenix Holdings II, L.L.C.. Any reliance on this report by any other party shall be at such party's sole risk.

Respectfully submitted,

SPEEDIE & ASSOCIATES, INC.

Ray Younathan

Ray Younathan, Environmental Specialist

Valerie A. Kearns

Valerie A. Kearns, E.I.T.

Registered Professional Engineer (Civil)
CERTIFICATE NO
14724
STEVEN A.
GRIESS
Date Signed 5-30-96
ARIZONA, U.S.A.

Steven A. Griess, P.E.

May 30, 1996

EFERENCES CITED and REVIEWED

American Society for Testing and Materials (ASTM). Standard Practice for Environmental Site Assessments: Phase I Environmental Site Assessment Process, E 1527 - 9. June 1994.

Anderson, T.W., et al. "Geohydrology and Water Resources of Alluvial Basins in South-Central Arizona and Parts of Adjacent States, Report 89-378." 1990,
qtd. in Hammett, B.A., and R.L. Herther. "D.W.R. Hydrologic Map Series Report No. 27,Sheet 1 of 3." 1992.

First American Title Insurance Company. Commitment For Title Insurance, Commitment No. 213-222-1004391. March 8, 1996.

Hammett, B.A., and R.L. Herther. "D.W.R. Hydrologic Map Series Report No. 27, Sheet 1 of 3." 1992.

Herther, Rick. Arizona Department of Water Resources. Telephone Interview. Younathan, R., May 16, 1996

Landiscor. K-12 aerial photograph. 1965, 1967, 1969-1971, 1973, 1975, 1976, 1978-1983, 1985-1991, 1993-1996.

Shasky, Russ. Phoenix Holdings II, L.L.C. Telephone Interview. Kearns, VA, May 23, 1996.

Troy. Rural Metro. Telephone Interview. Farnsley, FA, May 28, 1996.

United States Department of Agricultural Soil Conservation Service (USDA),Central Maricopa County, Arizona, USPD, November 1977.

United States Geological Survey (USGS), El Mirage, Arizona - Maricopa Co., 7.5 Minute Series (Topographic), USGS: 1957, Photo revised 1982.

Vista Information Solution Inc. Site Assessment Report, Report ID: 001195-959. May 13, 1996.

APPENDIX A: Surface Photographs

Photo No. 1 - View of a portion of the Property. Photograph taken from the Property's southern boundary, facing north.

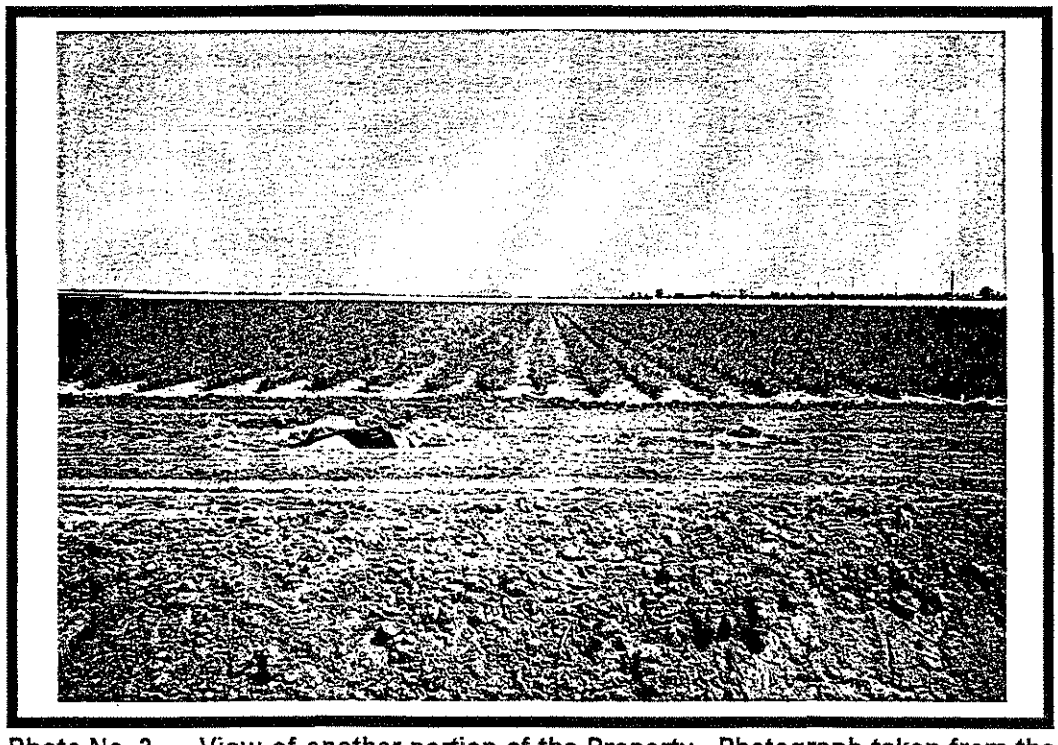


Photo No. 2 - View of another portion of the Property. Photograph taken from the Property's southern boundary, facing north.

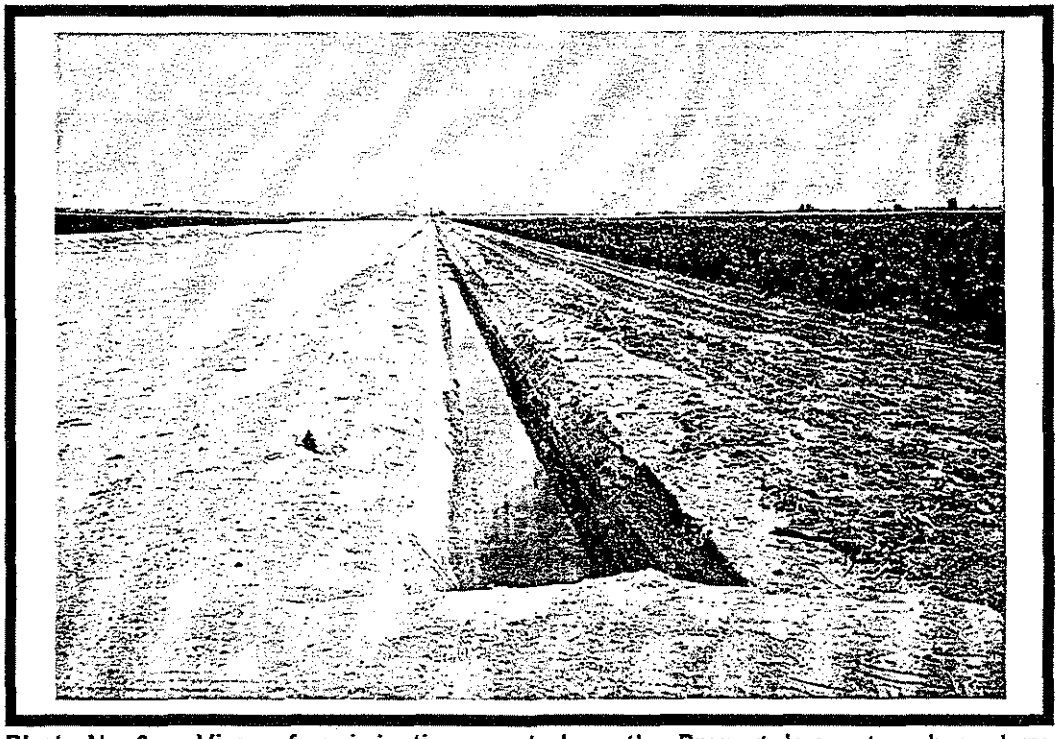


Photo No. 3 - View of an irrigation canal along the Property's western boundary. Photograph taken facing north.

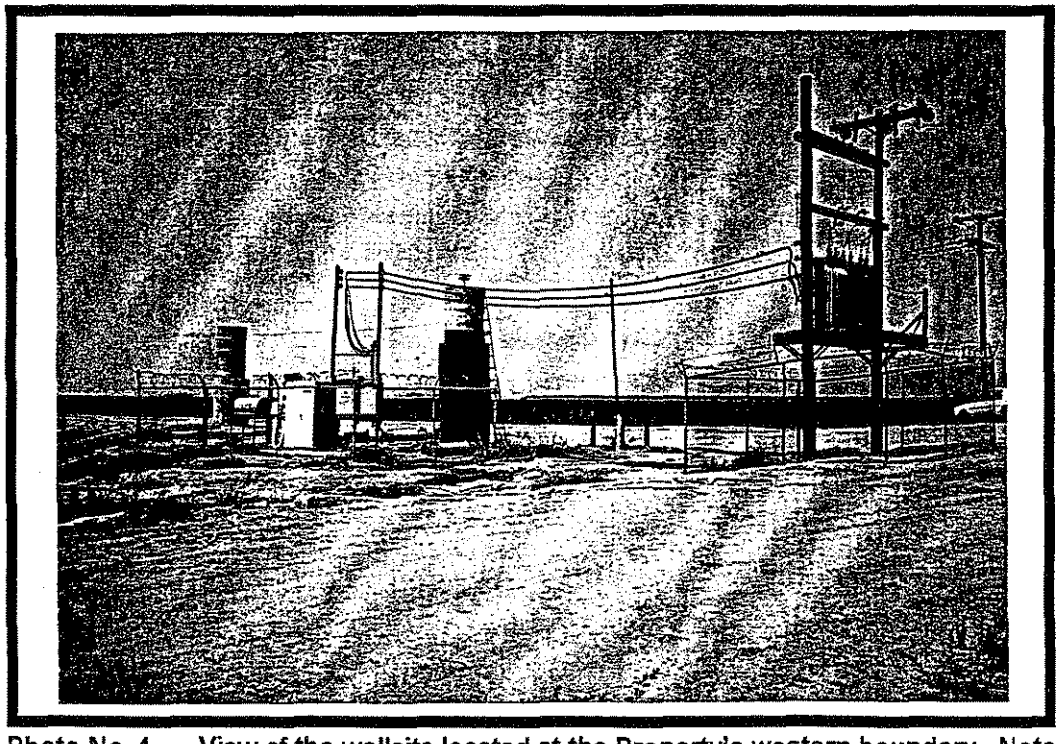


Photo No. 4 - View of the wellsite located at the Property's western boundary. Note the H-frame mounted transformers.

SITE ASSESSMENT REPORT
(EXTENDED BY 1 MILE)

PROPERTY INFORMATION	CLIENT INFORMATION
Project Name/Ref #: 960514EA Proposed Arena Dysart Rd Maricopa County, AZ Cross Street: S. of Greenway Road Latitude/Longitude: (33.616743, 112.346326)	Valerie A. Kearns Speedie Assoc 11029 N 24th Ave 805 Phoenix, AZ 85029

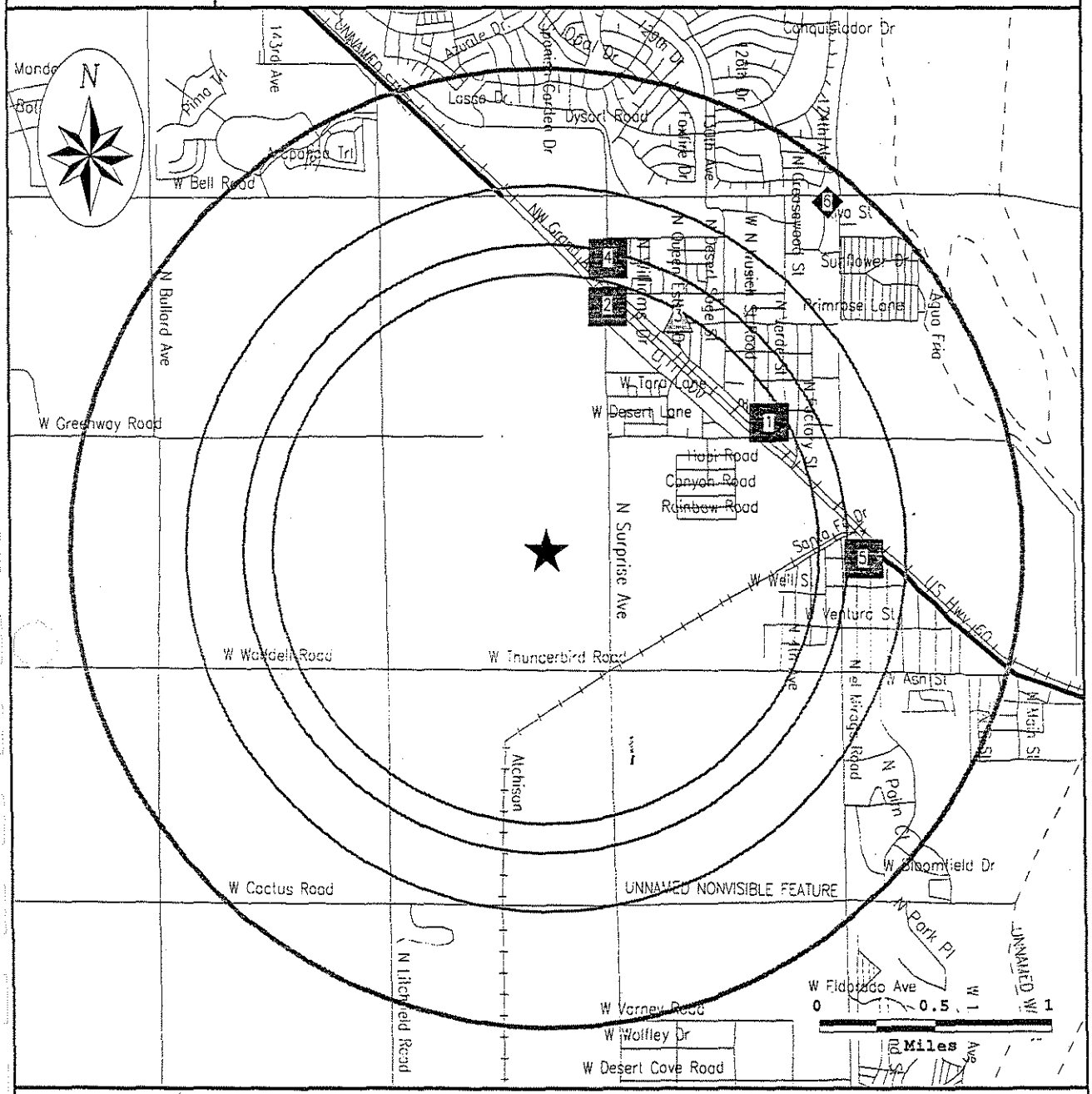
Site Distribution Summary Agency / Database - Type of Records			within 1 1/8 miles	1 1/8 to 1 1/4 miles	1 1/4 to 1 1/2 miles	1 1/2 to 2 miles
A) Databases searched to 2 miles:						
US EPA	NPL	National Priority List	0	0	0	0
US EPA	TSD	RCRA permitted treatment, storage, disposal facilities	0	0	0	0
STATE	SPL	State equivalent priority list	0	0	0	0
STATE	SCL	State equivalent CERCLIS list	0	0	0	1
B) Databases searched to 1 1/2 miles:						
US EPA	CERCLIS	Sites under review by US EPA	0	0	0	-
STATE	LUST	Leaking Underground Storage Tanks	3	1	2	-
STATE	SWLF	Permitted as solid waste landfills, incinerators, or transfer stations	0	0	0	-
C) Databases searched to 1 1/4 miles:						
STATE	UST	Registered underground storage tanks	4	2	-	-
D) Databases searched to 1 1/8 miles:						
US EPA	ERNS	Emergency Response Notification System of spills	0	-	-	-
US EPA	LG GEN	RCRA registered large generators of hazardous waste	0	-	-	-
US EPA	SM GEN	RCRA registered small generators of hazardous waste	0	-	-	-

This geographic database search meets the American Society for Testing Materials (ASTM) standards for a government records review. A (-) indicates the search distance exceeds ASTM search parameters.

LIMITATION OF LIABILITY
Customer proceeds at its own risk in choosing to rely on VISTA services, in whole or in part, prior to proceeding with any transaction. VISTA cannot be an insurer of the accuracy of the information, errors occurring in conversion of data, or for customer's use of data. VISTA and its affiliated companies, officers, agents, employees and independent contractors cannot be held liable for accuracy, storage, delivery, loss or expense suffered by customer resulting directly or indirectly from any information provided by VISTA.

SITE ASSESSMENT REPORT (EXTENDED BY 1 MILE)

Map of Sites within Two Miles



Subject Site	Category:	A	B	C	D
★	Databases Searched to:	2 mi.	1 1/2 mi.	1 1/4 mi.	1 1/8 mi.
	Single Sites	◆	■	△	○
	Multiple Sites	◆	■	△	○
		NPL, SPL, SCL, TSD	CERCLIS, LUST, SWLF	UST	ERNS, GENERATORS

Roads
Highways
Railroads
Rivers or Water Bodies
Utilities

If additional databases are listed in the cover page of the report they are also displayed on this map. The map symbol used corresponds to the database category letter A,B,C,D.

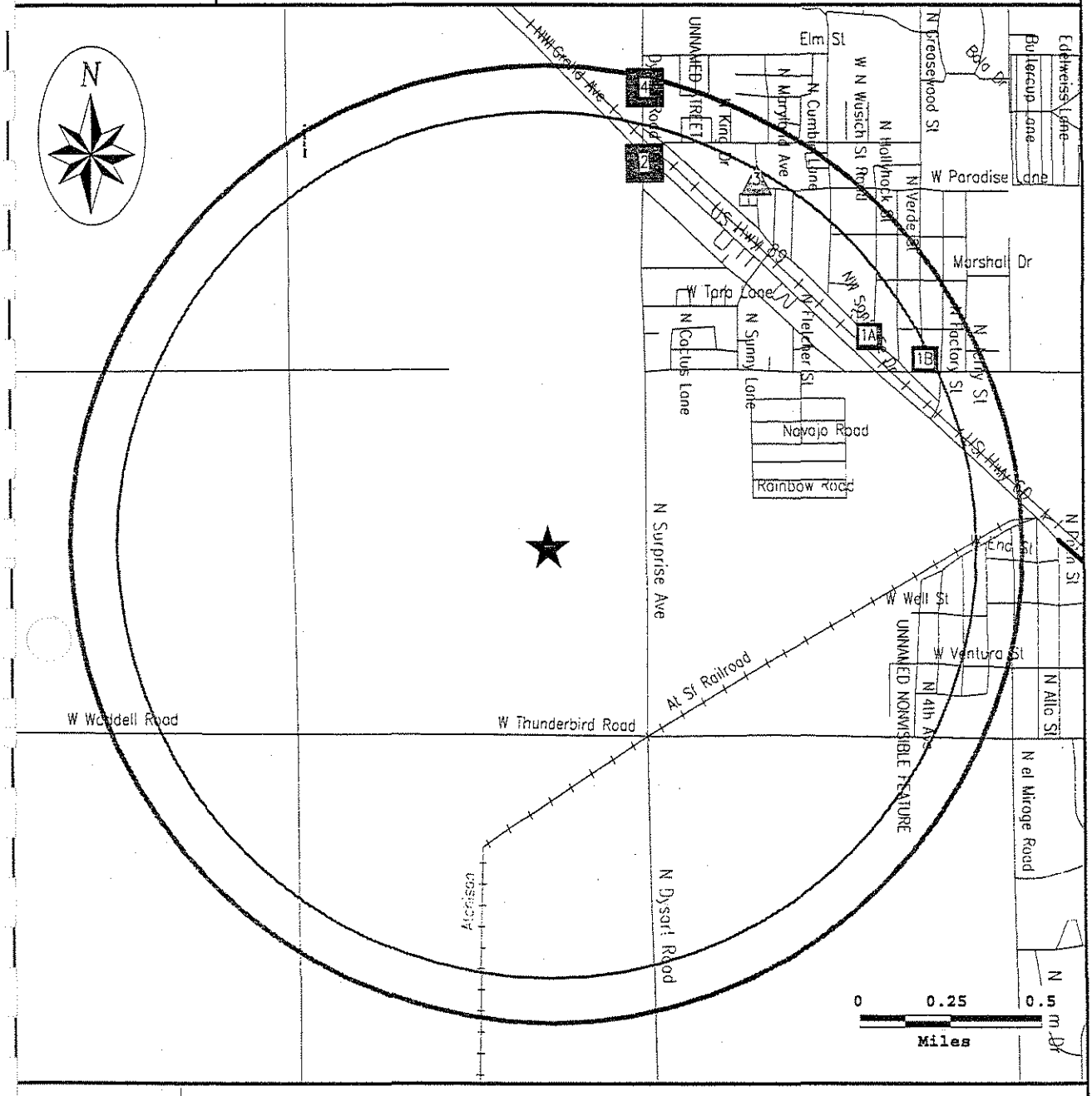
For More Information Call VISTA Information Solutions, Inc. at **1 - 800 - 767 - 0403**

Report ID: **001195-959**

Date of Report: **May 13, 1996**

SITE ASSESSMENT REPORT (EXTENDED BY 1 MILE)

Map of Sites within One and One-Quarter Miles



Subject Site	Category:	A	B	C	D
★	Databases Searched to:	2 mi.	1 1/2 mi.	1 1/4 mi.	1 1/8 mi.
	Single Sites	◆	■	△	○
	Multiple Sites	◆	■	△	○
		NPL, SPL, SCL, TSD	CERCLIS, LUST, SWLF	UST	ERNS, GENERATORS

Roads
Highways
Railroads
Rivers or Water Bodies
Utilities

If additional databases are listed in the cover page of the report they are also displayed on this map. The map symbol used corresponds to the database category letter A,B,C,D.

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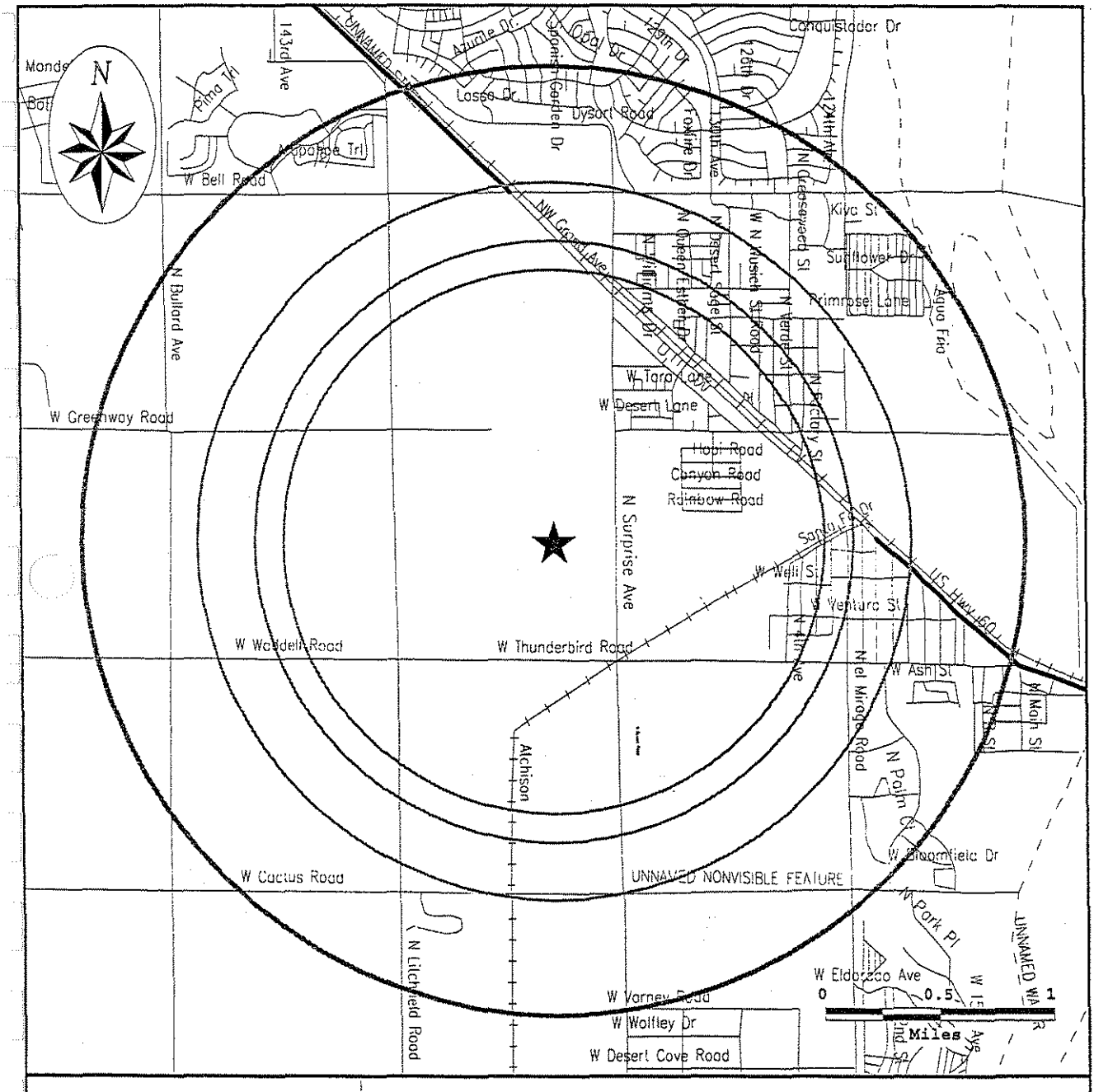
Date of Report: **May 13, 1996**

SITE ASSESSMENT REPORT (EXTENDED BY 1 MILE)

Street Map



Subject Site ★

Roads, Highways, Rivers, Water Bodies

Railroads, Utilities

For More Information Call VISTA Information Solutions, Inc. at **1 - 800 - 767 - 0403**

Report ID: **001195-959**

Date of Report: **May 13, 1996**

SITE ASSESSMENT REPORT
(EXTENDED BY 1 MILE)

SITE INVENTORY

MAP ID	PROPERTY AND THE ADJACENT AREA (within 1 1/8 miles)	A				B			C	D			VISTA ID DISTANCE DIRECTION
		NPL	TSD	SPL	SCL	CERCLIS	LUST	SWLF	UST	ERNS	LG GEN	SM GEN	
1A	CITY SHOP 12604 SANTA FE DRIVE SURPRISE, AZ 85374						X		X				716509 1.00 MI NE
1B	ROBERTS EXXON COUNTRY STORE 15445 N GREASEWOOD SURPRISE, AZ 85374						X		X				4289983 1.10 MI E
2	SURPRISE MAINTENANCE YARD 16281 N DYSART ROAD SURPRISE, AZ 85374						X						3851052 1.02 MI N
2	SURPRISE MAINTENANCE YARD 16281 N DYSART ROAD SURPRISE, AZ 85374								X				1832365 1.02 MI N
3	RAY W PETE JONES 16226 CHURCH STREET SURPRISE, AZ 85374								X				715551 1.10 MI NE

MAP ID	SITES IN THE SURROUNDING AREA (within 1 1/8 - 1 1/4 miles)	A				B			C	D			VISTA ID DISTANCE DIRECTION
		NPL	TSD	SPL	SCL	CERCLIS	LUST	SWLF	UST	ERNS	LG GEN	SM GEN	
4	KWIK-EEZ FORMER FAST GAS #302 16551 DYSART ROAD #123 SURPRISE, AZ 85374								X				711884 1.21 MI N
4	LEON'S TRAILER PARK WEST 16601 N SURPRISE AVE SURPRISE, AZ 85374						X		X				4950634 1.23 MI N

MAP ID	SITES IN THE SURROUNDING AREA (within 1 1/4 - 1 1/2 miles)	A				B			C	D			VISTA ID DISTANCE DIRECTION
		NPL	TSD	SPL	SCL	CERCLIS	LUST	SWLF	UST	ERNS	LG GEN	SM GEN	
5	EL MIRAGE SERVICE YARD 14501 ALTO STREET EL MIRAGE, AZ 85335						X		•				4595366 1.29 MI E
5	CIRCLE K # 876 12239 NW GRAND AVE EL MIRAGE, AZ 85335						X		•				712409 1.34 MI E

MAP ID	SITES IN THE SURROUNDING AREA (within 1 1/2 - 2 miles)	A				B			C	D			VISTA ID DISTANCE DIRECTION
		NPL	TSD	SPL	SCL	CERCLIS	LUST	SWLF	UST	ERNS	LG GEN	SM GEN	
6	UFI SURPRISE (VALLEY SPRAYER DUSTE 12205 W BELL RD SURPRISE, AZ 85374				X	•							436395 1.87 MI NE

STA Address*:	SCHULTZ AUTO SHREDDER FLUFF DUMP SIT GLENDALE, AZ	VISTA ID#:	5501414
SPL - State Equivalent Priority List / SRC# 2487		Agency ID:	5660

Agency Address:	*SAME AS ABOVE*
Facility Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*NOT AVAILABLE*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

VISTA Address*:	CIRCLE K # 1184 15457 NW GRAND AVE SURPRISE, AZ 85374	VISTA ID#:	712442
STATE LUST - State Leaking Underground Storage Tank / SRC# 2815		Agency ID:	0001375*3820.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*DECEMBER 7, 1994*
Media Affected:	*NOT AVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance*

UNMAPPED SITES	A				B			C	D			VISTA ID
	NPL	TSD	SPL	SCL	CERCLIS	LUST	SWLF	UST	ERNS	LG GEN	SM GEN	
JNOCAL 7455 16101 NW GRAND AVE SURPRISE, AZ 85374						X		X				2911749
Z SAND ROCK CSWLF AGUA FRIA RIVER GRAND AVE , AZ							X					3255565
ORMER BEARDSLEY NURSERY 9500 N GRAND AVE SURPRISE, AZ 85374						X		X				4950573
SONORA NURSERY 5300 NW GRAND AVE URPRISE, AZ 85374						X		X				1832499
M J SPRAY INC ACTUS DYSART RDS 1/2 MI W, L MIRAGE, AZ 85335								X		X		278073
MCQUEEN NW CORNER OF OCOTILLO AND MCQUEEN RO AZ							X					5187132
VEST SALT RIVER VALLEY GREENWAY REEMS RDS. EL MIRAGE, AZ 85335				X								1832774
ARICOPA COUNTY MUNI WATER DIST1 9420 N GRAND AVE SURPRISE, AZ 85374						X		X				1831768
COTTON LANE HOLDINGS INC E RNER OF CITRUS WADDELL U RISE, AZ 85374								X				1833570
WQ-SURPRISE URPRISE, AZ 85374				X								3850881
ILA RIVER, LOWER/MIDDLE VESTERN MARICOPA COUNTY , AZ			X									4856718
EEMS RD DBCP AREA REENWAY REEMS RDS EL MIRAGE, AZ 85335				X	X							349850
ARIZONA AUTO TECH 0306 GRAND AVE VICKENBURG, AZ 85390											X	4078761
WQ-EAST CENTRAL PHOENIX CAMELBACK TO THOMAS 16TH TO 56TH STR HOENIX, AZ				X								3850948
CHULTZ AUTO SHREDDER FLUFF DUMP SIT GLENDALE, AZ			X									5501414
L MIRAGE PLANT 641 N EL MIRAGE RD EL MIRAGE, AZ 85335								X				716781
CIRCLE K # 1184 5457 NW GRAND AVE URPRISE, AZ 85374						X		X				712442

An 'X' meets search criteria; a dot exceeds search criteria.
For more information call VISTA Information Solutions, Inc. at 1 - 800 - 767 - 0403.

SITE ASSESSMENT REPORT
(EXTENDED BY 1 MILE)

DETAILS

PROPERTY AND THE ADJACENT AREA (within 1 1/8 mile)

VISTA Address*:	CITY SHOP 12604 SANTA FE DRIVE SURPRISE, AZ 85374	VISTA ID#:	716509	Map ID
		Distance/Direction:	1.00 MI / NE	1A
		Plotted as:	Point	

STATE LUST - State Leaking Underground Storage Tank / SRC# 2815	Agency ID:	0004814*0762.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*APRIL 14, 1986*
Media Affected:	*NOT AVAILABLE*
Leak Cause:	*UNAVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance, Quantity (Units), Leak Source*

STATE UST - State Underground Storage Tank / SRC# 2814	Agency ID:	0-004814

Agency Address:	*SAME AS ABOVE*
Underground Tanks:	*1*
Aboveground Tanks:	*NOT REPORTED*
Tanks Removed:	*1*

Tank ID:	*1U*	Tank Status:	*REMOVED*
Tank Contents:	*GASOLINE (UNSPECIFIED)*	Leak Monitoring:	*NOT AVAILABLE*
Tank Age:	*12*	Tank Piping:	*GALVANIZED STEEL*
Tank Size (Units):	*2000 (GALLONS)*	Tank Material:	*BARE STEEL*

VISTA Address*:	ROBERTS EXXON COUNTRY STORE 15445 N GREASEWOOD SURPRISE, AZ 85374	VISTA ID#:	4289983	Map ID
		Distance/Direction:	1.10 MI / E	1B
		Plotted as:	Point	

STATE LUST - State Leaking Underground Storage Tank / SRC# 2815	Agency ID:	0008184*3010.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*SEPTEMBER 7, 1993*
Media Affected:	*NOT AVAILABLE*
Leak Cause:	*UNAVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance, Quantity (Units), Leak Source*

ATE UST - State Underground Storage Tank / SRC# 2814	Agency ID:	0-008184

Agency Address:	SAME AS ABOVE
Underground Tanks:	2
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	2

Tank ID:	1U	Tank Status:	REMOVED
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	BARE STEEL
Tank Size (Units):	10000 (GALLONS)	Tank Material:	BARE STEEL
Tank ID:	2U	Tank Status:	REMOVED
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	NOT REPORTED	Tank Piping:	BARE STEEL
Tank Size (Units):	10000 (GALLONS)	Tank Material:	BARE STEEL

VISTA Address*:	SURPRISE MAINTENANCE YARD 16281 N DYSART ROAD SURPRISE, AZ 85374	VISTA ID#: Distance/Direction: Plotted as:	3851052 1.02 MI / N Point	Map ID 2

STATE LUST - State Leaking Underground Storage Tank / SRC# 2815	Agency ID:	0006987*2597.01

Agency Address:	SAME AS ABOVE
Tank Status:	NOT AVAILABLE
Discovery Date:	NOVEMBER 25, 1992
Media Affected:	NOT AVAILABLE
Leak Cause:	UNAVAILABLE
Remedial Action:	NOT AVAILABLE
Remedial Status 1:	NOT AVAILABLE
Remedial Status 2:	NOT AVAILABLE
ields Not Reported:	Substance, Quantity (Units), Leak Source

VISTA Address*:	SURPRISE MAINTENANCE YARD 16281 N DYSART ROAD SURPRISE, AZ 85374	VISTA ID#: Distance/Direction: Plotted as:	1832365 1.02 MI / N Point	Map ID 2

STATE UST - State Underground Storage Tank / SRC# 2814	Agency ID:	0-006987

Agency Address:	SAME AS ABOVE
Underground Tanks:	3
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	1

Tank ID:	1U	Tank Status:	CURRENT
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	MONITOR PRESENT
Tank Age:	7	Tank Piping:	FIBERGLASS
Tank Size (Units):	12000 (GALLONS)	Tank Material:	FIBERGLASS
Tank ID:	2U	Tank Status:	CURRENT
Tank Contents:	DIESEL	Leak Monitoring:	MONITOR PRESENT
Tank Age:	7	Tank Piping:	FIBERGLASS
Tank Size (Units):	12000 (GALLONS)	Tank Material:	FIBERGLASS
Tank ID:	3U	Tank Status:	REMOVED
Tank Contents:	USED OIL	Leak Monitoring:	MONITOR PRESENT
Tank Age:	7	Tank Piping:	FIBERGLASS
Tank Size (Units):	500 (GALLONS)	Tank Material:	FIBERGLASS

PROPERTY AND THE ADJACENT AREA (within 1 1/8 mile) CONT.

STA Address*:	RAY W PETE JONES 16226 CHURCH STREET SURPRISE, AZ 85374	VISTA ID#: Distance/Direction: Plotted as:	715551 1.10 MI / NE Point	Map ID 3
STATE UST - State Underground Storage Tank / SRC# 2814		Agency ID:	0-006595	

Agency Address:	SAME AS ABOVE
Underground Tanks:	2
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	2

Tank ID:	1U	Tank Status:	REMOVED
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	16	Tank Piping:	GALVANIZED STEEL
Tank Size (Units):	1000 (GALLONS)	Tank Material:	BARE STEEL
Tank ID:	2U	Tank Status:	REMOVED
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	NOT AVAILABLE
Tank Age:	16	Tank Piping:	GALVANIZED STEEL
Tank Size (Units):	1000 (GALLONS)	Tank Material:	BARE STEEL

SITES IN THE SURROUNDING AREA (within 1 1/8 - 1 1/4 mile)

VISTA Address*:	KWIK-EEZ FORMER FAST GAS #302 16551 DYSART ROAD #123 SURPRISE, AZ 85374	VISTA ID#: Distance/Direction: Plotted as:	711884 1.21 MI / N Point	Map ID 4
STATE UST - State Underground Storage Tank / SRC# 2814		Agency ID:	0-002198	

Agency Address:	SAME AS ABOVE
Underground Tanks:	3
Aboveground Tanks:	NOT REPORTED
Tanks Removed:	NOT REPORTED

Tank ID:	1U	Tank Status:	CURRENT
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	MONITOR PRESENT
Tank Age:	8	Tank Piping:	FIBERGLASS
Tank Size (Units):	8000 (GALLONS)	Tank Material:	FIBERGLASS
Tank ID:	2U	Tank Status:	CURRENT
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	MONITOR PRESENT
Tank Age:	8	Tank Piping:	FIBERGLASS
Tank Size (Units):	8000 (GALLONS)	Tank Material:	FIBERGLASS
Tank ID:	3U	Tank Status:	CURRENT
Tank Contents:	GASOLINE (UNSPECIFIED)	Leak Monitoring:	MONITOR PRESENT
Tank Age:	8	Tank Piping:	FIBERGLASS
Tank Size (Units):	6000 (GALLONS)	Tank Material:	FIBERGLASS

SITES IN THE SURROUNDING AREA (within 1 1/8 - 1 1/4 mile) CONT.

VISTA Address*:	LEON'S TRAILER PARK WEST 16601 N SURPRISE AVE SURPRISE, AZ 85374	VISTA ID#: Distance/Direction: Plotted as:	4950634 1.23 MI / N Point	Map ID 4

STATE LUST - State Leaking Underground Storage Tank / SRC# 2815	Agency ID:	0008290*3511.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*CLOSED*
Discovery Date:	*MAY 5, 1994*
Media Affected:	*NOT AVAILABLE*
Leak Cause:	*UNAVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance, Quantity (Units), Leak Source*

STATE UST - State Underground Storage Tank / SRC# 2814	Agency ID:	0-008290

Agency Address:	*SAME AS ABOVE*
Underground Tanks:	*2*
Aboveground Tanks:	*NOT REPORTED*
Tanks Removed:	*2*

Tank ID:	*1U*	Tank Status:	*REMOVED*
Tank Contents:	*GASOLINE (UNSPECIFIED)*	Leak Monitoring:	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	Tank Piping:	*GALVANIZED STEEL*
Tank Size (Units):	*NOT REPORTED (GALLONS)*	Tank Material:	*BARE STEEL*
Tank ID:	*2U*	Tank Status:	*REMOVED*
Tank Contents:	*DIESEL*	Leak Monitoring:	*NOT AVAILABLE*
Tank Age:	*NOT REPORTED*	Tank Piping:	*GALVANIZED STEEL*
Tank Size (Units):	*NOT REPORTED (GALLONS)*	Tank Material:	*BARE STEEL*

SITES IN THE SURROUNDING AREA (within 1 1/4 - 1 1/2 mile)

VISTA Address*:	EL MIRAGE SERVICE YARD 14501 ALTO STREET EL MIRAGE, AZ 85335	VISTA ID#: Distance/Direction: Plotted as:	4595366 1.29 MI / E Point	Map ID 5

STATE LUST - State Leaking Underground Storage Tank / SRC# 2815	Agency ID:	0003896*2548.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*AUGUST 31, 1992*
Media Affected:	*NOT AVAILABLE*
Leak Cause:	*UNAVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance, Quantity (Units), Leak Source*

SITES IN THE SURROUNDING AREA (within 1 1/4 - 1 1/2 mile) CONT.

VISTA Address*:	CIRCLE K # 876 12239 NW GRAND AVE EL MIRAGE, AZ 85335	VISTA ID#: Distance/Direction: Plotted as:	712409 1.34 MI / E Point	Map ID 5
STATE LUST - State Leaking Underground Storage Tank / SRC# 2815		Agency ID:	0001340*3178.01	

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*NOVEMBER 17, 1993*
Media Affected:	*NOT AVAILABLE*
Leak Cause:	*UNAVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance, Quantity (Units), Leak Source*

SITES IN THE SURROUNDING AREA (within 1 1/2 - 2 miles)

VISTA Address*:	UFI SURPRISE (VALLEY SPRAYER DUSTE 12205 W BELL RD SURPRISE, AZ 85374	VISTA ID#: Distance/Direction: Plotted as:	436395 1.87 MI / NE Point	Map ID 6
SCL - State Equivalent CERCLIS List / SRC# 2924		EPA ID: Agency ID:	AZD980880942 297	

Agency Address:	*VALLEY SPRAYER DUSTER SERVICE INC* *12205 W BELL RD* *SURPRISE, AZ 85374*
ity Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*PRELIMINARY ASSESSMENT IN PROGRESS*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

UNMAPPED SITES

VISTA Address*:	UNOCAL 7455 16101 NW GRAND AVE SURPRISE, AZ 85374	VISTA ID#:	2911749
STATE LUST - State Leaking Underground Storage Tank / SRC# 2815		Agency ID:	0000951*3690.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*AUGUST 31, 1994*
Media Affected:	*NOT AVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance*

VISTA Address*:	AZ SAND ROCK CSWLF AGUA FRIA RIVER GRAND AVE AZ	VISTA ID#:	3255565
STATE SWLF - Solid Waste Landfill / SRC# 2099		EPA/Agency ID:	N/A

Agency Address:	*SAME AS ABOVE*
Facility Type:	*SANITARY LANDFILL/LANDFILL*
Facility Status:	*CLOSED*
Permit Status:	*CLOSED*

VISTA Address*:	FORMER BEARDSLEY NURSERY 19500 N GRAND AVE SURPRISE, AZ 85374	VISTA ID#:	4950573
STATE LUST - State Leaking Underground Storage Tank / SRC# 2815		Agency ID:	0008310*3394.01

Agency Address:	*SAME AS ABOVE*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*FEBRUARY 25, 1994*
Media Affected:	*NOT AVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance*

VISTA Address*:	SONORA NURSERY 15300 NW GRAND AVE SURPRISE, AZ 85374	VISTA ID#:	1832499
STATE LUST - State Leaking Underground Storage Tank / SRC# 2815		Agency ID:	9007501*1127.01

Agency Address:	*SONORA NURSERY* *15300 NW GRAND AVE* *EL MIRAGE, AZ 85335*
Tank Status:	*CLOSED*
Discovery Date:	*FEBRUARY 20, 1990*
Media Affected:	*NOT AVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance*

VISTA Address*:	MCQUEEN NW CORNER OF OCOTILLO AND MCQUEEN RO AZ	VISTA ID#:	5187132
STATE SWLF - Solid Waste Landfill / SRC# 2099		EPA/Agency ID:	N/A

Agency Address:	*SAME AS ABOVE*
Facility Type:	*SANITARY LANDFILL/LANDFILL*
Facility Status:	*ACTIVE*
Permit Status:	*OPEN OR ACTIVE SITE*

VISTA Address*:	WEST SALT RIVER VALLEY GREENWAY REEMS RDS. EL MIRAGE, AZ 85335	VISTA ID#:	1832774
SCL - State Equivalent CERCLIS List / SRC# 2924		Agency ID:	406

Agency Address:	*WEST SALT RIVER VALLEY GREENWAY REEMS RDS. EL MIRAGE, AZ 85374*
Facility Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*NOT AVAILABLE*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

VISTA Address*:	MARICOPA COUNTY MUNI WATER DIST1 19420 N GRAND AVE SURPRISE, AZ 85374	VISTA ID#:	1831768
STATE LUST - State Leaking Underground Storage Tank / SRC# 2815		Agency ID:	0003053*1402.01

Agency Address:	*MARICOPA COUNTY MUNI WATER DIST1 19420 N GRAND AVE BEARDSLEY, AZ 85374*
Tank Status:	*NOT AVAILABLE*
Discovery Date:	*JULY 10, 1990*
Media Affected:	*NOT AVAILABLE*
Remedial Action:	*NOT AVAILABLE*
Remedial Status 1:	*NOT AVAILABLE*
Remedial Status 2:	*NOT AVAILABLE*
Fields Not Reported:	*Substance*

VISTA Address*:	WQ-SURPRISE SURPRISE, AZ 85374	VISTA ID#:	3850881
SCL - State Equivalent CERCLIS List / SRC# 2924		Agency ID:	767

Agency Address:	*WQ-SURPRISE SURPRISE, AZ*
Facility Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*UNKNOWN*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

VISTA Address*:	GILA RIVER, LOWER/MIDDLE WESTERN MARICOPA COUNTY AZ	VISTA ID#:	4856718
SPL - State Equivalent Priority List / SRC# 2487		Agency ID:	5220

Agency Address:	*SAME AS ABOVE*
Facility Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*NOT AVAILABLE*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

VISTA Address*:	REEMS RD DBCP AREA GREENWAY REEMS RDS EL MIRAGE, AZ 85335	VISTA ID#:	349850
CERCLIS / SRC# 2739		EPA ID:	AZD982007395

Agency Address:	*SAME AS ABOVE*
NPL Status:	*NOT A PROPOSED, CURRENT, OR DELETED NPL SITE*
Site Ownership:	*COUNTY OWNED*
Lead Agency:	*NOT AVAILABLE*
Site Description:	*NOT REPORTED*

SCL - State Equivalent CERCLIS List / SRC# 2924	EPA ID: Agency ID:	AZD982007395 649

Agency Address:	*REEMS RD. DBCP AREA* *GREENWAY REEMS RDS* *EL MIRAGE, AZ 85374*
Facility Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*PRELIMINARY ASSESSMENT IN PROGRESS*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

VISTA Address*:	WQ-EAST CENTRAL PHOENIX CAMELBACK TO THOMAS 16TH TO 56TH STR PHOENIX, AZ	VISTA ID#:	3850948
SCL - State Equivalent CERCLIS List / SRC# 2924		Agency ID:	421

Agency Address:	*SAME AS ABOVE*
Facility Type:	*NOT AVAILABLE*
Lead Agency:	*NOT AVAILABLE*
State Status:	*STATE LEAD*
Pollutant 1:	*UNKNOWN*
Pollutant 2:	*UNKNOWN*
Pollutant 3:	*UNKNOWN*
Fields Not Reported:	*Status*

SITE ASSESSMENT REPORT (EXTENDED BY 1 MILE)

DESCRIPTION OF DATABASES SEARCHED

A) DATABASES SEARCHED TO 2 MILES

NPL
SRC#: 2640

VISTA conducts a database search to identify all sites within 2. mile of your property.
The agency release date for NPL was September, 1995.

The National Priorities List (NPL) is the EPA's database of uncontrolled or abandoned hazardous waste sites identified for priority remedial actions under the Superfund program. A site must meet or surpass a predetermined hazard ranking system score, be chosen as a state's top priority site, or meet three specific criteria set jointly by the US Dept of Health and Human Services and the US EPA in order to become an NPL site.

SPL
SRC#: 2487

VISTA conducts a database search to identify all sites within 2. mile of your property.
The agency release date for Superfund and WQARF Priorities List was June, 1995.

This database is provided by the Department of Environmental Quality.

SCL
SRC#: 2924

VISTA conducts a database search to identify all sites within 2. mile of your property.
The agency release date for Cercla Information Data System (ACIDS) was February, 1996.

This database is provided by the Department of Environmental Quality.

RCRA-TSD
SRC#: 2909

VISTA conducts a database search to identify all sites within 2. mile of your property.
The agency release date for RCRIS was February, 1996.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA TSDs are facilities which treat, store and/or dispose of hazardous waste.

B) DATABASES SEARCHED TO 1 1/2 MILES

CERCLIS
SRC#: 2738

VISTA conducts a database search to identify all sites within 1.5 mile of your property.
The agency release date for CERCLIS was December, 1995.

The CERCLIS List contains sites which are either proposed to or on the National Priorities List(NPL) and sites which are in the screening and assessment phase for possible inclusion on the NPL. The information on each site includes a history of all pre-remedial, remedial, removal and community relations activiies or events at the site, financial funding information for the events, and unrestricted enforcement activities.

NFRAP
SRC#: 2739

VISTA conducts a database search to identify all sites within 1.5 mile of your property.
The agency release date for CERCLIS-NFRAP was December, 1995.

NFRAP sites may be sites where, following an initial investigation, no contamination was found, contamination was removed quickly, or the contamination was not serious enough to require Federal Superfund action or NPL consideration.

SWLF
SRC#: 2099

VISTA conducts a database search to identify all sites within 1.5 mile of your property.
The agency release date for Active Landfills List was October, 1994.

This database is provided by the Department of Environmental Quality, Solid Waste Dept..

SWLF
SRC#: 2099

VISTA conducts a database search to identify all sites within 1.5 mile of your property.
The agency release date for Inactive Landfills List was October, 1994.

This database is provided by the Department of Environmental Quality, Solid Waste Dept..

LUST
SRC#: 2815

VISTA conducts a database search to identify all sites within 1.5 mile of your property.
The agency release date for LUST File Listing was January, 1996.

This database is provided by the Department of Environmental Quality, UST Compliance Unit.

C) DATABASES SEARCHED TO 1 1/4 MILES

UST's
SRC#: 2814

VISTA conducts a database search to identify all sites within 1.25 mile of your property.
The agency release date for Ust-DMS Facility Tank Data Listing was January, 1996.

This database is provided by the Department of Environmental Quality, UST Compliance Unit; Caution-Many states do not require registration of heating oil tanks, especially those used for residential purposes.

D) DATABASES SEARCHED TO 1 1/8 MILES

ERNS
SRC#: 2885

VISTA conducts a database search to identify all sites within 1.125 mile of your property.
The agency release date for ERNS was June, 1995.

The Emergency Response Notification System (ERNS) is a national database used to collect information on reported releases of oil and hazardous substances. The database contains information from spill reports made to federal authorities including the EPA, the US Coast Guard, the National Response Center and the Department of transportation. A search of the database records for the period October 1986 through June 1995 revealed the following information regarding reported spills of oil or hazardous substances in the stated area.

RCRA-LgGen
SRC#: 2909

VISTA conducts a database search to identify all sites within 1.125 mile of your property.
The agency release date for RCRIS was February, 1996.

The EPA's Resource Conservation and Recovery Act (RCRA) Program identifies and tracks hazardous waste from the point of generation to the point of disposal. The RCRA Facilities database is a compilation by the EPA of facilities which report generation, storage, transportation, treatment or disposal of hazardous waste. RCRA Large Generators are facilities which generate at least 1000 kg./month of non-acutely hazardous waste (or 1 kg./month of acutely hazardous waste).

APPENDIX C: Project Personnel Credentials

AY YOUNATHAN - *Environmental Specialist*

Mr. Younathan performs research and field activities related to Phase I Environmental Site Assessments and ransaction Screens. These activities include governmental database records research, historical records research, interviews, site recognizance, and draft report preparation. Mr. Younathan received his Master's egree in Hydrogeology from California State University at Stanislaus. He has three years experience in the nvironmental field, five years experience in the geotechnical field, and twelve years experience in the civil ngineering field.

VALERIE A. KEARNS, E.I.T. - *Project Manger-Preliminary Environmental Assessments*

Is. Kearns is responsible for directing the efforts of a project team in performing Preliminary Environmental Site Assessments. In this capacity, Ms. Kearns manages and oversees all phases of Phase I Environmental Site ssessments and Transaction Screens. This includes project scope definition, technical resource allotment and assessment, project tracking, client status communications as necessary, and general project oversight. Ms. Kearns received her Bachelor's degree in Nuclear Engineering from Arizona State University and has four years xperience in the field of engineering including preliminary environmental site assessments, health physics, and nuclear safety operational analysis.

STEVEN A. GRIESS, P.E - *Department Manager*

Mr. Griess is a registered professional engineer in the state of Arizona and has over 20 years experience in the field of geotechnical, materials and environmental engineering on a wide variety of projects including government, industrial, residential and manufacturing sites. Mr. Griess' experience in the environmental engineering area ranges from preliminary environmental site assessments to site characterization and remediation. Mr. Griess acts as the Environmental Department Manager and in that capacity is responsible for project review and oversight.

2. MSE REPORT

MSE ENVIRONMENTAL, INC.

1250-H Avenida Acaso
Camarillo, CA 93012

Telephone (805) 987-0217
Fax (805) 987-8718

December 13, 1996

Mr. Russ Shasky
PHOENIX HOLDINGS II, L.L.C.
3104 East Camelback Road, Box 612
Phoenix, AZ 85016

Subject: Report of Sampling and Analysis of Surficial Soil
Arena Development
North of Waddell Road between
West Point Parkway and Dysart Road
Surprise, Arizona

Dear Mr. Shasky:

MSE Environmental, Inc. (MSE) recently collected and analyzed twelve soil samples from the Arena development property, located in Surprise, Maricopa County, California (Figure 1). This work was conducted in response to a request from Phoenix Holdings II, L.L.C., based upon recommendations of a Phase I Environmental Site Assessment (ESA) of the subject property performed by Speedie and Associates of Phoenix, Arizona. According to the ESA, the site has historically been used for agriculture, and the use of agricultural chemicals at the site is suspected. The purpose of the recent site work was to investigate the presence, if any, of pesticides and herbicides in the surficial soils at the property.

FIELD ACTIVITIES

Prior to selecting sampling locations, the property was divided into 100 equal parcels. The parcels sampled were selected randomly using the random number generating feature of the Microsoft Excel spreadsheet program. The soil samples were collected from the center of the selected parcels. To assure a representative soil sample, equal amounts of soil at two inch intervals ranging from approximately 4 to 10 inches below ground surface (bgs) was placed on a plate. The soil was mixed manually, then divided into quarters. Two opposite quarters were selected, and the soil from these quarters was mixed manually and again divided into quarters. Two opposite quarters were selected and the soil from these two quarters was placed in the sample containers. The soil that was not selected was discarded.

On November 30, 1996, twelve soil samples were collected using the process described previously, and placed into two 40 milliliter VOAs. The VOAs were sealed with a teflon-lined lid, labeled, placed on blue ice, and transported to Zymax Envirotechnology, a state-certified laboratory, for analysis. Since the property was either planted with roses or tilled at the time of the site visit, three samples were obtained from planted areas (Figure 2).

Geology

The soil encountered in obtaining the soil samples included light to dark brown silty clay. The general soil lithology in the area consists of sandy clay loam (Speedie, May 30, 1996).

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Soil Analytical Results

The collected soil samples were submitted under chain of custody procedures to Zymax Envirotechnologies of San Luis Obispo, California for analyses. The samples were analyzed for organochlorine pesticides by United States Environmental Protection Agency (EPA) method 8080, and herbicides by EPA method 8150.

Detectable concentrations of 4,4'-dichlorodiphenyldichloroethylene (DDE), were reported in all samples collected, and concentrations ranged from 0.054 to 0.46 milligrams per kilogram (mg/kg). No other chlorinated pesticides were present above the method detection limit (Table 1).

Detectable concentrations of chlorinated herbicides were not reported (Table 1). Copies of the analytical report and chain of custody record are presented in Appendix A.

DISCUSSION

The use of DDT in agricultural applications was banned in 1978 (Farm Chemicals Handbook, 1995). DDE is a degradation, or daughter, product of DDT resulting from the loss of molecules of hydrochloric acid. The presence of both DDT and DDE, along with the length of time since the last legal use of DDT, suggests that DDT may have been used on the property and is in the process of biodegradation.

The draft report prepared by ADEQ (amended March 1996) and entitled "Human Health-Based Guidance Levels For Contaminants In Drinking Water and Soil" provides ingestion health-based guidance level values for chemical contaminants in soil. These values are based on average daily ingestion of soil during a lifetime of seventy years, and have been accepted by the ADEQ as remedial action levels. These values constitute a set of consistently-derived health-based levels that are used by the ADEQ as cleanup levels. These levels are based upon ingestion as a route of entry into the human body. According to this document, the remediation level for DDE is 4.0 mg/kg, based on residential development.

The EPA has not established maximum contaminant levels for DDT, DDD, DDE, and dieldrin. Resource Conservation and Recovery Act (RCRA) action levels proposed for DDE is 3.0 mg/kg, (Farm Chemicals Handbook, 1995).

CONCLUSIONS

Detectable concentrations of herbicides were not reported in the soil samples collected from the site. The detectable concentrations of DDE were below the cleanup levels established by the ADEQ for sensitive reception areas such as residential development, and the action levels proposed by RCRA. The presence of DDE on the subject property should not adversely affect human health. No further assessment or remedial activities are recommended from this investigation.

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This report was prepared consistent with current and generally accepted environmental consulting principles and practices that are within the limitations described in Appendix B. If you have any questions, please do not hesitate to call either of the undersigned at (805) 987-0217.

Sincerely,

MSE ENVIRONMENTAL, INC.

Chris R. Rohlfing
Environmental Geologist

Frank W. Doerfler, Jr.
Registered Environmental Assessor No. 00069

CRR:gv

REGISTERED ENVIRONMENTAL ASSESSOR
FRANK W DOERFLER, JR.
No. 00069
Expires 6/97
STATE OF CALIFORNIA

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REFERENCES

1. Speedie and Associates. Report on Phase I Environmental Site Assessment. May 30, 1996.

2. Arizona Department of Environmental Quality. Amended Soil Remediation Rules. March 29, 1996.

3. 1995 Farm Chemicals Handbook Volume 81. Pesticide Dictionary. 1995.

4. Arizona Department of Environmental Quality. Human Health-Based Guidance Levels for Contaminants in Drinking Water and Soil. September, 1990.

5. N. Irving Sax and Richard J. Lewis, Sr. Hawley's Condensed Chemical Dictionary, Eleventh Edition. 1987.

6. Marshall Sittig. Handbook of Toxic and Hazardous Chemicals and Carcinogens, Second Edition. 1985.

Attachments:

Figure 1 - Vicinity Map
Figure 2 - Sample Location Map

Table 1 - Summary of Soil Analytical Results

Appendix A - Laboratory Report and Chain of Custody Record
Appendix B - Limitations

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FIGURES

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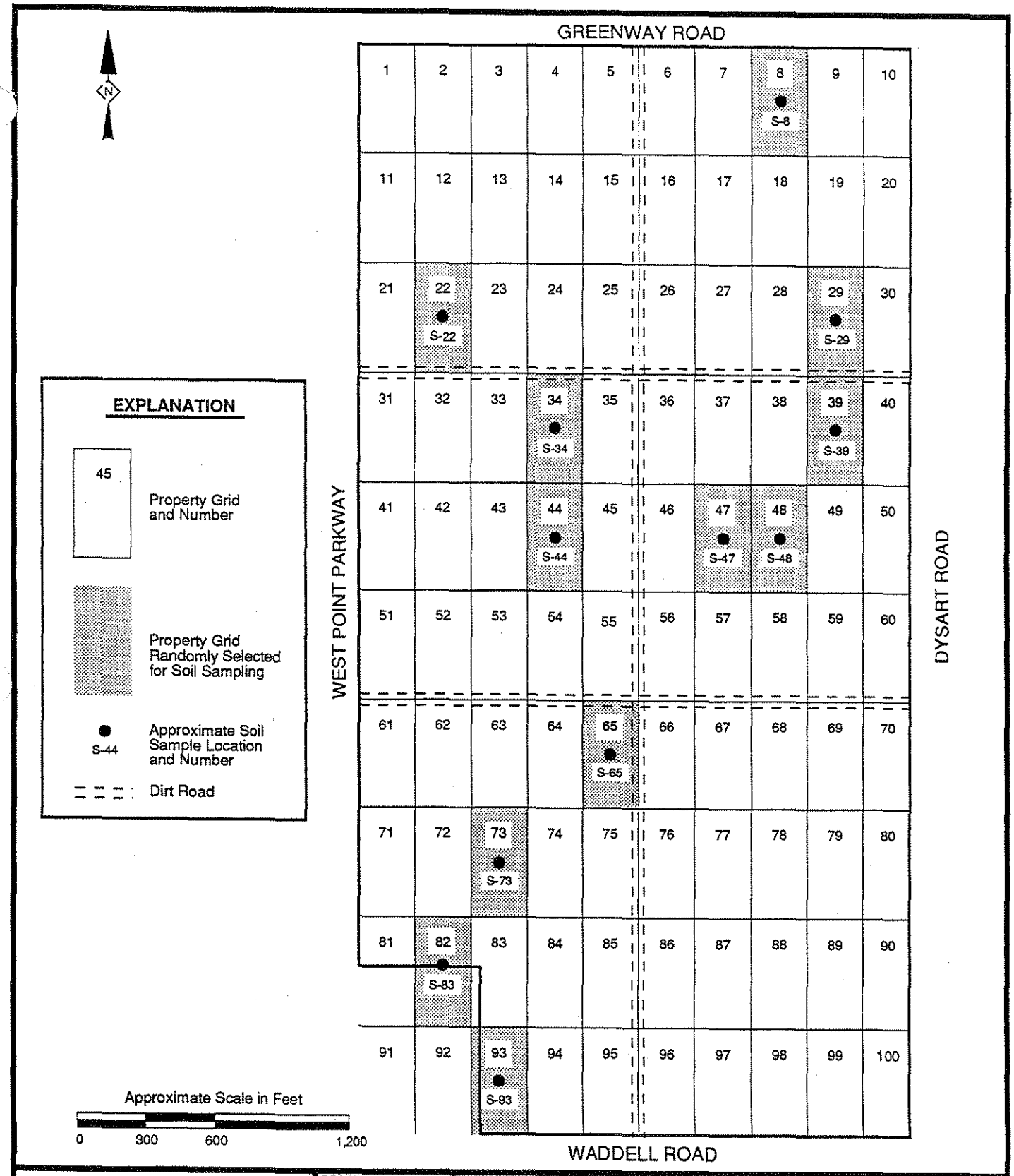

MSE ENVIRONMENTAL, INC.

DRAWING NUMBER: 1442.2	SCALE: 1"=600'
Source: MSE Environmental, Inc.	

SAMPLE LOCATION MAP

Arena Development
North of Waddell Road between
West Point Road and Dysart Road
Surprise, Arizona

FIGURE 2

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TABLE

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TABLE 1
SUMMARY OF SOIL ANALYTICAL RESULTS
ARENA DEVELOPMENT
NORTH OF WADDELL ROAD BETWEEN
WEST POINT PARKWAY AND DYSART ROAD
SURPRISE, ARIZONA

Sample Number	Sample Depth (inches)	Sample Date	(mg/kg) (1)	Other Chlorinated (mg/kg) (1)	Chlorinated (mg/kg) (2)
S-8	4-10	30-Nov-96	0.30	ND	ND
S-22	4-10	30-Nov-96	0.32	ND	ND
S-29	4-10	30-Nov-96	0.46	ND	ND
S-34	4-10	30-Nov-96	0.22	ND	ND
S-39	4-10	30-Nov-96	0.39	ND	ND
S-44	4-10	30-Nov-96	0.054	ND	ND
S-47	4-10	30-Nov-96	0.16	ND	ND
S-48	4-10	30-Nov-96	0.17	ND	ND
S-65	4-10	30-Nov-96	0.053	ND	ND
S-73	4-10	30-Nov-96	0.14	ND	ND
S-82	4-10	30-Nov-96	0.14	ND	ND
S-93	4-10	30-Nov-96	0.14	ND	ND
ADEQ Ingestion Health-Based Levels			4.0 *	Various	Various

Notes:
(1) = Chlorinated pesticides analyzed by EPA Method 8080.
(2) = Chlorinated herbicides analyzed by EPA Method 8150.
ND = Not detected (see Appendix A for detection limits).
mg/kg = Milligrams per kilogram.
4,4'-DDE = 4,4'-dichlorodiphenyldichloroethylene
ADEQ = Arizona Department of Environmental Quality.
*** = ADEQ threshihold level for residential property.**

APPENDIX A

LABORATORY REPORT AND CHAIN OF CUSTODY RECORD

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ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-1 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-8 12/07/96 EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.30
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717

*PQL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
ZymaX envirotechnology, inc.

John MacMurphey
Laboratory Director

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ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-1 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-8 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-2 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-22 12/06/96 EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.32
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
ZymaX envirotechnology, inc.

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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-2 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: S-22 Analyzed: Method:	 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
ZymaX envirotechnology, inc.

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REPORT OF ANALYTICAL RESULTS

Client: Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: 10133-3 Collected: 11/30/96 Received: 12/03/96 Matrix: Soil
Project: Phoenix Holdings Project Number: 1442-96085 Collected by: Chris Rohlfing	Sample Description: S-29 Analyzed: 12/06/96 Method: EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.46
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717

*PQL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-3 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-29 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client: Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: 10133-4 Collected: 11/30/96 Received: 12/03/96 Matrix: Soil
Project: Phoenix Holdings Project Number: 1442-96085 Collected by: Chris Rohlfing	Sample Description: S-34 Analyzed: 12/06/96 Method: EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.22
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717

*PQL - Practical Quantitation Limit

**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-4 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: S-34 Analyzed: Method:	 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-5 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-39 12/06/96 EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.39
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-5 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-39 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-6 11/30/96 12/03/96 Soil
Project:	Phoenix Holdings	Sample Description:	S-44
Project Number:	1442-96085	Analyzed:	12/06/96
Collected by:	Chris Rohlfing	Method:	EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.054
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-6 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-44 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client: Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: 10133-7 Collected: 11/30/96 Received: 12/03/96 Matrix: Soil
Project: Phoenix Holdings Project Number: 1442-96085 Collected by: Chris Rohlfing	Sample Description: S-47 Analyzed: 12/06/96 Method: EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.16
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-7 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-47 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
ZymaX envirotechnology, inc.

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REPORT OF ANALYTICAL RESULTS

Client: Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: 10133-8 Collected: 11/30/96 Received: 12/03/96 Matrix: Soil
Project: Phoenix Holdings Project Number: 1442-96085 Collected by: Chris Rohlfing	Sample Description: S-48 Analyzed: 12/08/96 Method: EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client: Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: 10133-9 Collected: 11/30/96 Received: 12/03/96 Matrix: Soil
Project: Phoenix Holdings Project Number: 1442-96085 Collected by: Chris Rohlfing	Sample Description: S-65 Analyzed: 12/06/96 Method: EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.053
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
ZymaX envirotechnology, inc.

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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-9 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-65 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

Submitted by,
ZymaX envirotechnology, inc.

John MacMurphey
Laboratory Director

GC #2 (ECD)
10133-9h.xls
JMM/jgt/dz/jc

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fax 805.544.8226
tel 805.544.4696

ZymaX envirotechnology

REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number:	10133-10
		Collected:	11/30/96
		Received:	12/03/96
		Matrix:	Soil
Project:	Phoenix Holdings	Sample Description:	S-73
Project Number:	1442-96085	Analyzed:	12/06/96
Collected by:	Chris Rohlfing	Method:	EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.14
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Endrin aldehyde	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-10 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-73 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Extracted by EPA 3550 on 12/05/96.

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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-11 11/30/96 12/03/96 Soil
Project:	Phoenix Holdings	Sample Description:	S-82
Project Number:	1442-96085	Analyzed:	12/06/96
Collected by:	Chris Rohlfing	Method:	EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.14
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Note: Extracted by EPA 3550 on 12/05/96.	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

Submitted by,
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REPORT OF ANALYTICAL RESULTS

Client: Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: 10133-11 Collected: 11/30/96 Received: 12/03/96 Matrix: Soil
Project: Phoenix Holdings Project Number: 1442-96085 Collected by: Chris Rohlfing	Sample Description: S-82 Analyzed: 12/08/96 Method: EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Analysis performed by CA Department of Health Services certified laboratory #1544

Submitted by,
ZymaX envirotechnology, inc.

for
John MacMurphey
Laboratory Director

1013311h.xls
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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-12 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-93 12/06/96 EPA 8080

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED PESTICIDES		
Aldrin	0.002	ND
Alpha-BHC	0.002	ND
Beta-BHC	0.002	ND
Delta-BHC	0.002	ND
Gamma-BHC (Lindane)	0.002	ND
Chlordane	0.1	ND
4,4'-DDD	0.002	ND
4,4'-DDE	0.002	0.14
4,4'-DDT	0.002	ND
Dieldrin	0.002	ND
Endosulfan I	0.002	ND
Endosulfan II	0.002	ND
Endosulfan sulfate	0.002	ND
Endrin	0.002	ND
Note: Extracted by EPA 3550 on 12/05/96.	0.002	ND
Endrin ketone	0.002	ND
Heptachlor	0.002	ND
Heptachlor epoxide	0.002	ND
Methoxychlor	0.002	ND
Toxaphene	0.1	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
***PQL - Practical Quantitation Limit**
****Results listed as ND would have been reported if present at or above the listed PQL.**

Note: Extracted by EPA 3550 on 12/04/96.

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REPORT OF ANALYTICAL RESULTS

Client:	Chris Rohlfing MSE Environmental, Inc. 1250-H Avenida Acaso Camarillo, CA 93012	Lab Number: Collected: Received: Matrix:	10133-12 11/30/96 12/03/96 Soil
Project: Project Number: Collected by:	Phoenix Holdings 1442-96085 Chris Rohlfing	Sample Description: Analyzed: Method:	S-93 12/08/96 EPA 8150

CONSTITUENT	PQL* mg/kg	RESULT** mg/kg
CHLORINATED HERBICIDES		
2,4-D	0.04	ND
2,4-DB	0.04	ND
Dalapon	0.1	ND
Dicamba	0.004	ND
Dichloroprop	0.04	ND
Dinoseb	0.007	ND
MCPP	4.0	ND
MCPA	4.0	ND
2,4,5-T	0.004	ND
2,4,5-TP (Silvex)	0.004	ND

ZymaX envirotechnology, inc. is certified by CA Department of Health Services: Laboratory #1717
*PQL - Practical Quantitation Limit
**Results listed as ND would have been reported if present at or above the listed PQL.

Note: Analysis performed by CA Department of Health Services certified laboratory #1544

Submitted by,
ZymaX envirotechnology, inc.

for

John MacMurphey
Laboratory Director

1013312h.xls
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CHAIN OF CUSTODY RECORD
ANALYTICAL REQUEST

MSE ENVIRONMENTAL, INC.
1250-H Avenida Acaso
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Fax: (805) 987-8718

LABORATORY Zymax
ADDRESS 1 Zaca Lane
San Luis Obispo, CA 93401
PHONE (805) 544-4696
SAMPLER'S NAME Chris Rohlfing

DATE 11/30/96
PROJECT NO. 1442-96085
PROJECT NAME Phoenix Holdings
PROJECT MANAGER Chris Rohlfing
SAMPLER'S SIGNATURE Chris Rohlfing

** PLEASE REFERENCE MSE PROJECT NUMBER ON ALL LABORATORY REPORTS AND INVOICES

TURN AROUND TIME: 24-HOUR ___ 48-HOUR ___ 72-HOUR ___ STANDARD (5-DAY) ✓ OTHER ___

SAMPLE ID.	MATRIX	DATE SAMPLED	TIME	PRESERVATION	NUMBER OF CONTAINERS	BTEX/TPHg 8020/8015 modified	BTEX 8020	TPH 8015 MOD. GAS☐ DIESEL☐	TRPH 418.1	LEAD 7420/7421	Chlorinated Pest. 8080	Chlorinated Herb. 8150		
S-8 10133-1	SOIL	11/30/96	11:42	ICE	2-6 ml VOAs	X					X	X		
S-22 -2	"	"	12:03	"	"						X	X		
S-29 -3	"	"	12:16	"	"						X	X		
S-34 -4	"	"	12:33	"	"						X	X		
S-39 -5	"	"	12:54	"	"						X	X		
S-44 -6	"	"	13:09	"	"						X	X		
S-47 -7	"	"	13:21	"	"						X	X		
S-48 -8	"	"	13:34	"	"						X	X		
S-65 -9	"	"	13:57	"	"						X	X		
S-73 -10	"	"	14:06	"	"						X	X		
S-82 -11	"	"	14:19	"	"						X	X		
S-93 -12	"	"	14:31	"	"						X	X		
				"	"									

REMARKS / SPECIAL INSTRUCTIONS:

SAMPLE INTEGRITY: (FOR LAB USE)
INTACT ___
ON ICE ___

RELINQUISHED BY	DATE	TIME	RECEIVED BY	DATE	TIME
Chris Rohlfing	11/30/96	13:25	Kim Wachel Zymax	12-3-96	10:00

APPENDIX B

LIMITATIONS

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Recycled Paper

GENERAL LIMITATIONS

The services described in this report were performed consistent with generally accepted professional consulting principles and practices. No other warranty express or implied, is made. These services were performed consistent with MSE's agreement with MSE's client. This report is solely for the use and information of MSE's client unless otherwise noted.

Any reliance on this report by a third party is at such party's sole risk.

Opinions and recommendations contained in this report apply to conditions existing when services were performed and are intended only for the client, purposes, locations, time frames, and project parameters indicated. MSE is not responsible for the impacts of any changes in environmental standards, practices, or regulations subsequent to performance of services. MSE does not warrant the accuracy of information supplied by others, nor the use of segregated portions of this report.

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APPENDIX B

PRELIMINARY DRAINAGE REPORT

Preliminary Master Drainage Study

ROSEVIEW PLANNED AREA DEVELOPMENT
CITY OF SURPRISE, ARIZONA

Prepared for:

Surprise 320 LLC
Phoenix, Arizona

Prepared By:
DMJM Arizona, Inc

June, 1997
Revised November, 1997

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Retention Basin Volume Calculations ..... Appendix B.2

INTRODUCTION

DMJM has been engaged by Surprise 320, LLC. (DMJM Project No. 6531.10) to design the Roseview Residential Development, a Planned Area Development (PAD).

The proposed PAD is shown on the project location map (Figure V.1) on page 2 and it is located in Township 3 North, Range 1 West, on the east side of Section 10 of the Gila and Salt River Base and Meridian, Maricopa County, Arizona.

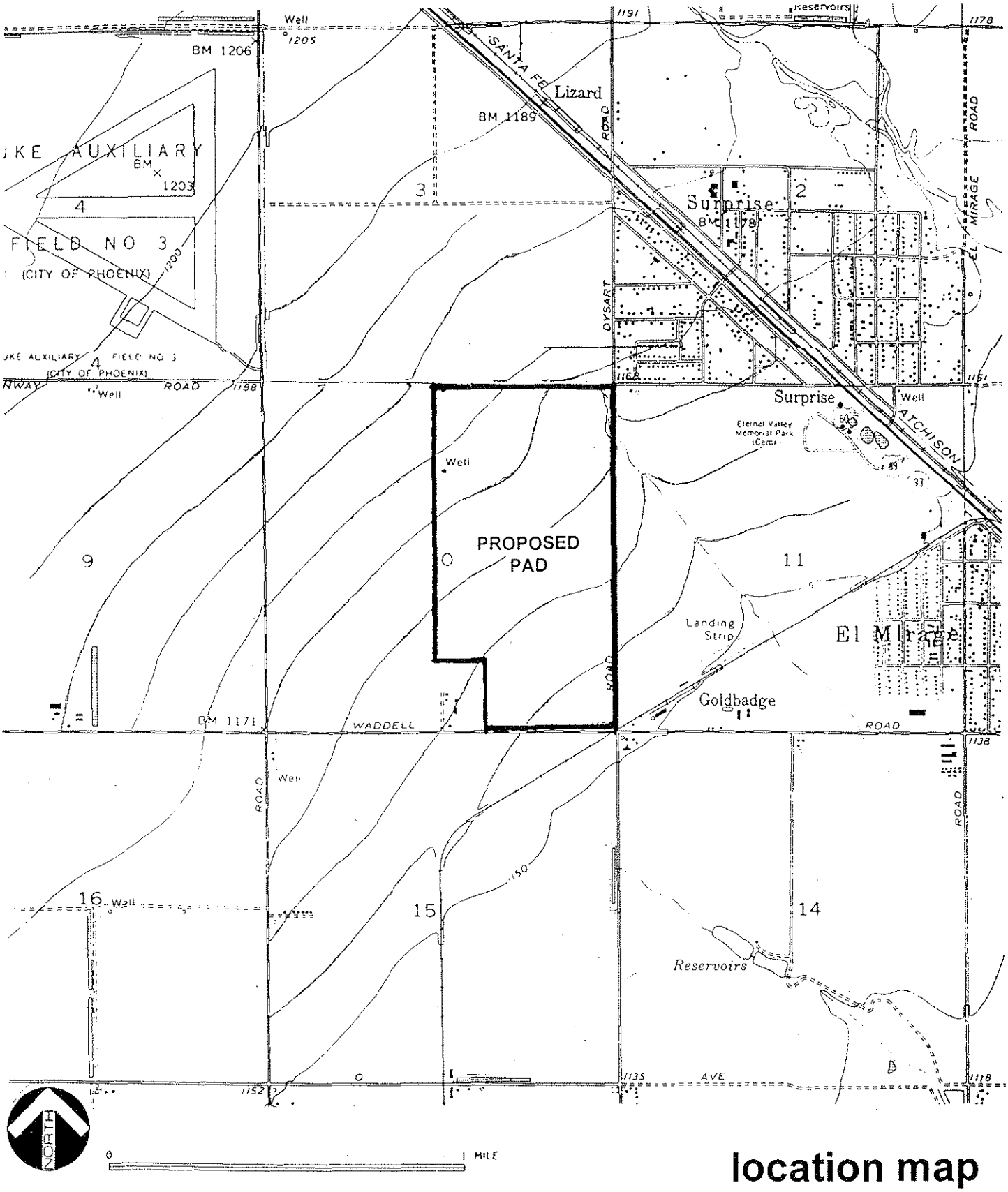
The project site is located within the City of Surprise between Greenway Road to the north, Waddell Road to the south, Dysart Road to the east and the mid-section line to the west.

A. PURPOSE OF REPORT

The purpose of this report is to investigate, evaluate and document the existing on-site hydrologic conditions and make recommendations for incorporating retention facilities and the conveyance means to reach these facilities.

B. BACKGROUND AND OVERVIEW

1. Existing Conditions. The existing on-site drainage area is approximately 320 acres and its present use is agricultural although it is zoned R-43. The vegetative cover is approximately 50 percent which reflects the average percentage of area that actually has crops planted at any one time. The drainage area has an average slope of 0.51 percent and it drains from the northwest corner of the property (Elevation High of + 1178 feet) towards the southeast corner (Elevation Low of + 1153 feet) where it eventually outfalls into the El Mirage Tributary Wash.



location map

FIGURE V.1

DMJM

Daniel, Mann, Johnson, & Mendenhall
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

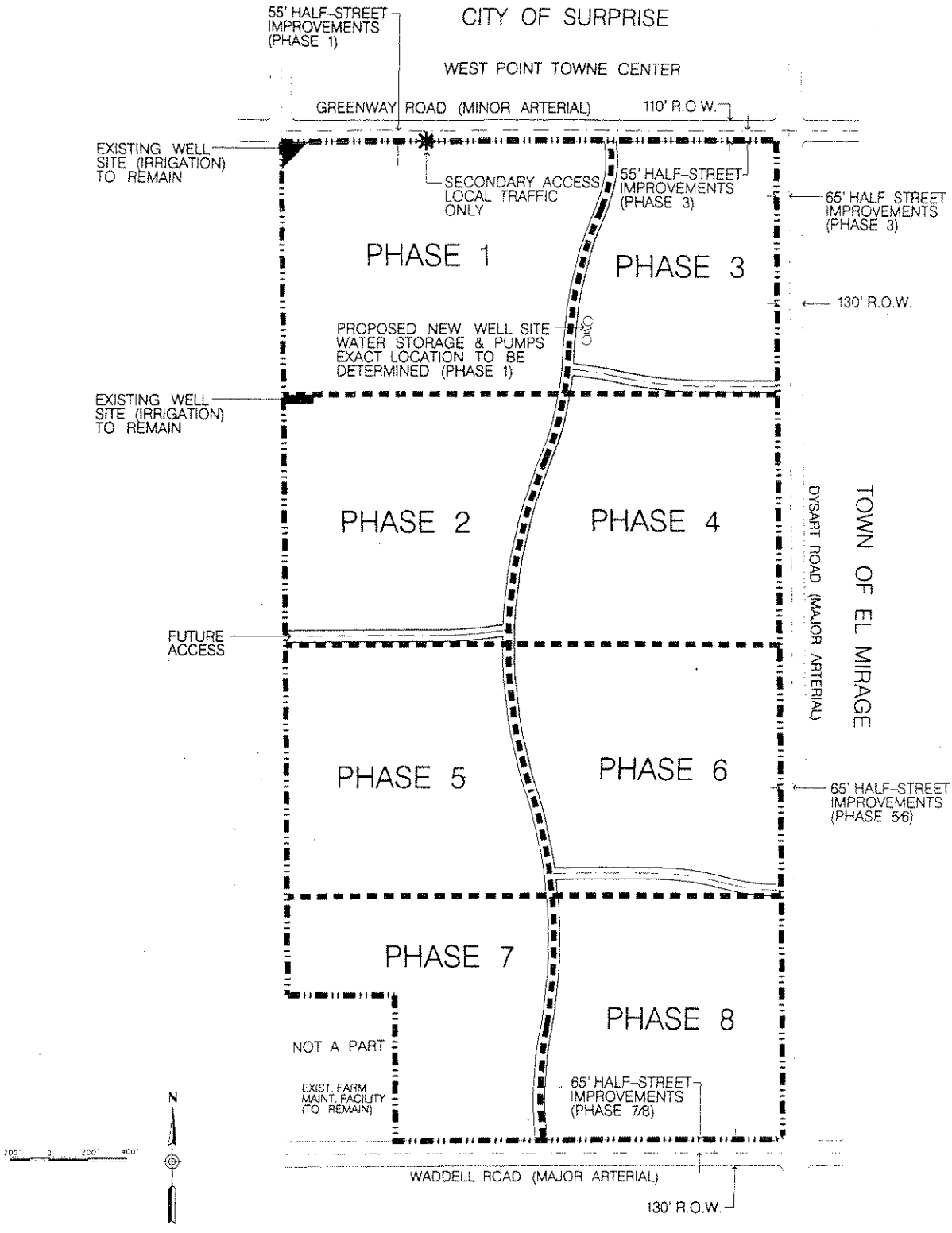
Dysart Road intersects the Roseview property and the El Mirage Tributary Wash and it is built to the natural grade. Runoff from the Roseview property concentrates at the southeast corner, backs up and then drains across Dysart Road into the El Mirage Tributary Wash.

The current FEMA Flood Insurance Rate Map (FIRM Map No. 04013C1605F) indicates that the project site is located in a flood hazard zone X. Zone X is defined as, "areas of 500-year flood; areas of 100-year floods with average depths of less than one foot or with drainage areas less than one mile; and areas protected by levees from the 100-year flood." No other zones apply. FEMA has revised the FIRM map with a LOMR (Letter of Map Revision), dated October, 1997. The LOMR is in response to the newly constructed drainage channel located along the southern edge of West Point Towne Center. (See Figure 2 – Flood Map in Volume I of the PAD.

2. Proposed Conditions. The proposed Roseview PAD (see Figure V.2 on page 4) will consist of single family units with an average lot size of approximately 5,000 square feet. The Roseview PAD will be constructed in eight phases and the net total drainage area of the eight phases is 289.2 acres. Table 1 below shows the acreage of the eight phases.

TABLE 1.
Summary of Phasing Drainage Areas

Size (ac)	PHASE
72.78	1 & 3
75.59	2 & 4
67.63	5 & 6
71.20	7 & 8
289.20	**TOTAL**



proposed p.a.d.

FIGURE V.2

DMJM

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300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

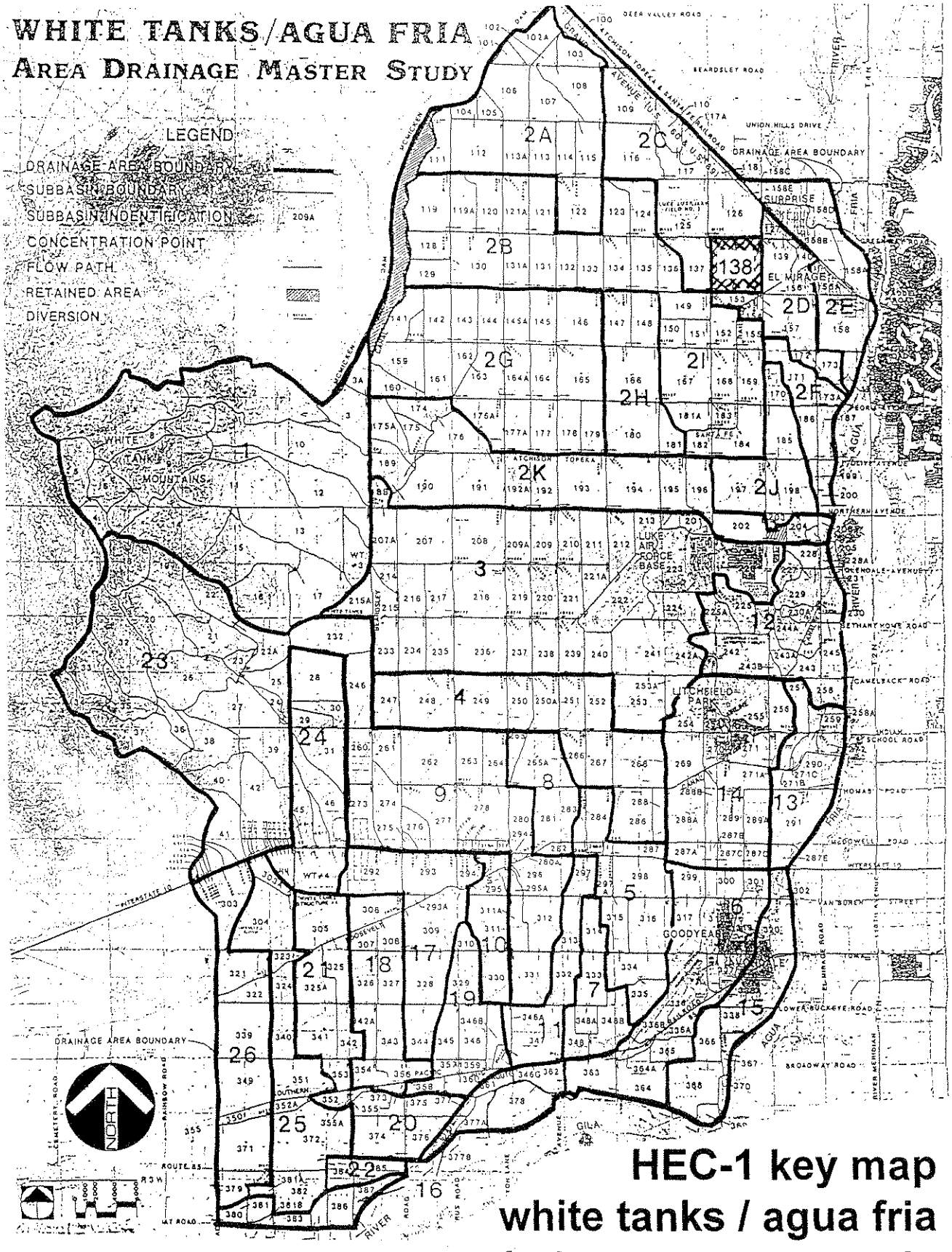
The City of Surprise will not permit on-site runoff from the Roseview area to flow over Dysart Road and discharging runoff to the El Mirage Tributary Wash would require elevating Dysart Road and regrading of the El Mirage Tributary Wash. Therefore the full 100-year 2-hour on-site peak runoff volume will be retained and drained with dry wells. Each phase will be independently graded so that the peak storm water runoff drains into its own on-site retention basin.

3. Off-Site Drainage. There are four off-site drainage areas that affect the Roseview property. The first off-site drainage area is located directly north of the Roseview property and it is planned to be developed into the West Point Towne Center (WPTC). The second off-site drainage area is northwest of the Roseview property which is currently being used for agricultural purposes. The third off-site drainage area is located west of Litchfield Road and the fourth is between Litchfield Road and the Roseview property. Current land usage is agricultural. These four off-site drainage areas impact, or combine to impact, the Roseview project site at the following locations:

- Northeast corner of the Roseview property at the intersection of Greenway Road and Dysart Road.
- Along the west property line towards the middle of the development.

  Note: The actual point where runoff enters the Roseview property will be determined when the topographical survey has been completed.
- Southwest corner of the Roseview property along Waddell Road.

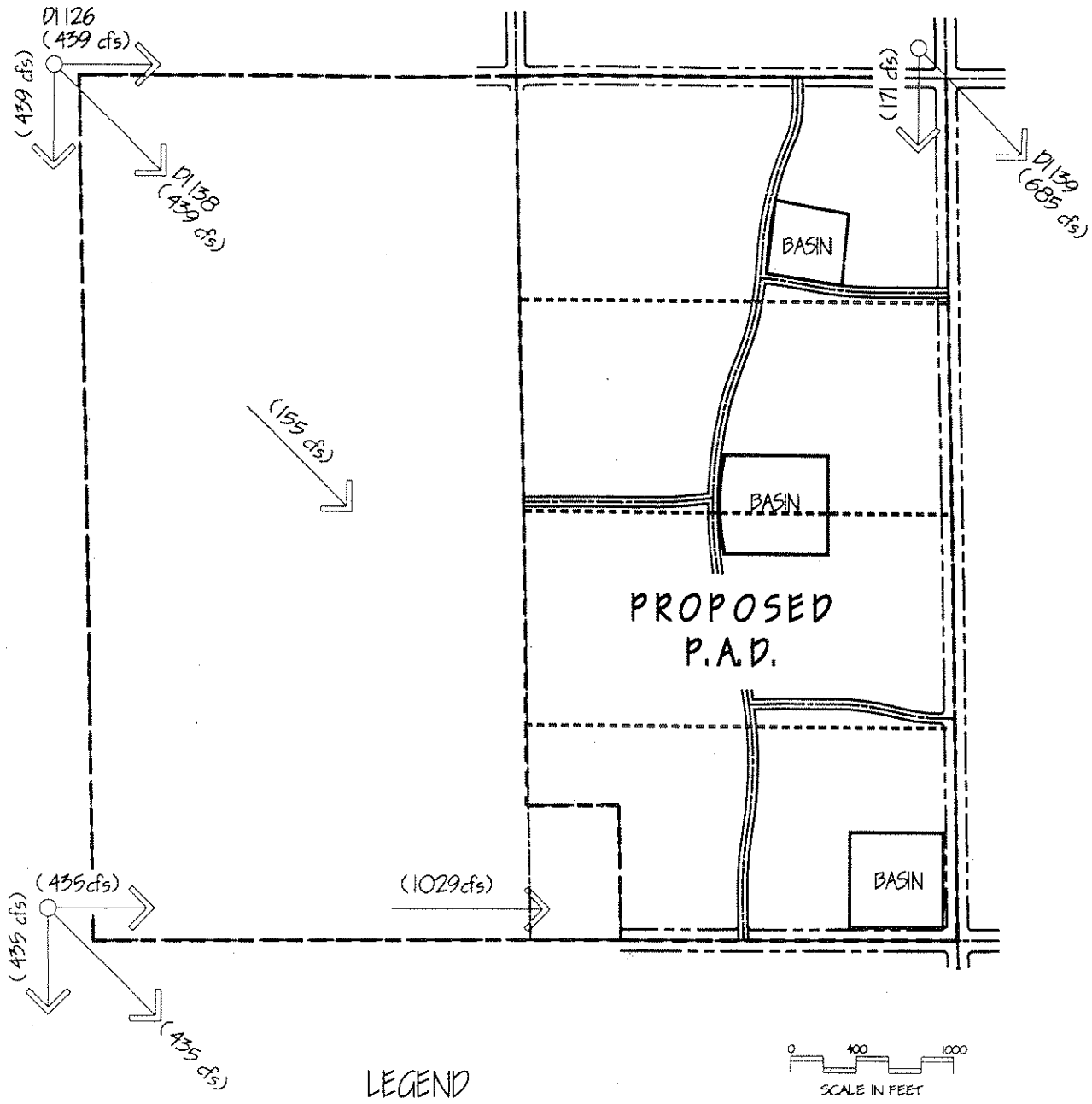
The off-site peak flows were determined from the HEC-1 Key Map for the White Tanks/Agua Fria Area Drainage Master Study (see Figures V.3 and V.4 on pages 6 and 7), prepared by the Flood Control District for Maricopa County (FCDMC).



HEC-1 key map
white tanks / agua fria
area drainage master study

DMJM
Daniel, Mann, Johnson, & Mendenhall
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217

FIGURE V.3



LEGEND

- - - SUBBASIN BOUNDARY

D1126 100 YEAR 24 HOUR PEAK FLOW DIVERSIONS

subbasin 138
white tanks/agua fria
area drainage master study

FIGURE V.4

DMJM

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Phoenix, Arizona 85013-3499
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Fax: 602/285-1984

The White Tanks/Agua Fria drainage area is approximately 220 square miles therefore, the off-site peak runoff was calculated for the 100-year 24-hour storm. The HEC-1 map shows a 100-year 24-hour off-site peak flow concentration of 1318 cfs at the intersection of Litchfield Road and Greenway Road which comes from the northwest off-site drainage area. The 1318 cfs splits three ways at the intersection with 439 cfs flowing east in an existing channel north of the Greenway Road alignment, 440 cfs flowing south along the west side of Litchfield Road and 439 cfs flowing southeasterly across the adjacent property west of the Roseview property and then through it.

At the Greenway Road alignment and Dysart Road intersection, the northeast corner of the Roseview property, the peak runoff from the off-site drainage area northwest of Roseview is 439 cfs and it combines with runoff (417 cfs) from the off-site drainage area north of the Roseview property for a total concentration of 856 cfs. The flow splits at the intersection with 171 cfs flowing south along the west side of Dysart Road (adjacent to the Roseview property) and the remaining flow (685 cfs) discharges onto Dysart Road, crossing it, and then flowing into the El Mirage Tributary Wash.

The off-site drainage area west of Litchfield Road concentrates at the intersection of Waddell Road and Litchfield Road (1305 cfs) and it also splits three ways with 435 cfs flowing to the south, southeast and to the east through the Roseview property.

The off-site drainage area between Litchfield Road and the Roseview area generates a 100-year 24-hour peak flow of 155 cfs and it concentrates at the southwest corner of the Roseview property. The three off-site peak flows, 435 cfs flowing east along Waddell Road, 439 cfs coming from the split at the Litchfield and Greenway intersection, and the 155 cfs for the area east of the Roseview property combine for a total of 1029 cfs at the intersection of Waddell Road and the mid-section line. The 1029 cfs then flows north along Waddell Road to the southeast corner of the Roseview property where it combines with the runoff from the off-site drainage area

north of Roseview area (171 cfs). The off-site flows then splits at the Waddell Road and Dysart Road intersection and discharges out of the Roseview property.

There is a ditch that runs adjacent to Dysart Road on the east side of the Roseview property that begins at the Greenway Road alignment and Dysart Road intersection. It runs the length of the Roseview property to Waddell Road and it appears to have been a tail water ditch used to drain the adjacent irrigated fields. The ditch is trapezoidal in shape with a three foot bottom width, two and a half to one side slope on the west side, two to one on the east and approximately three and a half feet deep. The ditch appears to be unmaintained and it is in poor condition showing significant signs of erosion on both side slopes. The longitudinal slope of the ditch is 0.36 percent and the maximum capacity is approximately 33.5 cfs. The maximum carrying capacity of the ditch appears to be significantly larger than 33.5 cfs because the left bank along Dysart Road is approximately one foot higher than the right bank. However, the maximum carrying capacity of the ditch has not been determined at time because the topographical survey has not been completed. See Figure V.8 in Appendix B.2 for the tail water ditch cross section and the discharge capacity calculations.

As mentioned earlier, the West Point Towne Center (WPTC) is being developed north of the Roseview area and the owners of WPTC will convey the off-site peak flow of 439 cfs (from the eastern split at Greenway and Litchfield Roads) to Dysart Road and the Greenway Road alignment by storm drain or open channel. The WPTC will then detain and meter the discharge of the peak flow to its natural flow path. The West Point Towne Center's proposed drainage system discharges an off-site peak flow of 439 cfs. Inspection of the HEC-1 Key Map for the White Tanks/Agua Fria Area Drainage Master Study and the FEMA Flood Insurance Rate Map indicates that the natural flow path and peak flows of the off-site runoff should have minimal to the northeast corner of the Roseview property. DMJM will continue to coordinate with David Evans & Associates (West Point Towne Center's consultant) and the City of Surprise to address the off-site drainage issues impacting the Roseview property at the Dysart Road and Greenway Road alignment intersection once the master drainage study is finalized and has been approved.

OBJECTIVES

- The objectives of the Preliminary Master Drainage Study Report are as follows:
- Determine the peak runoff flows from the 100-yr, 2-hr event for the Roseview Planned Area Development.
- Determine the peak runoff volume to be retained for the post developed conditions for the 100-yr, 2-hr storm event for the eight development phases.
- Drain the retention basin within 36 hours by incorporating dry wells into the retention basin design.
- Provide a preliminary drainage plan to drain the eight development phases into the retention basins.

PROCEDURES AND METHODOLOGIES

This section documents the procedures and methodologies used for hydrology, retention basin sizing and hydraulics within this report.

The City of Surprise has adopted the Flood Control District of Maricopa County's (FCDMC) Drainage Design Manual for Maricopa County, Arizona - Volume 1. The FCDMC through its drainage policies, ordinances, and retention basin requirements for proposed developments will require that the proposed Roseview Planned Area Development retain the 100-yr, 2-hr event for the proposed conditions.

A. EXISTING CONDITIONS HYDROLOGY

The following lists the procedures, methodologies and standards that were used to develop the hydrologic model (HEC-1) for the existing conditions drainage for the Roseview PAD project.

1. Standards Used

- Drainage Design Manual for Maricopa County, Arizona - Volume 1, Hydrology was used to develop the hydrological parameters.
- HEC-1 was used for the hydrological computations.
- Drainage Design Menu System (DDMS) version 1.1 was used to develop the HEC-1 model.
- Rainfall loss parameters were calculated using the Green and Ampt infiltration equation. Loss parameters were obtained from the Soil Conservation Service's soil survey of Maricopa County Central Part II supplied by the FCDMC's Geographic Information Systems (GIS) group in digital format.
- Land use types were derived based on present usage for the existing conditions HEC-1 model.
- Land use types for the future development conditions were derived from the proposed Roseview Planned Area Development.
- The Clark Unit Hydrograph method was used to calculate the peak runoff flows.

2. HEC-1 Parameters

a. Watershed Delineation. The on-site drainage area was delineated using the proposed Roseview PAD plan and field reconnaissance to verify the overall delineation. Microstation was used to determine the on-site drainage areas for each phase.

b. Time of Concentration. The flow path for obtaining the time of concentration was determined by: 1) taking into account variables such as, the longest flow path and the flow path that appear to carry the majority of the runoff flows; 2) making field visits to approximate actual flow paths adjacent to and through the Roseview property and 3) using USGS quadrangle topographic mapping. Using the these three components, the concentration point was determined to be at the lowest elevation where the flow path outlets the drainage area. Flow path, elevation, length and slope were estimated from the topographic mapping.

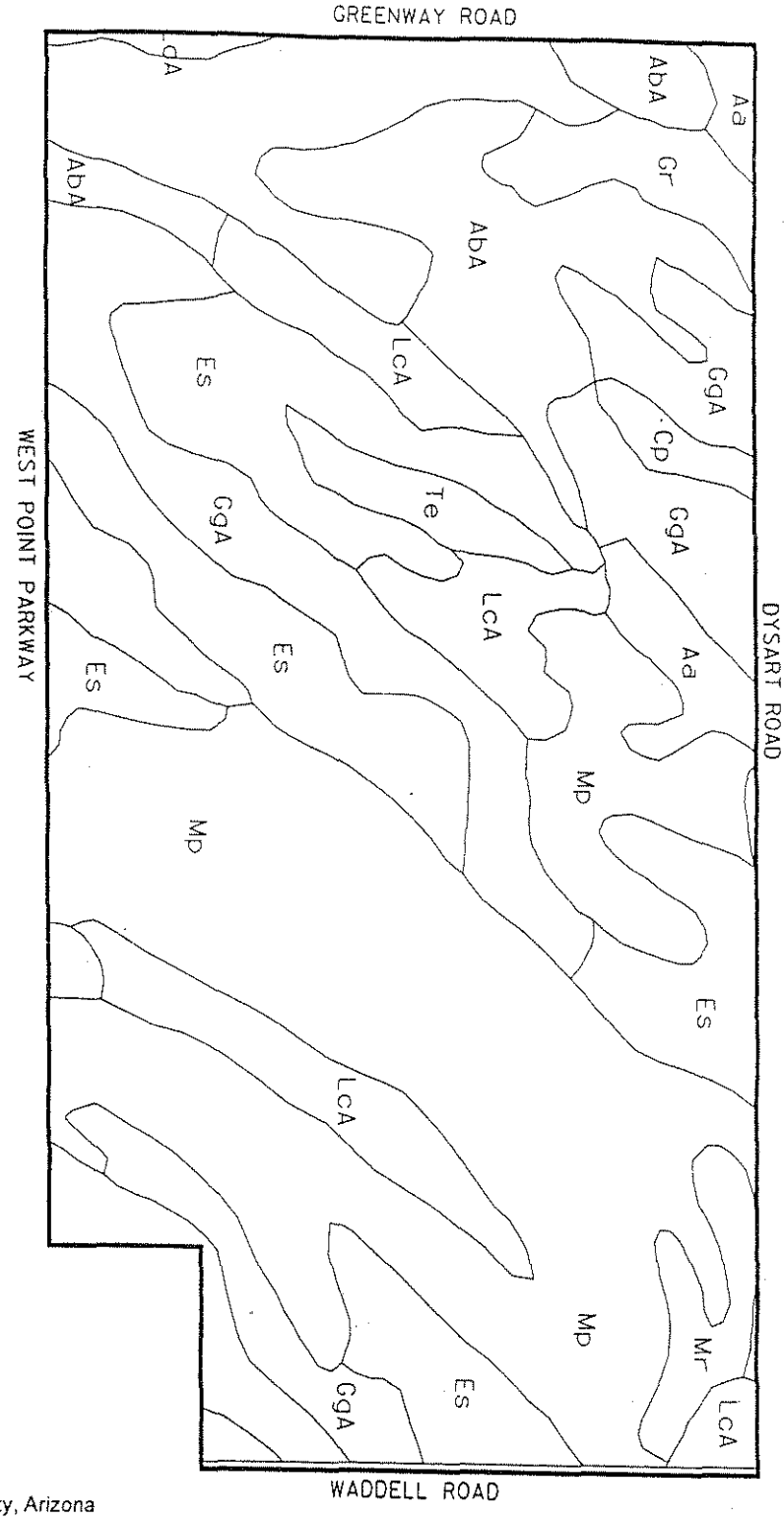
c. Rainfall. The precipitation depths were estimated using the NOAA ATLAS II isopluvial maps. The PREFRE program provided with DDMS was used to calculate the return year rainfall depths. The 100 year 6-hour rainfall depth was determined by using the storm distribution pattern number 1.4 with an aerial reduction factor of .987. The rainfall depth for the 100-yr, 6-hr storm is 3.18 inches. The 100-yr, 2-hr precipitation depth is 2.73 inches.

e. Soils Type. The soil types for the on-site drainage area is shown in Figure V.5 (Soil Survey Map) on page 15. Soil types were identified by merging of the Soil Conservation Service's soil survey of Maricopa County Central Part II with the Roseview PAD digital file. The soil type areas were calculated by using area measurement in Microstation. The soils types and the corresponding loss rate parameters were identified within the DDMS software and determined from default lookup tables included within the software. A breakdown of the soils types per subbasin and the Green Ampt Loss rates associated with the soils type are listed in Table 2 on page 17.

f. Land Use. The land use for the subbasins were determined by their present use for the existing condition model. For the present condition the land use is agricultural even though it is zoned for residential. Figure V.6 on page 16 shows the land usage for existing conditions and Table 2 on page 17 the associated Green Ampt loss rates.

3. HEC-1 Data Input

The HEC-1 data input was created by DDMS and the default lookup tables. Table 2 on page 17 lists the area weighted loss rates associated with the soil types and land usage calculated by the DDMS program that was input into the HEC-1 model. Located in Appendix B.1 is the printout (Printout AR-EXT.DAT) of the HEC-1 data input and output for the existing conditions.



LEGEND

- Aa - Agualt Loam
- Aba - Antho Sandy Loam 0-1% slopes
- Cp - Coolidge Sandy Loam
- Es - Estrella Loam
- GgA - Gilman Loam 0-1% slopes
- Gr - Glenbar Loam
- LcA - Laveen Loam 0-1% slopes
- Mp - Mahall Loam
- Mr - Mahall Clay Loam
- Te - Tremant Loam
- Tw - Tucson Clay Loam

NORTH

Source: Soil Survey for Central Maricopa County, Arizona
US Department of Agriculture Soil Conservation Service, 1972

200 0 200 400'
SCALE: 1"=200'

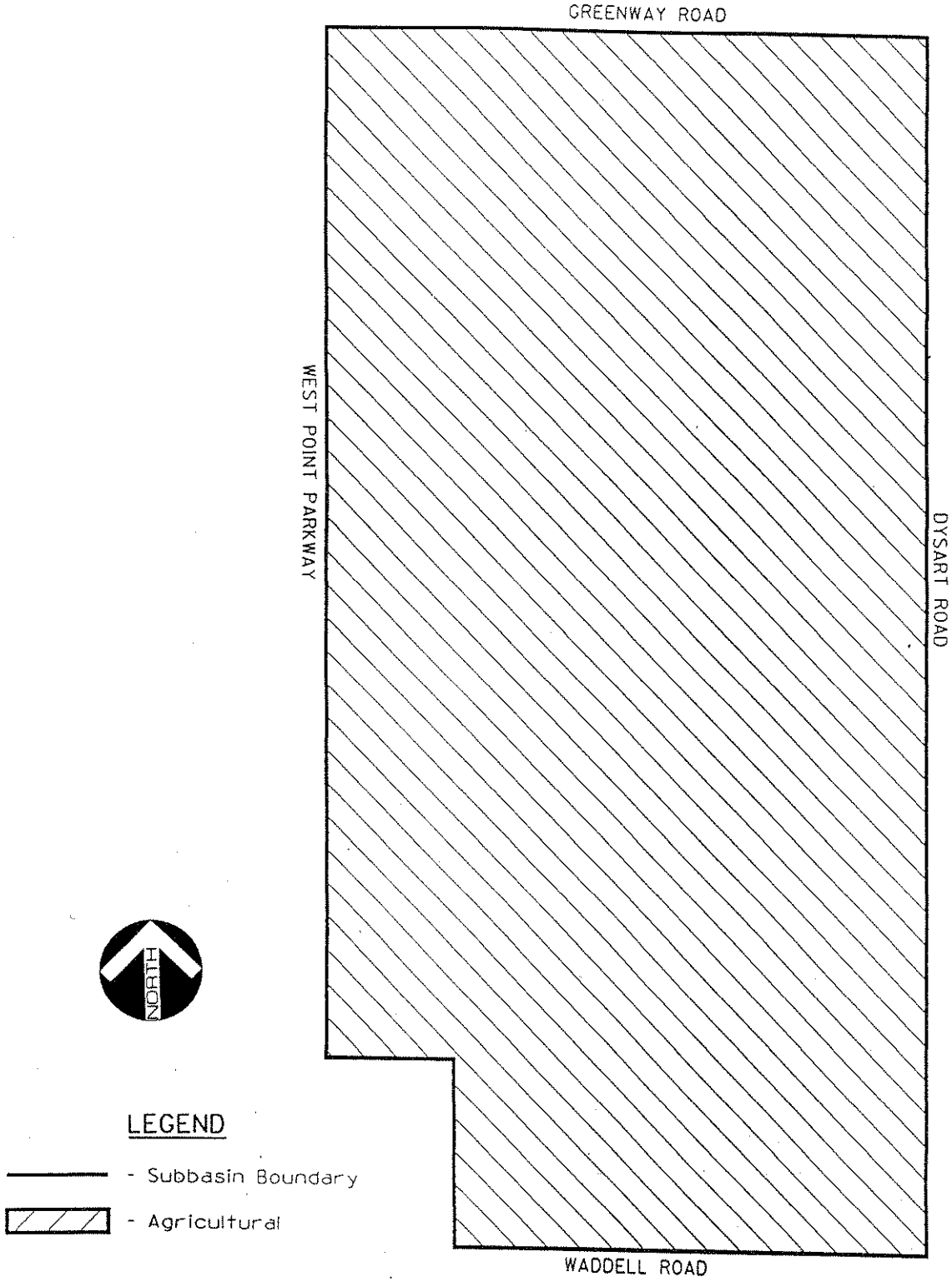
soil survey map

FIGURE V.5

DMJM

Daniel, Mann, Johnson, & Mendenhall
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

WEST POINT TOWNE CENTER



existing conditions land use map

DMJM

Daniel, Mann, Johnson, & Mendenhall
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013-3499
Telephone: 602/264-0217
Fax: 602/285-1984

FIGURE V.6

TABLE 2

SUBBASIN INPUT PARAMETERS FOR EXISTING CONDITIONS

SUBBASIN #	TOTAL AREA SQ. MI.	TOTAL AREA ACRE	SOILS MAP UNIT	SOILS AREA ACRE	ADJ. XKSAT	PSIF	WEIGHTED DTHETA	LAND USE TYPE	LAND USE AREA SQ.MI.	IA	KB ROUGHNESS TYPE	RTIMP %
DA1	0.500	320.00	Aa	6.8	0.360	4.80	0.250	AGRICULTURAL	320	0.50	0.87	0.0
			AbA	28.7								
			Cp	2.4								
			Es	53.6								
			GgA	70.4								
			Gr	6.4								
			LcA	39.7								
			Mp	97.6								
			Mr	5.7								
			Te	4.4								
			Tw	4.3								

B. RETENTION BASIN SIZING

The Roseview PAD will be divided and constructed in eight phases. All eight of the retention basins will be sized to retain the 100-year 2-hour peak runoff volume. Since each of the eight phases are less than 160 acres in size and there is no routing between the retention basins, the volume calculation for retention basin sizing were based on equation 3-4 from the FCD's Drainage Design Manual for Maricopa County, Arizona - Volume 1, Hydrology. The volume equation used is:

$$V = C * (P/12) * A$$

Where:

V = Required volume to retain in acre feet.

C = Rational runoff coefficient

P = The 100-year 2-hour precipitation depth in inches.

A = The drainage area in acres.

A runoff coefficient (0.69 for single family homes) was taken from Table 3.2 and the precipitation depth (P = 2.73 inches) from Figure 3.3 from the FCDMC's Drainage Design Manual for Maricopa County, Arizona - Volume 1. FCDMC Table 3.2 and FCDMC Figure 3.3 are located in Appendix B.2.

C. DRAINING RETENTION BASIN

Discharging the on-site runoff into the El Mirage Tributary Wash would require raising Dysart Road and regrading of the El Mirage Tributary Wash, therefore dry wells will be used to drain the retention basins. The number of the dry wells will be calculated so that the retention basins drains within the 36 hours.

Dry well calculations are based on manufacturer's product catalog recommendations. The equation used to calculate the total peak flow to drain the retention basin is:

$$\mathbf{Q_T = V/(T \times 3600)}$$

Where:

Q_T = Total peak flow to drain retention basin in cubic feet per second.

V = Volume retained in cubic feet.

T = Time required to drain retention basin in hours.

The minimum number of dry wells required were calculated by the equation:

$$\mathbf{N = (Q_T * 2^{*}) / P_R}$$

Where:

N = Minimum number of dry wells required.

Q_T = Total peak flow to drain retention basin in cubic feet per second.

P_R = Manufacturer's recommended percolation factor for individual dry wells in cubic feet per second.

*Note: *The number two is the derating factor for dry well aging.*

CONCLUSIONS

The 100-yr 2-hr existing condition peak runoff from the Roseview PAD is 337 cfs.

The retention volume requirements for the eight phases are shown below in Table 3.

TABLE 3.

Summary of 100-Year 2-Hour Runoff Volume Calculations

PHASE	Size (ac)	Volume (ac-ft)
1/3	72.78	11.7
2/4	75.39	12.2
5/6	69.63	11.2
7/8	71.20	11.5
TOTAL	289.20	46.6

DESIGN RECOMMENDATIONS

A. RETENTION BASIN SIZING

The retention basin will be designed to retain the full 100-year, 2-hour peak runoff volumes, they will have four to one side slopes and the water surface depth will not exceed 3 feet. The summary of the area reserved for detention/retention basins are listed below in Table 4.

TABLE 4.

Summary of Phasing Retention Basin Sizes

PHASE	Size (ac)
1/3	4.15
2/4	4.5
5/6	4.5
7/8	6.5

B. DRAINING RETENTION BASINS

Dry wells will be used to drain the retention basins within the 36 hour time requirement. A soils percolation test of the Roseview area will be required for the "Final Master Drainage Study" so that the required number of dry wells for each of the retention basins can be determined. The number of dry wells required for each retention basin will be calculated once the percolation test have been completed and documented in the Final Master Drainage Study.

C. PRELIMINARY DRAINAGE PLAN

The preliminary drainage plan shows the general direction that the Roseview PAD will be graded. A more detailed grading and drainage plan will be included with the "Final Master Drainage Study" after the topographical survey has been completed.

HYDROLOGIC AND HYDRAULIC ANALYSIS

A. EXISTING CONDITIONS HYDROLOGY

The existing conditions hydrologic calculations are shown in Appendix B.1 and in the HEC-1 computer output hardcopies.

The following lists the HEC-1 models included in Appendix B.1:

AR-EXT.DAT	Models the existing 100-yr, 6-hr conditions.
AR-OFF24.DAT	Models the existing 100-yr, 24-hr conditions.

B. RETENTION BASIN SIZING/DRAINING CALCULATIONS

The proposed retention basin calculations and hydraulic analyses are shown in Appendix B.2. The number of dry wells required for each retention basin will be determined in the "Final Master Drainage Study" when the percolation tests have been completed.

The following lists the hydraulic calculations included in Appendix B.2:

Figure V.8	Flowmaster sheet showing maximum carrying capacity of the tail water ditch.
FCDMC Table 3.2	C coefficients used with the Rational Method to calculate the amount of runoff volume required to retain.
FCDMC Figure 3.3	100-year 2-hour precipitation depth used with the Rational Method to calculate the amount of runoff volume required to retain.
Table 5	Excel spread sheet that calculates the peak runoff volume required to retain; ARENA.XLS.
Table 6	Excel spread sheet that calculates the maximum volume capacity of the proposed retention basins; ARENA.XLS.

REFERENCES

1. Flood Control District of Maricopa County. Drainage Design Manual for Maricopa County Volume I Hydrology. January 1, 1995.

2. Flood Control District of Maricopa County. Drainage Design Manual for Maricopa County Volume II Hydraulics. September 1, 1992.

3. Flood Control District of Maricopa County. SOIL SURVEY OF MARICOPA COUNTY ARIZONA. in digital format. September 1996.

4. Flood Insurance Rate Map Panel No. 2080 of 4350 No. 04013C1605F. September 30, 1995.

B.1 EXISTING CONDITIONS HEC-1 MODEL

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*             VERSION 4.0              *
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*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 756-1104             *
*                                      *
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XXXXXXX  XXXX     X        XXXXX  X
X     X  X        X              X
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X     X  XXXXXXX   XXXXX         XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

THE DEFINITIONS OF VARIABLES -RTIMP- AND -RTIOR- HAVE CHANGED FROM THOSE USED WITH THE 1973-STYLE INPUT STRUCTURE.
THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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  2           ID
  3           ID   ARENA EXISTING CONDITIONS 100-YEAR 6-HOUR
  4           ID
  5           ID   DDM MCUHP1 ARENA
  6           IT       5                    300
  7           IO       3
              * DDM   ***** Updated *****

  8           KK     DA1
  9           KM   SUB-BASIN DA1
 10           KM   6-HOUR RAINFALL, PATTERN NO. 1.40 WAS USED TO FIND TC & R FOR THIS BASIN
 11           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
 12           KM     L =  .95  Kb = .087  Adj. Slope =   26.0
 13           BA    .450
 14           IN      15
 15           KM   RAINFALL DEPTH OF 3.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
 16           PB   3.158
 17           KM   THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.40
 18           PC    .000    .008    .016    .025    .033    .041    .050    .058    .066    .075
 19           PC    .087    .099    .119    .148    .230    .407    .778    .881    .919    .945
 20           PC    .957    .968    .980    .990   1.000
 21           LG    .500    .250   4.800    .360    .000
 22           UC   1.075    .571
 23           UA       0       3       5       8      12      20      43      75      90      96
 24           UA     100
 25           ZZ
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*           SEPTEMBER 1990             *                    *   HYDROLOGIC ENGINEERING CENTER      *
*            VERSION 4.0               *                    *         609 SECOND STREET            *
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* RUN DATE  06/09/1997  TIME  08:32:38 *                    *          (916) 756-1104              *
*                                      *                    *                                      *
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                        AR-EXT.DAT

                        ARENA EXISTING CONDITIONS 100-YEAR 6-HOUR

                        DDM MCUHP1 ARENA

  7 IO          OUTPUT CONTROL VARIABLES
                      IPRNT          3  PRINT CONTROL
                      IPLOT          0  PLOT CONTROL
                      QSCAL         0.  HYDROGRAPH PLOT SCALE

    IT          HYDROGRAPH TIME DATA
                       NMIN          5  MINUTES IN COMPUTATION INTERVAL
                      IDATE      1    0  STARTING DATE
                      ITIME       0000  STARTING TIME
                         NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                     NDDATE      2    0  ENDING DATE
                     NDTIME       0055  ENDING TIME
                      ICENT         19  CENTURY MARK

                COMPUTATION INTERVAL     .08 HOURS
                     TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT


*** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** *** ***


          **************
          *            *
  8 KK    *       DA1  *
          *            *
          **************
                        SUB-BASIN DA1
                        6-HOUR RAINFALL, PATTERN NO. 1.40 WAS USED TO FIND TC & R FOR THIS BASIN
                        THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .987
                          L =  .95  Kb = .087  Adj. Slope =   26.0
                        RAINFALL DEPTH OF 3.20 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
                        THE FOLLOWING PC RECORD USED A 6-HOUR STORM WITH A PATTERN No. OF 1.40

 14 IN          TIME DATA FOR INPUT TIME SERIES
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                     JXDATE      1    0  STARTING DATE
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                JXTIME          0  STARTING TIME

            SUBBASIN RUNOFF DATA

13 BA         SUBBASIN CHARACTERISTICS
                TAREA         .45  SUBBASIN AREA

              PRECIPITATION DATA

17 PB           STORM        3.16  BASIN TOTAL PRECIPITATION

17 PI         INCREMENTAL PRECIPITATION PATTERN
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00      .00      .01      .01      .01      .01      .01      .01      .03
                .03      .03      .06      .06      .06      .12      .12      .12      .03      .03
                .03      .01      .01      .01      .01      .01      .01      .00      .00      .00
                .00      .00      .00      .00      .00      .00      .00      .00      .00      .00
                .00      .00

21 LG         GREEN AND AMPT LOSS RATE
                STRTL         .50  STARTING LOSS
                  DTH         .25  MOISTURE DEFICIT
                 PSIF        4.80  WETTING FRONT SUCTION
                XKSAT         .36  HYDRAULIC CONDUCTIVITY
                RTIMP         .00  PERCENT IMPERVIOUS AREA

22 UC         CLARK UNITGRAPH
                   TC        1.08  TIME OF CONCENTRATION
                    R         .57  STORAGE COEFFICIENT

23 UA         ACCUMULATED-AREA VS. TIME,  11 ORDINATES
                  .0       3.0       5.0       8.0      12.0      20.0      43.0      75.0      90.0      96.0
               100.0

                                                  ***

                                          UNIT HYDROGRAPH PARAMETERS
                                     CLARK   TC=  1.08 HR,       R=   .57 HR
                                    SNYDER   TP=   .87 HR,      CP=   .87

                                            UNIT HYDROGRAPH
                                        45 END-OF-PERIOD ORDINATES
            6.       14.       21.       28.       38.       53.       90.      154.      238.      293.
          298.      283.      261.      232.      201.      173.      150.      129.      112.       97.
           83.       72.       62.       54.       46.       40.       35.       30.       26.       22.
           19.       17.       14.       12.       11.        9.        8.        7.        6.        5.
            4.        4.        3.        3.        2.

   ***          ***          ***          ***          ***

                  HYDROGRAPH AT STATION      DA1

  TOTAL RAINFALL =    3.16, TOTAL LOSS =    1.91, TOTAL EXCESS =    1.25

PEAK FLOW     TIME                          MAXIMUM AVERAGE FLOW
  (CFS)       (HR)                  6-HR       24-HR       72-HR     24.92-HR
   337.       4.75        (CFS)      60.         15.         14.         14.
                         (INCHES)   1.241       1.241       1.241       1.241
                         (AC-FT)     30.         30.         30.         30.

                         CUMULATIVE AREA =     .45 SQ MI
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	DA1	337.	4.75	60.	15.	14.	.45		

*** NORMAL END OF HEC-1 ***

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*   HYDROLOGIC ENGINEERING CENTER      *
*         609 SECOND STREET            *
*      DAVIS, CALIFORNIA 95616         *
*          (916) 551-1748              *
*                                      *
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X     X  X        X               X
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X     X  XXXXXXX   XXXXX          XXX
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THIS PROGRAM REPLACES ALL PREVIOUS VERSIONS OF HEC-1 KNOWN AS HEC1 (JAN 73), HEC1GS, HEC1DB, AND HEC1KW.

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THE DEFINITION OF -AMSKK- ON RM-CARD WAS CHANGED WITH REVISIONS DATED 28 SEP 81. THIS IS THE FORTRAN77 VERSION
NEW OPTIONS: DAMBREAK OUTFLOW SUBMERGENCE , SINGLE EVENT DAMAGE CALCULATION, DSS:WRITE STAGE FREQUENCY,
DSS:READ TIME SERIES AT DESIRED CALCULATION INTERVAL LOSS RATE:GREEN AND AMPT INFILTRATION
KINEMATIC WAVE: NEW FINITE DIFFERENCE ALGORITHM

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  2           ID
  3           ID   ARENA EXISTING CONDITIONS 100-YEAR 24-HOUR
  4           ID
  5           ID   DDM MCUHP1 Adjacent off-site drainage 24-hour storm
  6           IT       5                    300
  7           IO       5
              * DDM   ***** Updated *****

  8           KK     DA1
  9           KM   SUB-BASIN DA1
 10           KM   24-HOUR SCS TYPE II RAINFALL WAS USED TO FIND TC & R FOR THIS BASIN
 11           KM   THIS BASIN USED RAINFALL REDUCTION FACTOR OF  .994
 12           KM     L =  .95  Kb = .087  Adj. Slope =   26.0
 13           BA    .494
 14           IN      15
 15           KM   RAINFALL DEPTH OF 3.18 WAS SPACIALLY REDUCED AS SHOWN BY THE PB RECORD
 16           PB   3.161
 17           KM   THE FOLLOWING PC RECORD USED A 24-HR SCS TYPE II STORM
 18           PC    .000    .002    .005    .008    .011    .014    .017    .020    .023    .026
 19           PC    .029    .032    .035    .038    .041    .044    .048    .052    .056    .060
 20           PC    .064    .068    .072    .076    .080    .085    .090    .095    .100    .105
 21           PC    .110    .115    .120    .126    .133    .140    .147    .155    .163    .172
 22           PC    .181    .191    .203    .218    .236    .257    .283    .387    .663    .707
 23           PC    .735    .758    .776    .791    .804    .815    .825    .834    .842    .849
 24           PC    .856    .863    .869    .875    .881    .887    .893    .898    .903    .908
 25           PC    .913    .918    .922    .926    .930    .934    .938    .942    .946    .950
 26           PC    .953    .956    .959    .962    .965    .968    .971    .974    .977    .980
 27           PC    .983    .986    .989    .992    .995    .998   1.000
 28           LG    .500    .250   5.100    .400    .000
 29           UC   1.396    .769
 30           UA      0       3       5       8      12      20      43      75      90      96
 31           UA    100
 32           ZZ
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```
****************************************
*                                      *
*   FLOOD HYDROGRAPH PACKAGE  (HEC-1)  *
*              MAY   1991              *
*           VERSION 4.0.1E             *
*                                      *
*  RUN DATE  10/07/96  TIME  08:33:01  *
*                                      *
****************************************
```

```
****************************************
*                                      *
*    U.S. ARMY CORPS OF ENGINEERS      *
*    HYDROLOGIC ENGINEERING CENTER     *
*          609 SECOND STREET           *
*       DAVIS, CALIFORNIA 95616        *
*           (916) 551-1748             *
*                                      *
****************************************
```

```
                    AR-OFF24.DAT

                    ARENA EXISTING CONDITIONS 100-YEAR 24-HOUR

                    DDM MCUHP1 Adjacent off-site drainage 24-hour storm

  7 IO        OUTPUT CONTROL VARIABLES
                   IPRNT          5  PRINT CONTROL
                   IPLOT          0  PLOT CONTROL
                   QSCAL         0.  HYDROGRAPH PLOT SCALE

   IT         HYDROGRAPH TIME DATA
                    NMIN          5  MINUTES IN COMPUTATION INTERVAL
                   IDATE      1    0  STARTING DATE
                   ITIME       0000  STARTING TIME
                      NQ        300  NUMBER OF HYDROGRAPH ORDINATES
                  NDDATE      2    0  ENDING DATE
                  NDTIME       0055  ENDING TIME
                   ICENT         19  CENTURY MARK

             COMPUTATION INTERVAL    0.08 HOURS
                  TOTAL TIME BASE   24.92 HOURS

        ENGLISH UNITS
             DRAINAGE AREA         SQUARE MILES
             PRECIPITATION DEPTH   INCHES
             LENGTH, ELEVATION     FEET
             FLOW                  CUBIC FEET PER SECOND
             STORAGE VOLUME        ACRE-FEET
             SURFACE AREA          ACRES
             TEMPERATURE           DEGREES FAHRENHEIT
```

RUNOFF SUMMARY
FLOW IN CUBIC FEET PER SECOND
TIME IN HOURS, AREA IN SQUARE MILES

OPERATION	STATION	PEAK FLOW	TIME OF PEAK	AVERAGE FLOW FOR MAXIMUM PERIOD 6-HOUR	24-HOUR	72-HOUR	BASIN AREA	MAXIMUM STAGE	TIME OF MAX STAGE
HYDROGRAPH AT	DA1	155.	13.00	33.	8.	8.	0.49		

*** NORMAL END OF HEC-1 ***

B.2 RETENTION BASIN SIZING/DRAINING CALCULATIONS

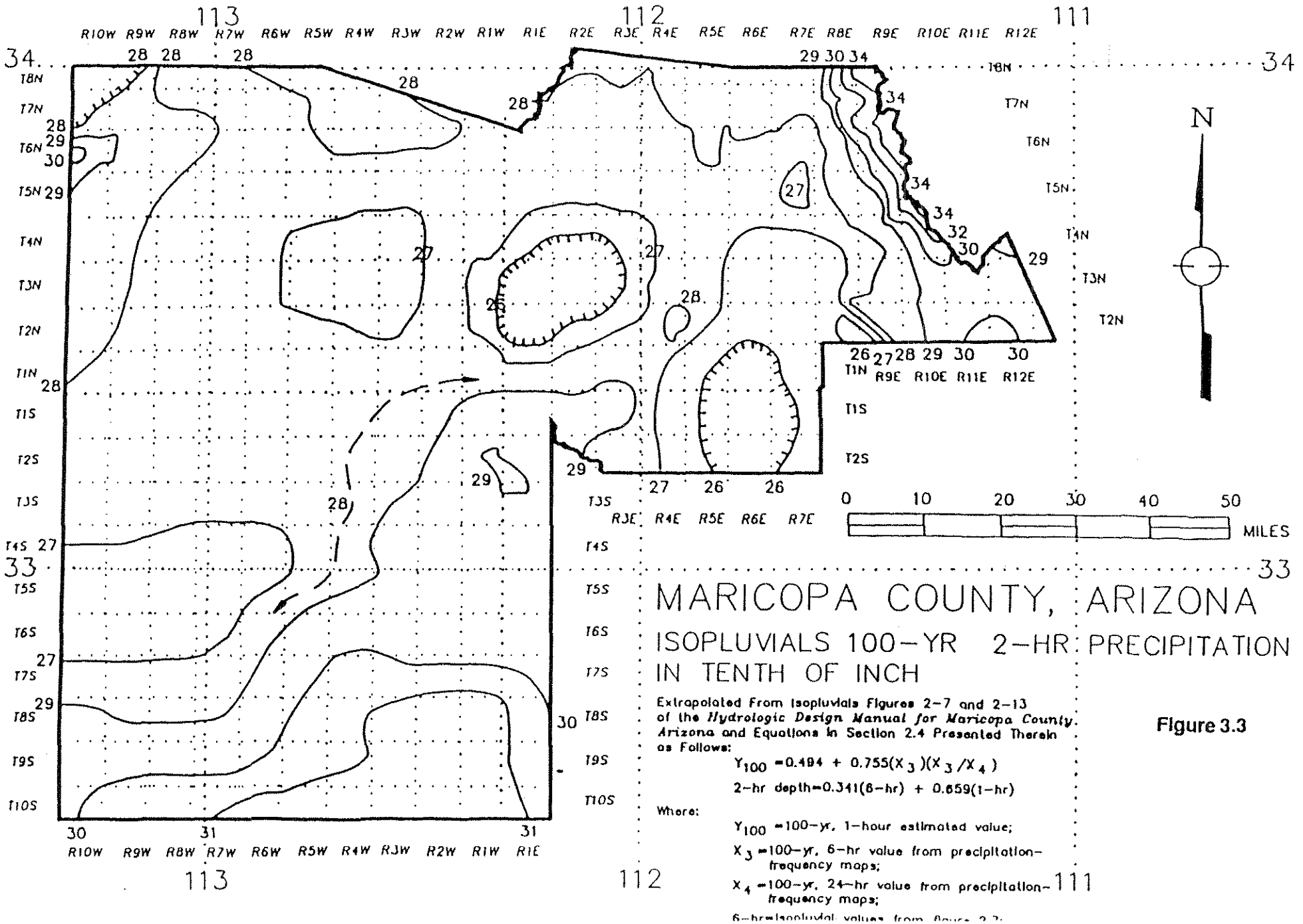
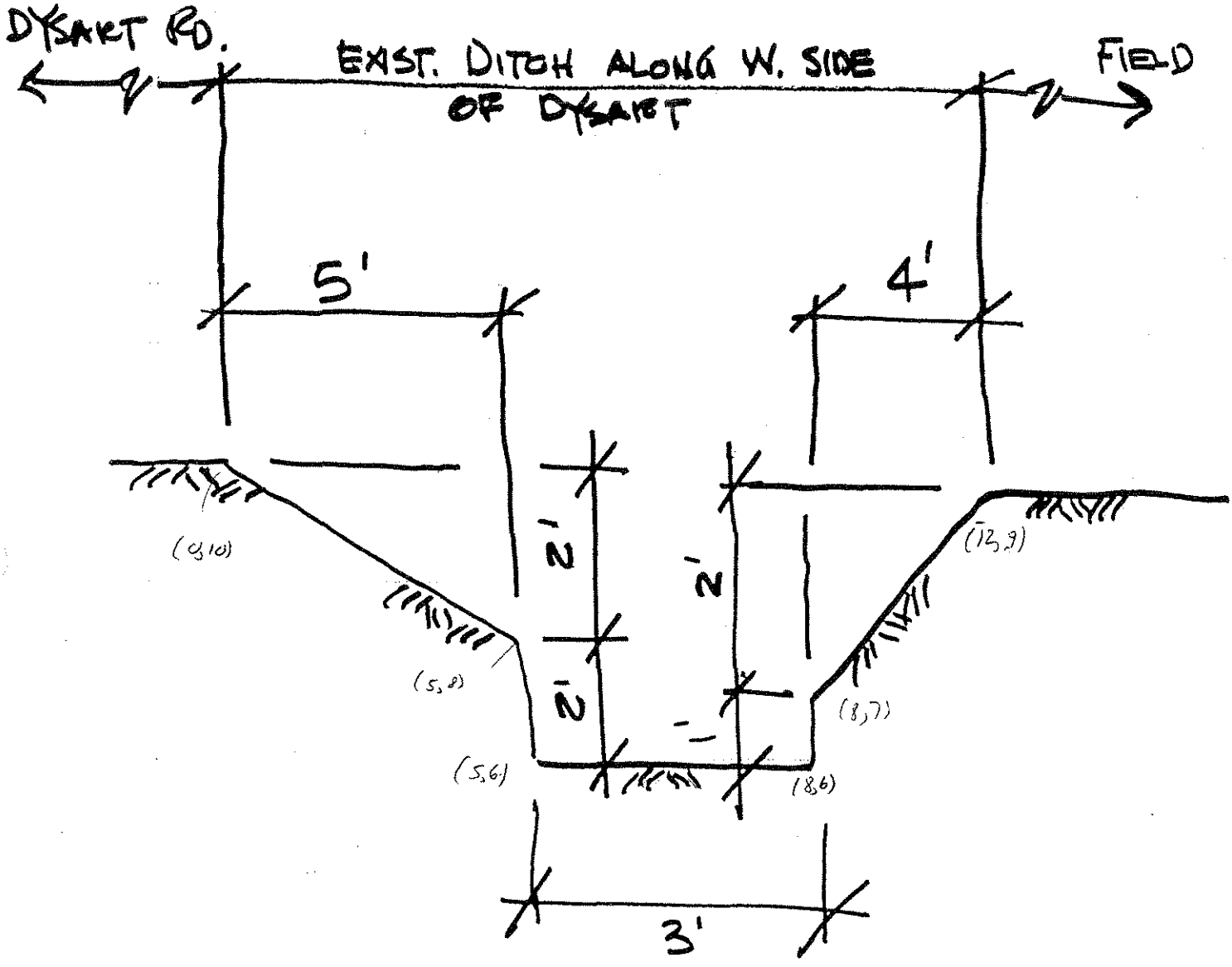

MARICOPA COUNTY, ARIZONA
ISOPLUVIALS 100-YR 2-HR PRECIPITATION
IN TENTH OF INCH
Extrapolated From Isopluvials Figures 2-7 and 2-13 of the Hydrologic Design Manual for Maricopa County, Arizona and Equations in Section 2.4 Presented Therein as Follows:
$Y_{100} = 0.494 + 0.755(X_3)(X_3/X_4)$
2-hr depth=0.341(6-hr) + 0.659(1-hr)
Where:
Y_{100} =100-yr, 1-hour estimated value;
X_3 =100-yr, 6-hr value from precipitation-frequency maps;
X_4 =100-yr, 24-hr value from precipitation-frequency maps;
N
0 10 20 30 40 50
MILES
113
112
111
34
33
R10W R9W R8W R7W R6W R5W R4W R3W R2W R1W R1E R2E R3E R4E R5E R6E R7E R8E R9E R10E R11E R12E
T8N T7N T6N T5N T4N T3N T2N T1N T1S T2S T3S T4S T5S T6S T7S T8S T9S T10S

Figure 3.3

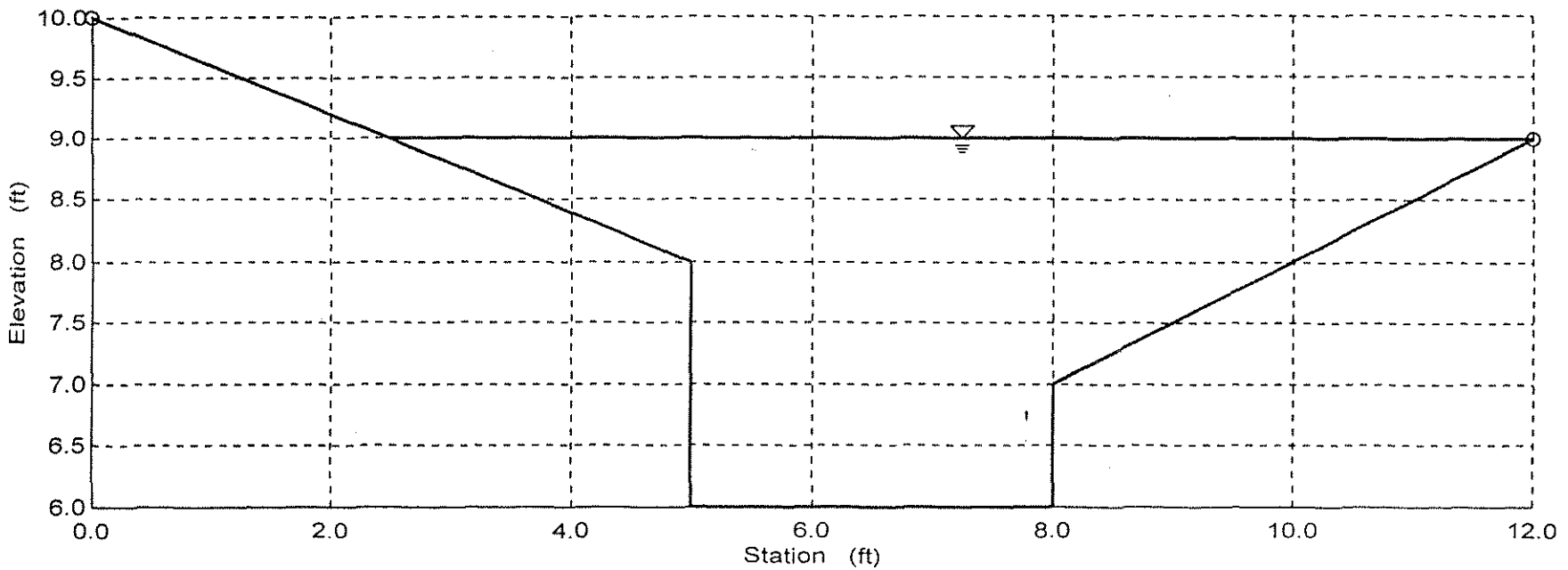
DMJM	PROJECT: ARENA P.A.D.	JOB NO. 0531.10	Y.8
		DESIGNED BY BC	DATE 9.30.96
SUBJECT: Tail Water Cross-Section		CHECKED BY	DATE



Cross Section for Irregular Channel

Project Description	
Project File	f:\proj\6531\hyd\arena.fm2
Worksheet	TAILWATER DITCH W. OF DYSART ROAD
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Section Data		
Wtd. Mannings Coefficient	0.040	
Channel Slope	0.003600	ft/ft
Water Surface Elevation	9.00	ft
Discharge	33.48	cfs



Maximum Capacity Calc
Worksheet for Irregular Channel

Project Description	
Project File	f:\proj\6531\hyd\arena.fm2
Worksheet	TAILWATER DITCH W. OF DYSART ROAD
Flow Element	Irregular Channel
Method	Manning's Formula
Solve For	Discharge

Input Data		
Channel Slope	0.003600	ft/ft
Water Surface Elevation	9.00	ft

Elevation range: 6.00 ft to 10.00 ft.

Station (ft)	Elevation (ft)	Start Station	End Station	Roughness
0.00	10.00	0.00	12.00	0.040
5.00	8.00			
5.00	6.00			
8.00	6.00			
8.00	7.00			
12.00	9.00			

Results		
Wtd. Mannings Coefficient	0.040	
Discharge	33.48	cfs
Flow Area	14.25	ft²
Wetted Perimeter	13.16	ft
Top Width	9.50	ft
Height	3.00	ft
Critical Depth	7.63	ft
Critical Slope	0.042367	ft/ft
Velocity	2.35	ft/s
Velocity Head	0.09	ft
Specific Energy	9.09	ft
Froude Number	0.34	
Flow is subcritical.		

Table 3.2
C Coefficients for Use with the Rational Method

Land Use	Return Period			
	2-10 Year	25 Year	50 Year	100 Year
Streets and Roads				
Paved Roads	0.75 – 0.85	0.83 – 0.94	0.90 – 0.95	0.94 – 0.95
Gravel Roadways & Shoulders	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Industrial Areas				
Heavy	0.70 – 0.80	0.77 – 0.88	0.84 – 0.95	0.88 – 0.95
Light	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
Business Areas				
Downtown	0.75 – 0.85	0.83 – 0.94	0.90 – 0.95	0.94 – 0.95
Neighborhood	0.55 – 0.65	0.61 – 0.72	0.66 – 0.78	0.69 – 0.81
Residential Areas				
(1) Lawns – Flat	0.10 – 0.25	0.11 – 0.28	0.12 – 0.30	0.13 – 0.31
– Steep	0.25 – 0.40	0.28 – 0.44	0.30 – 0.48	0.31 – 0.50
Suburban	0.30 – 0.40	0.33 – 0.44	0.36 – 0.48	0.38 – 0.50
Single Family	0.45 – 0.55	0.50 – 0.61	0.54 – 0.66	0.56 – 0.69
Multi-Unit	0.50 – 0.60	0.55 – 0.66	0.60 – 0.72	0.63 – 0.75
Apartments	0.60 – 0.70	0.66 – 0.77	0.72 – 0.84	0.75 – 0.88
(1) Parks/Cemetaries	0.10 – 0.25	0.11 – 0.28	0.12 – 0.30	0.13 – 0.31
Playgrounds	0.40 – 0.50	0.44 – 0.55	0.48 – 0.60	0.50 – 0.63
Agricultural Areas	0.10 – 0.20	0.11 – 0.22	0.12 – 0.24	0.13 – 0.25
Bare Ground	0.20 – 0.30	0.22 – 0.33	0.24 – 0.36	0.25 – 0.38
Undeveloped Desert	0.30 – 0.40	0.33 – 0.44	0.36 – 0.48	0.38 – 0.50
Mountain Terrain (Slopes > 10%)	0.60 – 0.80	0.66 – 0.88	0.72 – 0.95	0.75 – 0.95

Note: Values of C for 25, 50 and 100 Year were derived using frequency adjustment factors of 1.10, 1.20, and 1.25, respectively, with an upper limit of 0.95 for C for the 2-10 Year values.

(1) = NATURAL DESERT LANDSCAPING +/- 6/16/93

TABLE 5

100-Year 2-Hour Peak Runoff Volume Calculations

Retention basin	Phase 1	Phase 2	Phase 3	Phase 4
Area (ac)	72.78	75.59	69.63	71.2
P (in)	2.73	2.73	2.73	2.73
Rational Coeff. C	0.69	0.69	0.69	0.69
V (ac-ft)	**11.4**	**11.9**	**10.9**	**11.2**

$V = C * (P/12) * A$

TABLE 6

Retention Basin Volume Calculations

Retention Basins	Phase 1	Phase 2*	Phase 3	Phase 4
Floor Area (ac)	4.2	4.5	4.5	6.5
Depth (ft)	3.0	2.5	2.5	2.0
V (ac-ft)	12.5	11.3	11.3	13.0
Perimeter (ft)	2162	1665	2053	3681
Wedge Vol. (ac-ft)	0.9	0.5	0.6	0.7
Total Vol. (ac-ft)	**13.3**	**11.7**	**11.8**	**13.7**

V_{TOTAL} =Volume of floor + Volume of Wedge

* Phase 2 includes the interim condition where lots 47 through 62 (1.2 ac) are used for temporary storage until Phase 3 is constructed.

DMJM	PROJECT: JARO - ARENA	JOB NO. 658101	SHEET of
		DESIGNED BY DBL	DATE 6-6-97
SUBJECT: ON-SITE RETENTION CALCS.		CHECKED BY	DATE

$C_{100\text{-}YR} = 0.69$ From pg 3-5 of FCDMC's Drainage Design Manual. Land use is Single Family Home.

DETENTION / RETENTION VOLUME CALCS.

$V = C(I/12)A$

V = Vol. in ac-ft

C = Rational Coefficient (0.69)

I = PRECIPITATION DEPTH of 2.8 inches From Figure 3.3

A = AREA IN ACRES.

Phase 1

A = 72.78 ac

$V = 0.69(2.8/12) \times 72.78 = \underline{11.7 \text{ ac-ft}}$

Phase 2

A = 75.59 ac

$V = 0.69(2.8/12) \times 75.59 = \underline{12.2 \text{ ac-ft}}$

Phase 3

A = 69.63 ac

$V = 0.69(2.8/12) \times 69.63 = \underline{11.2 \text{ ac-ft}}$

Phase 4

A = 71.20 ac

$V = 0.69(2.8/12) \times 71.20 = \underline{11.5 \text{ ac-ft}}$

B.3 PRELIMINARY DRAINAGE PLAN

Y:\653\arna\dwg\653drn2.dgn Dec. 01, 1997 12:09:52

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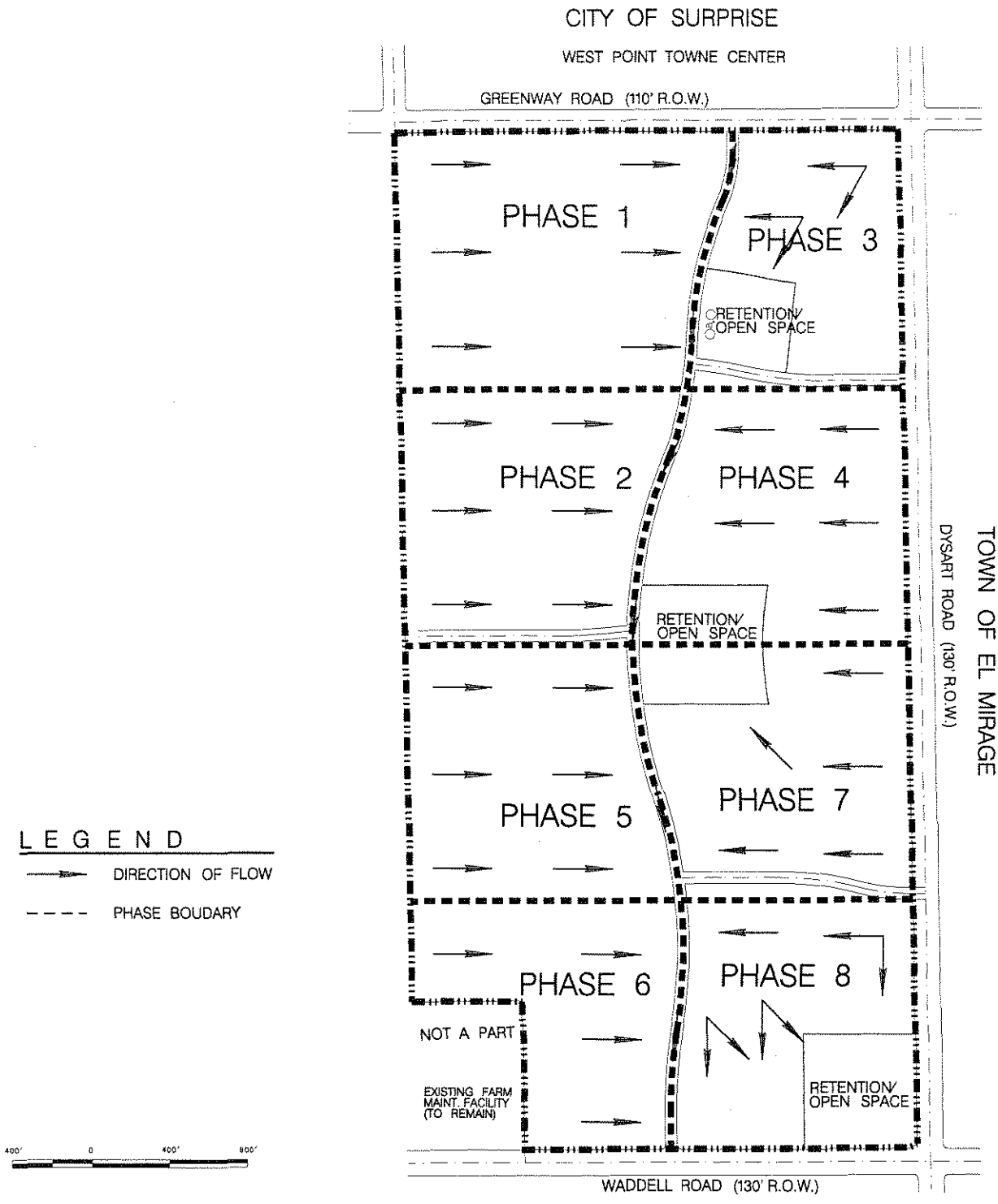

EXHIBIT V.9

DMJM ARIZONA INC.

PLANNING
ARCHITECTURE
ENGINEERING
LANDSCAPE ARCHITECTURE

300 W. CLARENDON AVE.
SUITE 400
PHOENIX, ARIZONA 85013
(602)264-0217
(602)264-1357

DATE APR 97
DESIGN BY PD
DRAWN BY SS

REFERENCE
22 AUG 97

TITLE
CONCEPTUAL DRAINAGE PLAN

PROJECT
ROSEVIEW P.A.D.

SURPRISE 320, L.L.C.
3200 N. CENTRAL AVE., STE. 2100
PHOENIX, AZ 85012
(602) 954-6300

PRELIMINARY
NOT FOR CONSTRUCTION OR RECORDING

APPENDIX C

FINAL TRAFFIC IMPACT ANALYSIS

Traffic Impact Analysis

FINAL TRAFFIC IMPACT ANALYSIS

ROSEVIEW PLANNED AREA DEVELOPMENT
CITY OF SURPRISE, ARIZONA

Prepared for:

Surprise 320 LLC
Phoenix, Arizona

Prepared By:
DMJM Arizona, Inc

June, 1997
Revised November, 1997
Revised April, 1998

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INTRODUCTION

This report summarizes the traffic impact analysis for the proposed Roseview Planned Area Development (P.A.D.) in the City of Surprise. The purpose of this analysis is to identify any potential traffic impacts associated with the proposed development and to identify measures to mitigate the impacts, if needed. This report was prepared according to the City of Surprise guidelines on "Traffic Impact Assessments for Project Development", listed in the Comprehensive Development Guide. This analysis addressed the Traffic Impact for the entire proposed development.

SITE LOCATION

The proposed Planned Area Development (P.A.D.) will be built on approximately 293 net acres. The parcel is located south of Greenway Road, north of Waddell Road, and west of Dysart Road. Except for a 10.4-acre portion in the southwest corner, the project comprises the entire east ½ of Section 10, R1W T3N. **Figure VI-1** shows the site location.

SITE PLAN

Figure VI-2 shows the proposed site plan including access points, internal circulation system, and surrounding roadways. Access to the site will be provided via five unrestricted collector streets. The street locations are as follows:

- Two streets on Dysart Road between Greenway Road and Waddell Road.
- One street on Waddell Road between Litchfield and Dysart Road.
- One street on Greenway Road between West Point Parkway and Dysart Road.

- One street stubbing out to the west at the mid-section line to connect into the future development in the west half of the section. Also an internal roadway system would be designed to facilitate travel between site parcels.

PROJECT DESCRIPTION

The proposed development will consist of a maximum of 1,500 single-family detached housing units and is scheduled to be built in eight phases on approximately 293 net acres.

STUDY AREA

The study area consists of the site access points, and the intersections of:

1. Greenway Road / Dysart Road
2. Dysart Road / Waddell Road
3. Greenway Road / West Point Parkway (T-intersection)

APPROACH

The following approach was developed in close coordination with the City of Surprise Engineering staff. It is structured to meet the City requirements on traffic impact assessments for the Roseview Planned Area Development (P.A.D.) as stated in the City Comprehensive Development Guide. Warrant analysis at key intersections will be conducted to determine the need of traffic signal. The traffic input study for "West Point Towne Center" (P.A.D. proposed just north of the subject site) was also reviewed for its impact on this project.

EXISTING TRAFFIC VOLUMES

Existing AM peak and PM peak-hour tuning movements counts were performed at the intersection of Dysart Road and Greenway Road, Dysart Road and Waddell Road on September 14, 1996. These counts are shown in **Figures VI- 3 and 4** respectively. Also a twenty four (24) hour traffic count was performed on Dysart Road between Greenway Road and Waddell Road.

EXISTING LEVEL OF SERVICE

A Level of Service (LOS) analysis was performed for the existing intersection to determine the existing operating conditions.. All level-of-service analysis in this study are based on the "Highway Capacity Manual" (TRB Special Report 209, 1996) and the Highway Capacity Software (HCM and HCS respectively). Level-of-service analysis is used to evaluate and quantify operating conditions and traffic congestion at intersections. At signalized and unsignalized intersections, level-of-service is measured in terms of the average vehicle delay. **Table VI-1** summarizes the result of the capacity analysis.

Existing AM and PM peak-hour operational level-of-service analyses at the study intersections were performed to assess the operating conditions. Table 1 summarizes the result of the capacity analysis.

TABLE VI-1. EXISTING LEVEL-OF -SERVICE (1996)

Unsignalized Intersection	**AM PEAK-HOUR**		**PM PEAK-HOUR**	
	SEC/VEH	**LOS**	**SEC/VEH**	**LOS**
Dysart @ Greenway				
WBL	6.5	B	5.2	B
SBL	2.8	A	0.3	A
Dysart @ Waddell Road				
EBL	7.1	B	6.1	B
WBT	10.4	C	5.9	B
NBL	2.9	A	0.1	A
SBL	2.9	A	0.3	A

Existing level-of-service is acceptable for all legs.

TRIP GENERATION

Trip generation for the proposed project was developed based on standard procedures set forth in Trip Generation Institute of Transportation Engineers (ITE), 5th Edition, 1991 (land-Use Code 210). Fitted curve equations were used to determine the project generated traffic volumes during the AM peak, and PM peak-hour and daily. **Table VI-2** summarizes the trip generation for the proposed P.A.D.

TABLE VI-2. SITE TRAFFIC GENERATION

Land Use	ITE Code	Size (Units)	Trip Rates[1] - Project Trips					
			Weekday AM Peak Hour			Weekday PM Peak Hour		
			In	Out	Total	In	Out	Total
Single Family Detached Housing	210	1,500	26%	74%	100%	65%	35%	100%
			220	624	844	808	434	1242

Land Use	ITE Code	Size (Units)	Trip Rates[1] - Project Trips		
			Daily		
			In	Out	Total
Single Family Detached Housing	210	1,500	50%	50%	100%
			6,250	6,250	12,500

[1] Based on the fitted curve values presented in the Institute if Transportation Engineers (ITE) Trip Generation, 5th Edition, 1991.

TRIP DISTRIBUTION

Due to the site location with respect to the junction of major highway (US 60), it was assumed that the distribution of the project related trips would be toward major employment centers. Therefore the following distribution was assumed:

- 50% To / From the Southeast (downtown Phoenix)
- 30% To / From the Northeast
- 10% To / From the Southwest
- 10% To / From the Northwest

It is noted that the majority of the trips (50%) have been distributed to the Southeast. This traffic is assumed travel on Greenway Road due to its connection with Grand Avenue (US 60). The AM and PM peak-hour project related trips are shown on **Figures VI-5 and 6** respectively.

PROJECTED TRAFFIC VOLUMES

Forecast Non-site Traffic Volumes

The horizon years for the site development are year 2002 (opening year for full occupancy) and year 2015. Traffic volumes for year 2015 were requested from the City of Surprise engineering staff, in return, the City engineering staff suggested that, for baseline traffic volumes at the intersection of Dysart Road and Greenway Road, we should use the "West Point Towne Center" traffic impact analysis prepared by David Evans and Associates and ten percent (10%) compound annual growth rate at the intersection of Dysart Road and Waddell Road. However, when the above suggestions were applied, there was a big difference in the number of vehicles departing Waddell Road and approaching Greenway Road and departing Greenway Road and approaching Waddell Road. Based on the above finding and getting the best results given the data available, the following steps were used in the analysis.

1. At the intersection of Dysart and Waddell Roads two annual growth rates of 10% and 5% were applied to the existing traffic volumes to obtain year 2002 and 2015 traffic volumes respectively.
2. Traffic volumes for years 2002 and 2015 at the intersection of Dysart and Greenway an annual growth rate of 10% and 5% were applied to the following movements:
    - South Bound Through and South Bound Left Turn Movements
    - North Bound Through and North Bound Right Turn Movements
    - West Bound Left Turn and West Bound Right Turn Movements.

summary level-of-service analysis is shown on **Table VI-4**. HCS summary reports are provided in the Technical Appendix.

As illustrated in **Table VI-4**, the majority of the movements at the key intersections will operate at an acceptable level-of-service (LOS). The proposed Project Area Development (P.A.D.) has little effect at the surrounding key intersections. As for the intersections providing access to the projects, all movements operate at an acceptable level-of-service with the exception of the NB left turn at the intersection of Greenway and Street A. This movement will operate at LOS F during the AM and PM peak hour in years 2002 and 2015. Also, the EB left turn movements at both Dysart Road and Street B and C will operate at LOS F. The failure of the above mentioned movements is due to the heavy through movements. It is noted that the failure of one movement at an unsignalized intersection does not necessarily warrant the installation of a signal.

ROADWAY IMPROVEMENTS

The following is a discussion of the roadway improvements needed for the surrounding roadways.

Dysart Road

The proposed reconstruction of Dysart Road as a six lane major divided arterial will be more than adequate for the forecasted traffic. The north bound and south bound approaches at the intersections of Greenway and Waddell Road will require a flared section to provide an exclusive left turn lane.

Greenway Road

Greenway Road is scheduled to be constructed as a five lane minor arterial. This section will handle the anticipated future traffic adequately. The east bound approach at the intersection of Dysart requires a flared section to provide an exclusive left turn lane. To provide a better level-of-service at the intersection of Dysart, it is recommended that a three through lanes with a right turn should be provided at both east bound and west bound approaches.

Waddell Road

Waddell Road is scheduled to be reconstructed to six lane major divided arterial. The proposed reconstruction will be adequate to handle the forecasted traffic volumes. The east bound and west bound approaches at the intersection of Dysart Road will require a flared section to provide an exclusive left turn lane.

West Point Parkway

After discussions with the City of Surprise Engineering staff it was agreed that West Point Parkway would **not** be extended south of Greenway.

CONCLUSION

The proposed Roseview Planned Area Development (P.A.D.) can be supported by the existing roadway network provided the mitigations recommended are implemented. The traffic analysis was based on information from the master plan prepared for this site. Several of the assumptions used in the analysis are based on motorists following desirable travel paths. Due to the relatively close proximity to US 60, this development is expected to generate and attract the majority of its users from the Southeast (Phoenix). It is expected to generate a total of 12,500 daily trips of which 844 will occur during the AM peak hour and 1,242 will occur during the PM peak hour. The warrant analysis for year 2002 without the project indicated that the proposed P.A.D. has little effect on the intersections in question and it also indicated that signals are warranted at the analyzed intersections. It is noted that the traffic signal requirements at the intersections of Dysart / Greenway Road, Dysart / Waddell Road and Greenway Road / West Point Parkway are not required entirely by the proposed Roseview P.A.D., but rather by a combination of this site and the rapid growth expected in the surrounding areas.

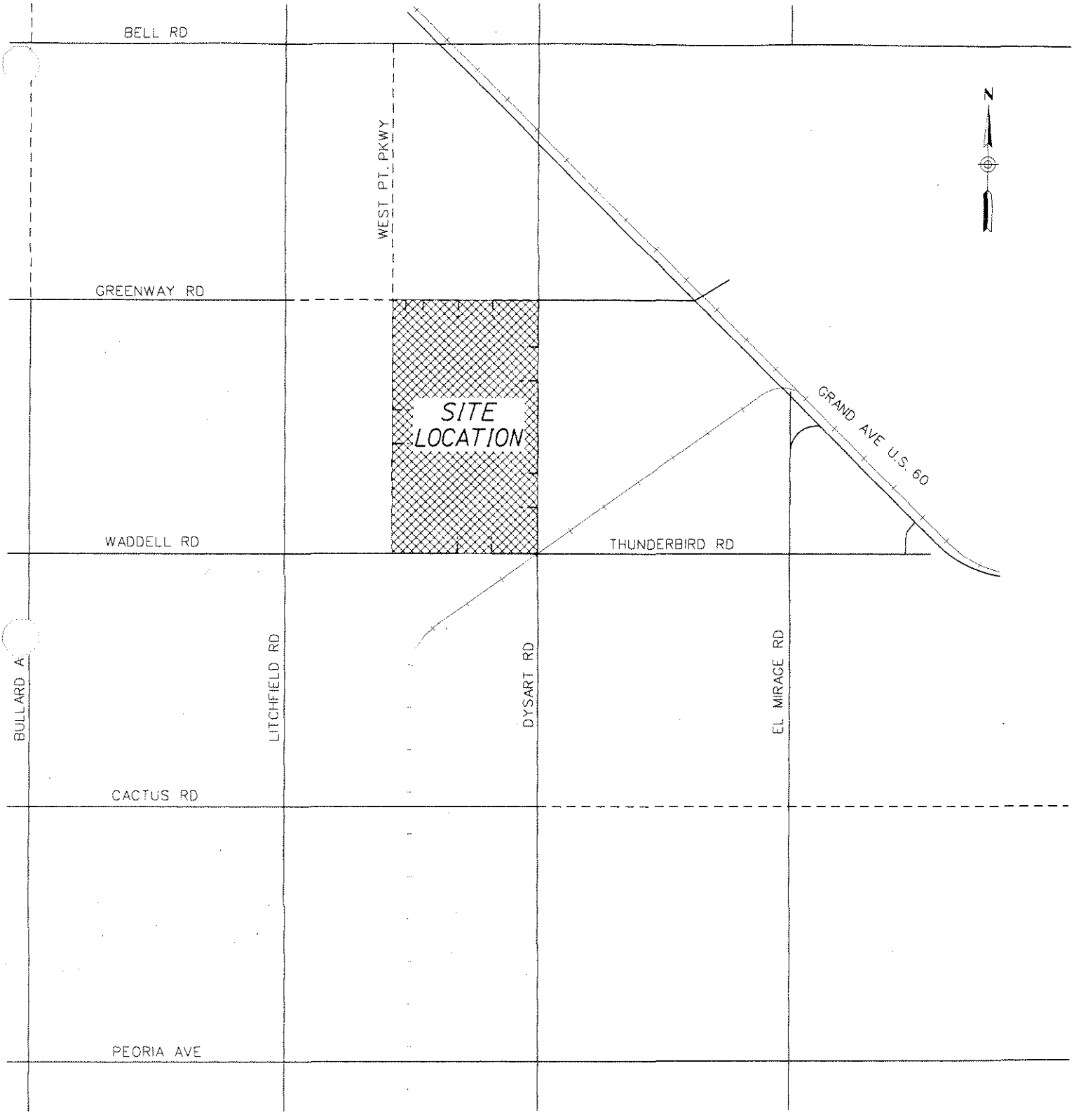


FIGURE VI-1
SITE LOCATION

DMJM

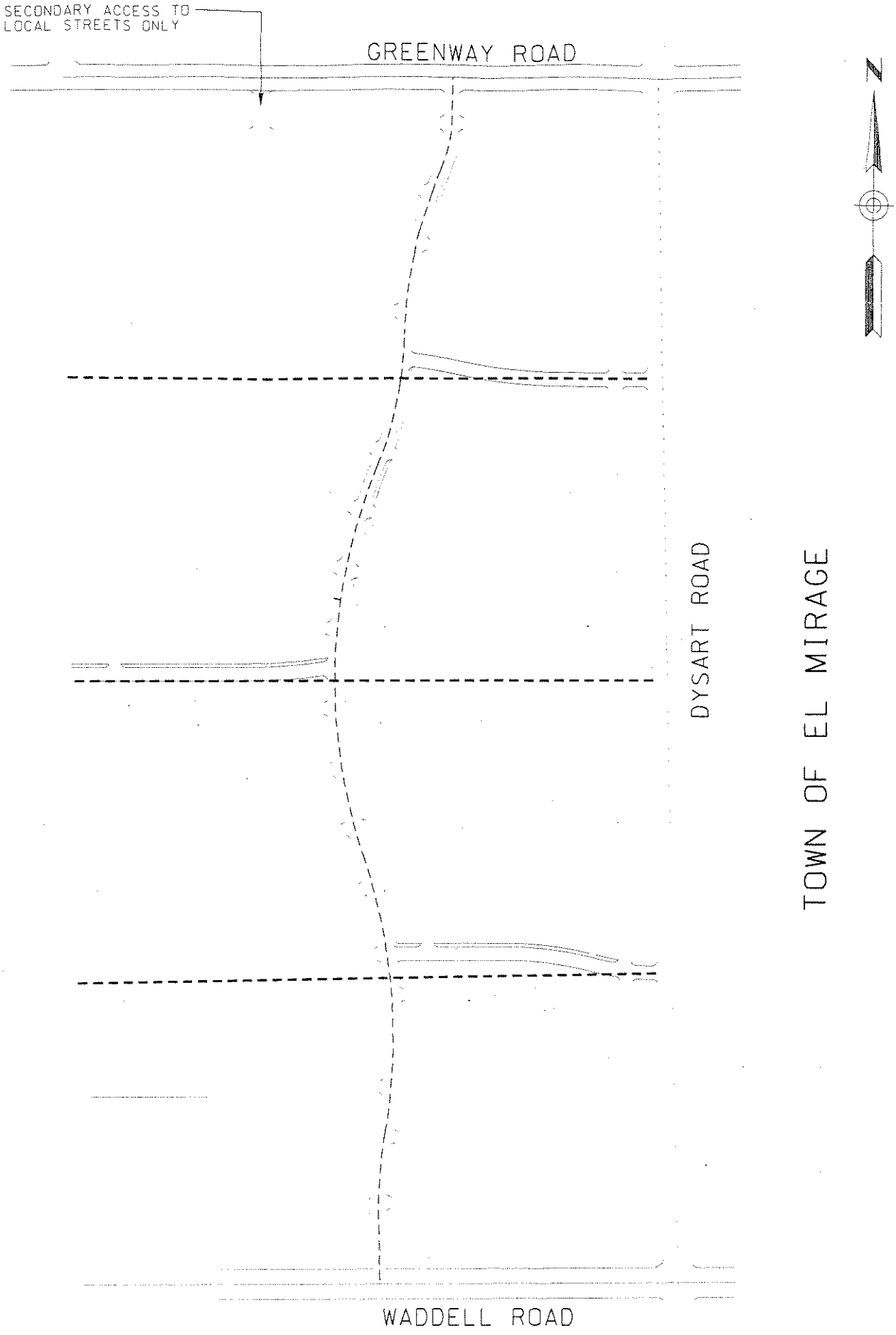


FIGURE VI-2
SITE PLAN

DMJM

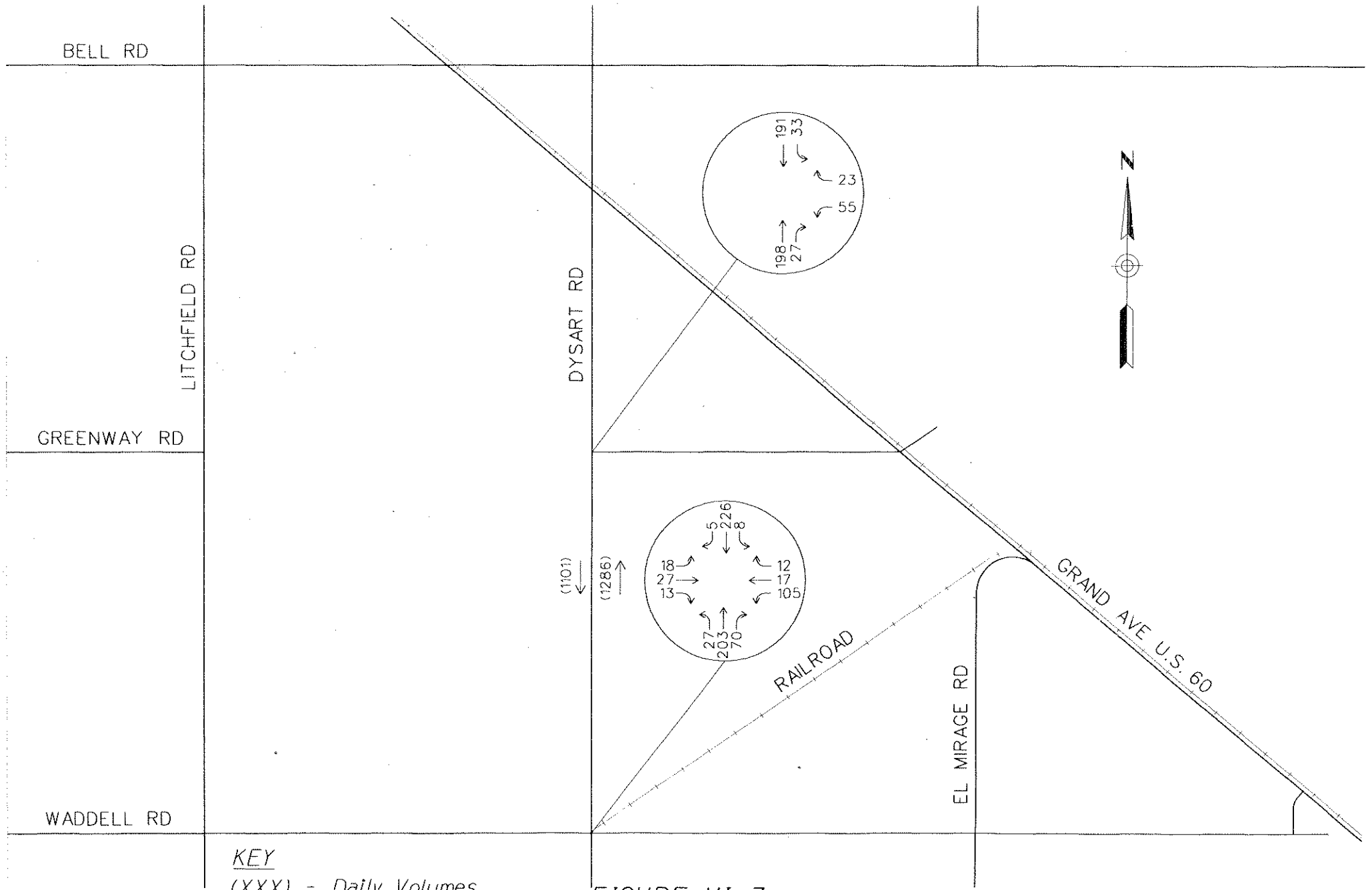


FIGURE VI-3
Existing AM Peak-Hour
Traffic Volumes

DMJM

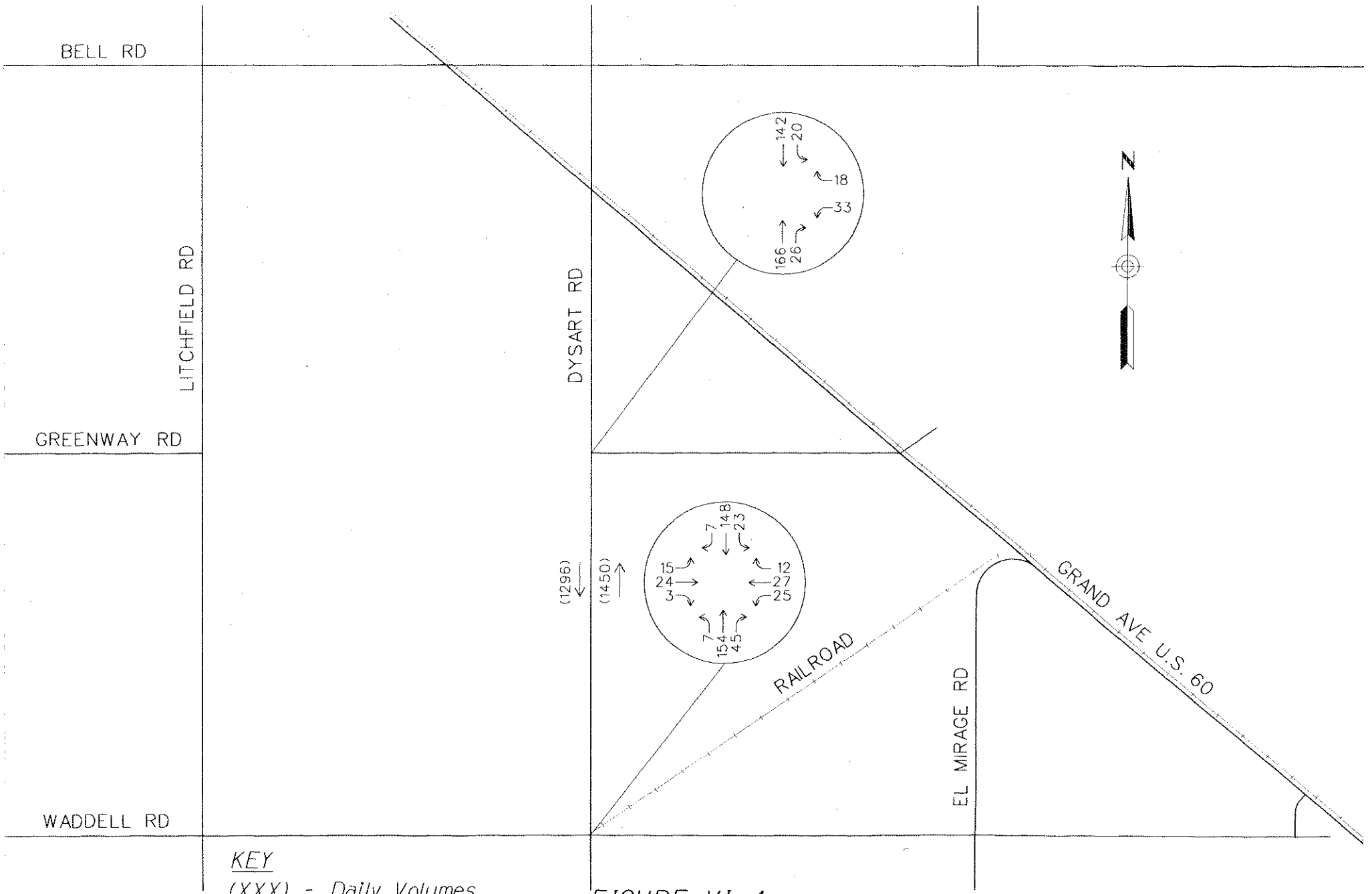


FIGURE VI-4
Existing PM Peak-Hour
Traffic Volumes

DMJM

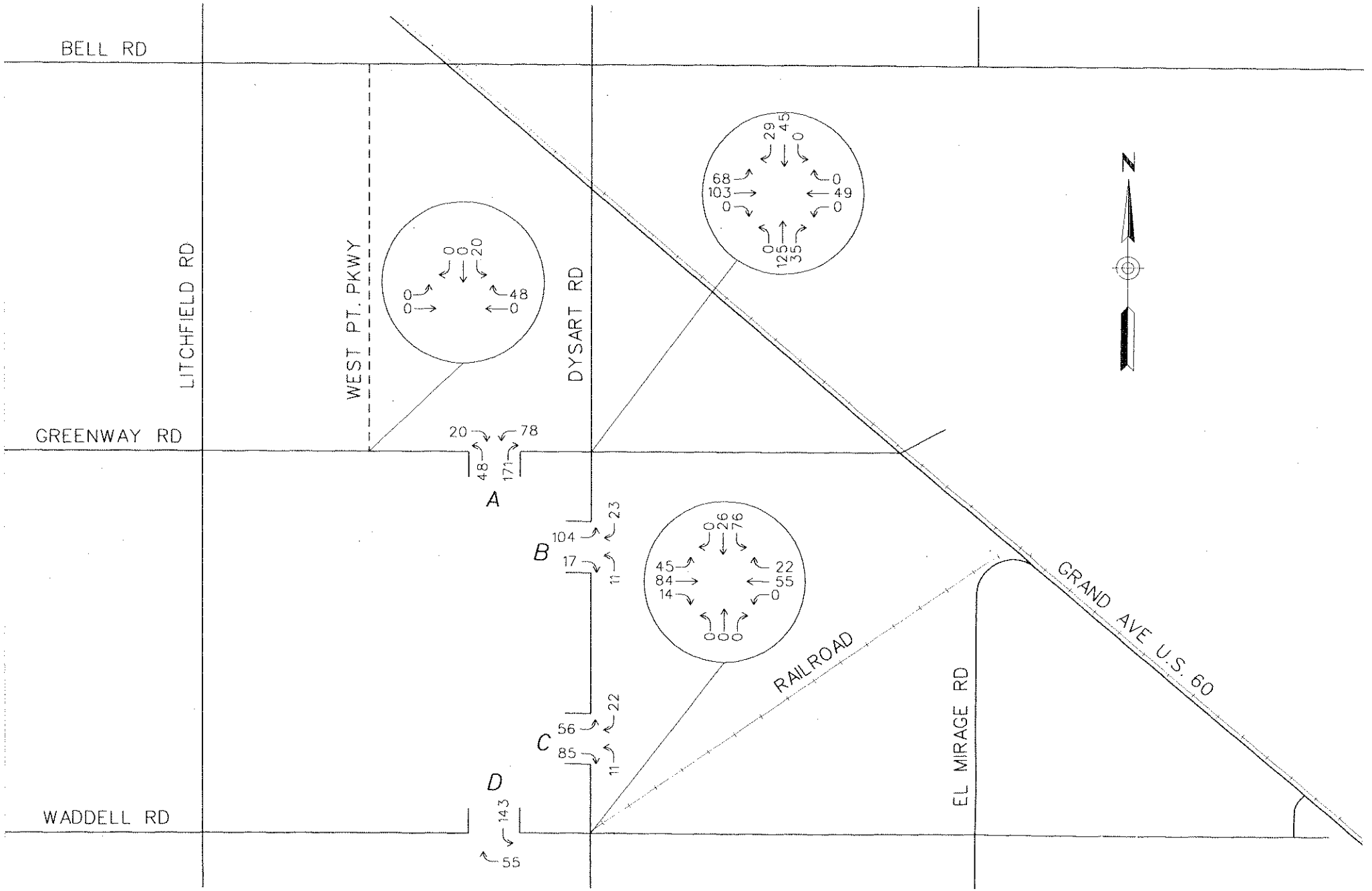


FIGURE VI-5
AM Peak-Hour Project Related Trips

DMJM

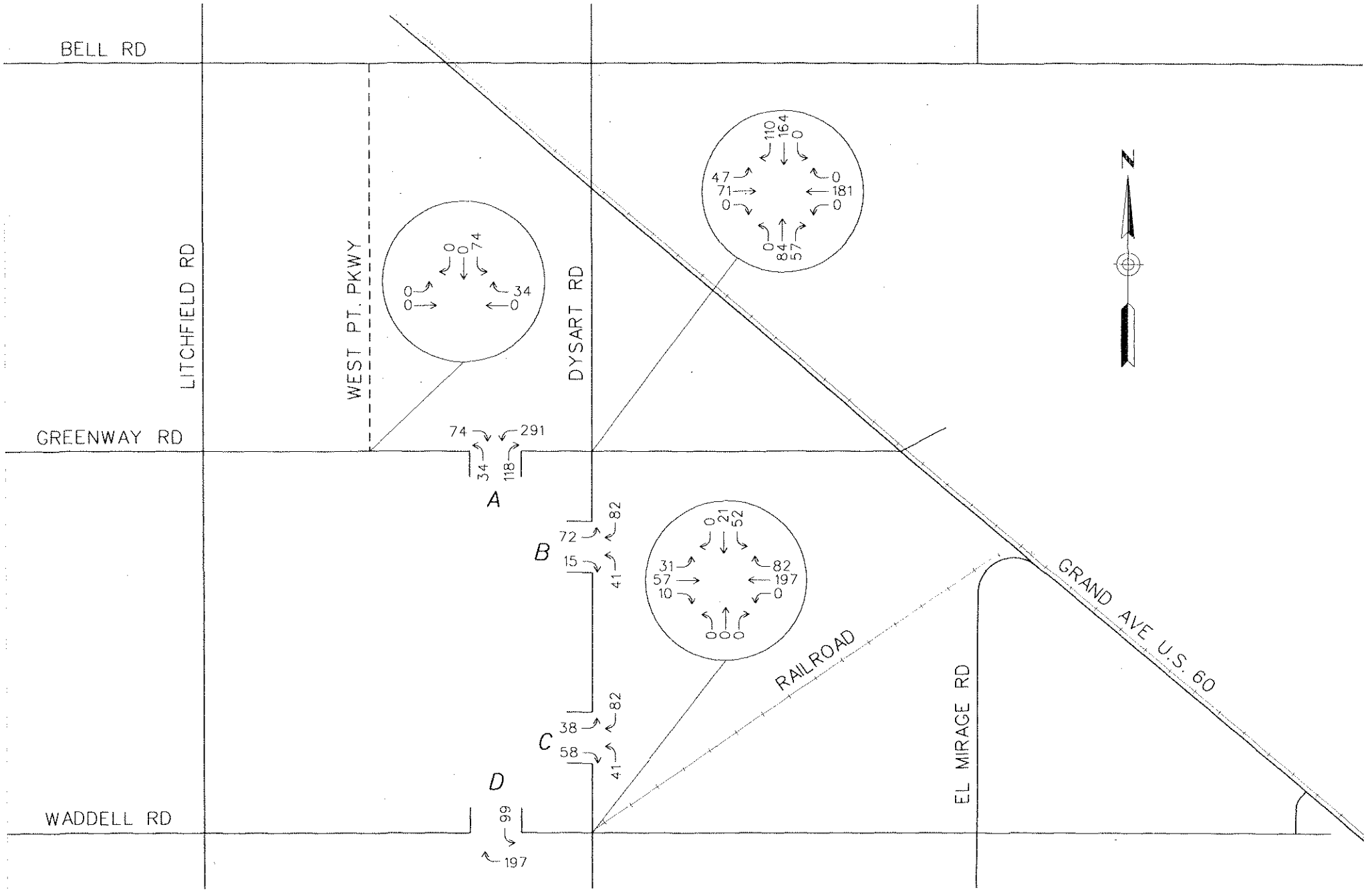
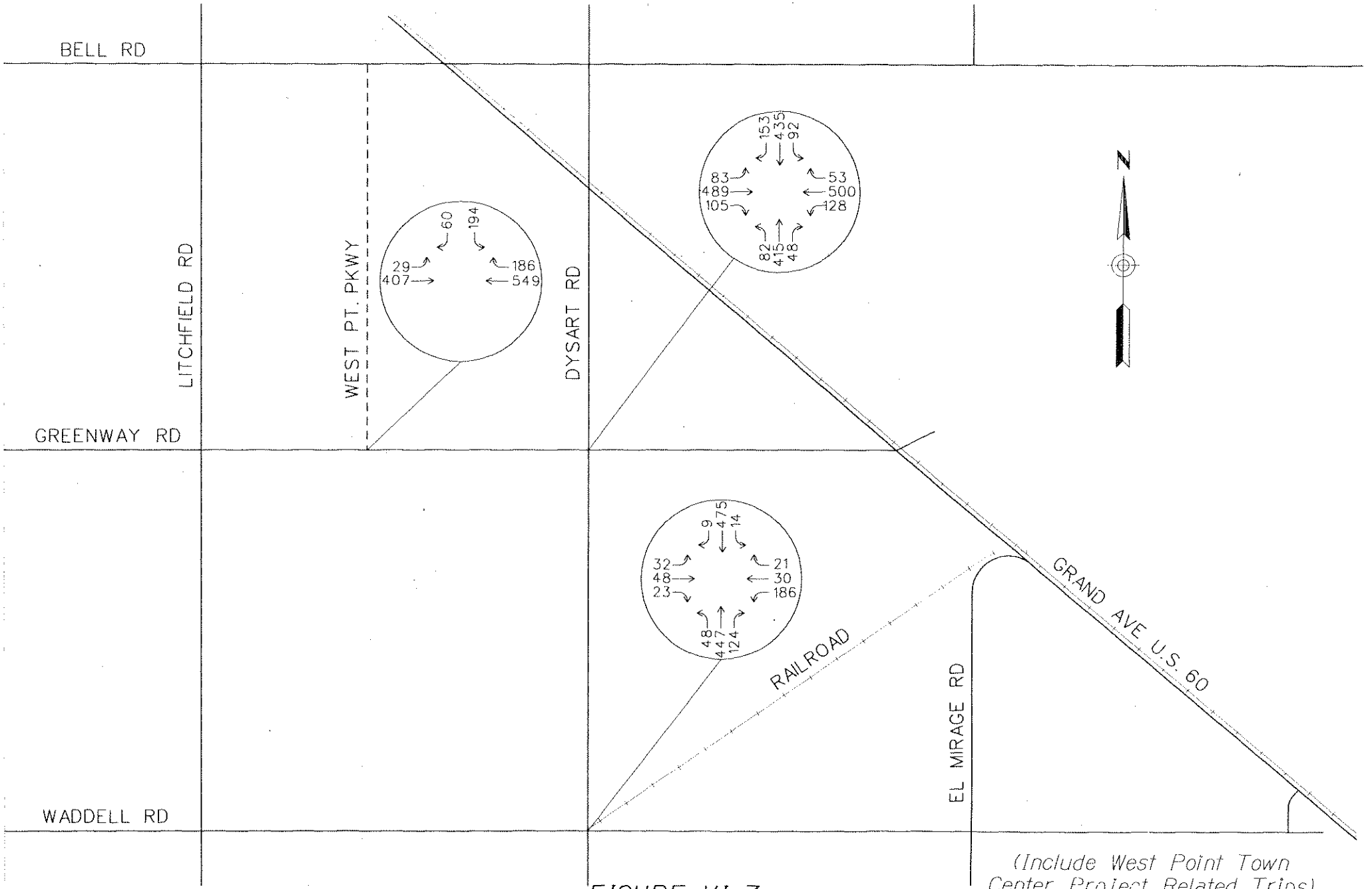


FIGURE VI-6
PM Peak-Hour Project Related Trips

DMJM



(Include West Point Town Center Project Related Trips)

FIGURE VI-7
AM Peak-Hour 2002 Traffic Volumes
Without The Project

DMJM

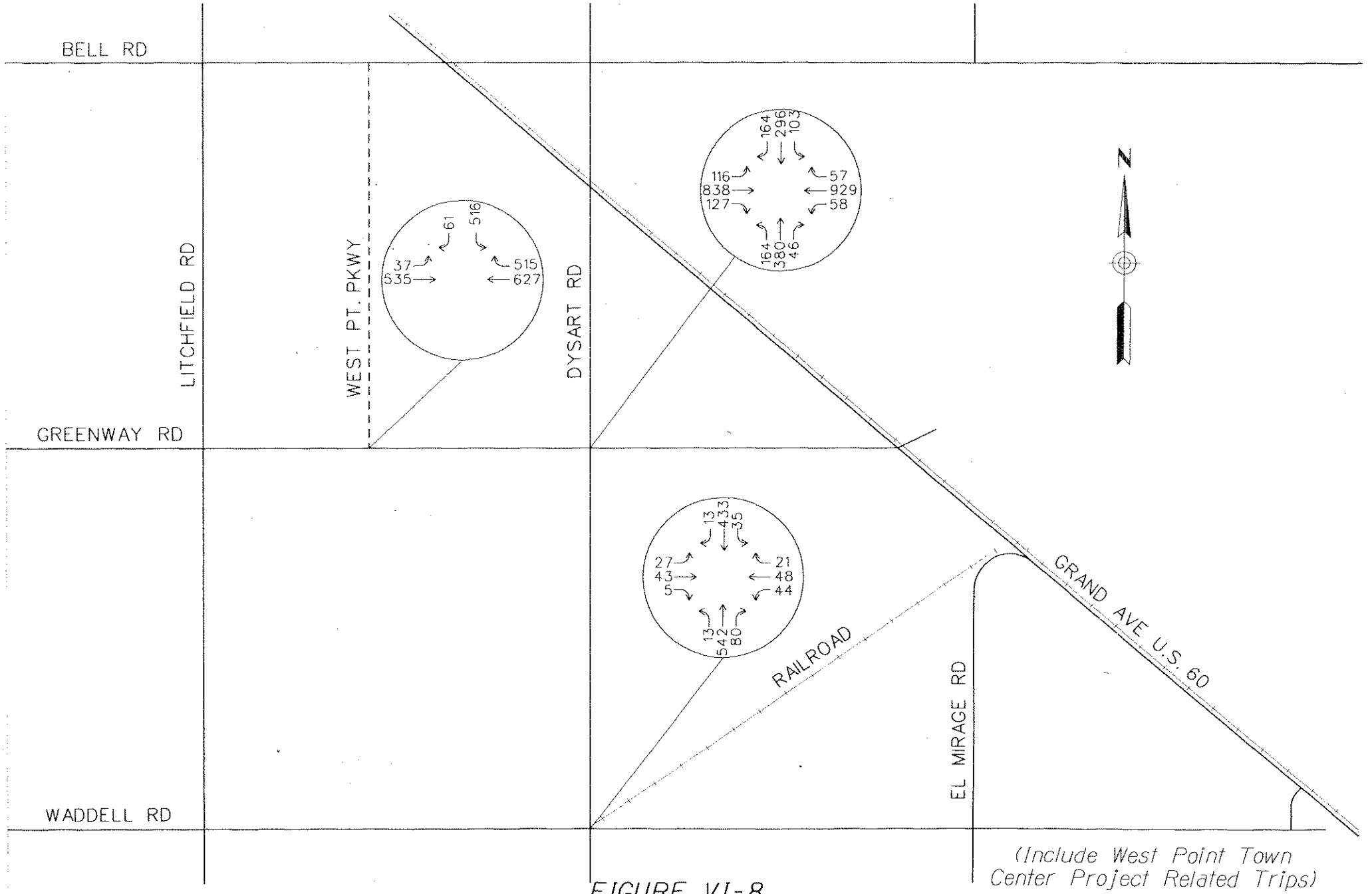
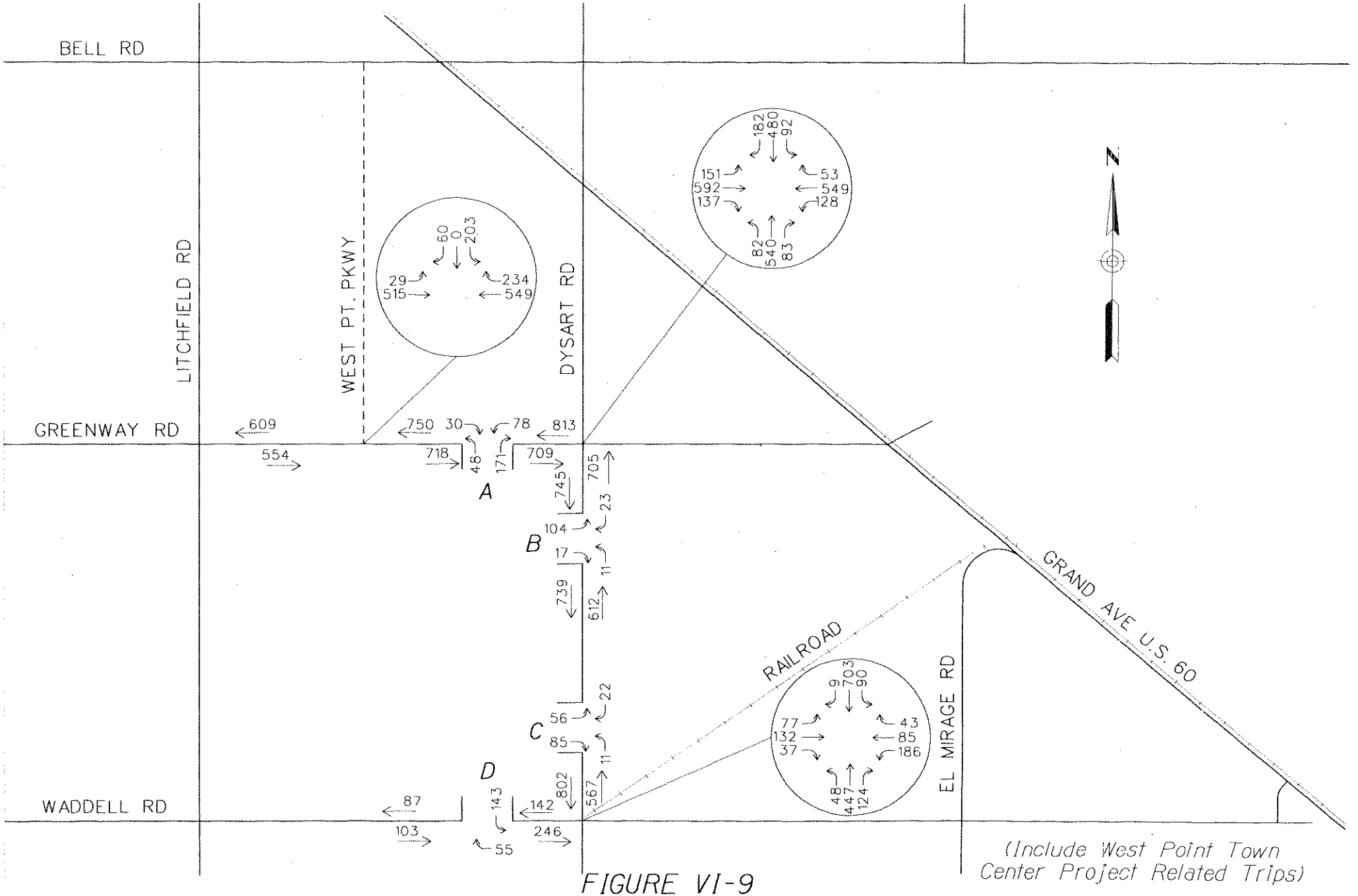


FIGURE VI-8
PM Peak-Hour 2002 Traffic Volumes
Without The Project

DMJM



(Include West Point Town Center Project Related Trips)

FIGURE VI-9
AM Peak-Hour 2002 Project Traffic Volumes
With The Project

DMJM

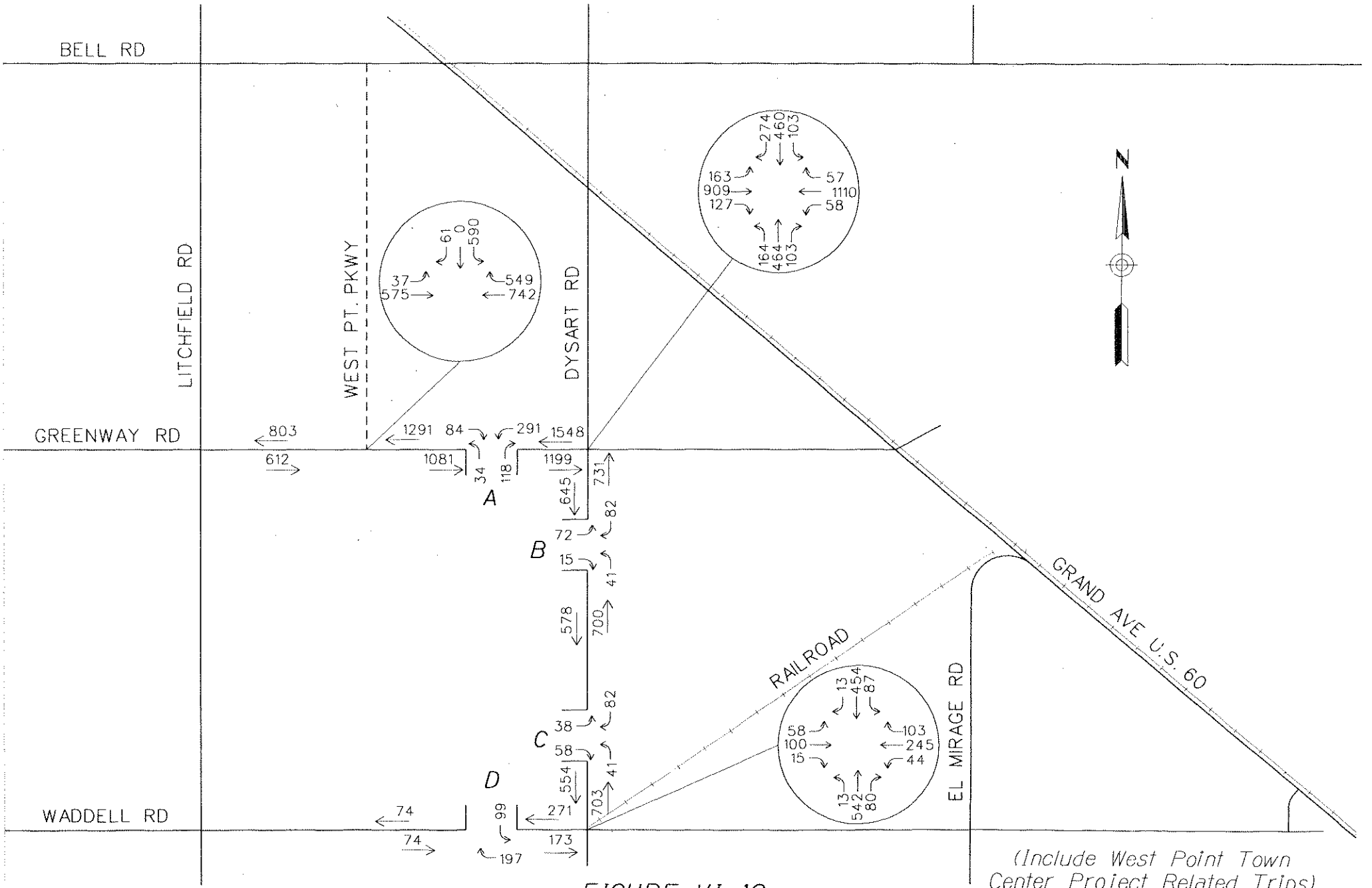


FIGURE VI-10
PM Peak-Hour 2002 Project Traffic Volumes
With The Project

DMJM

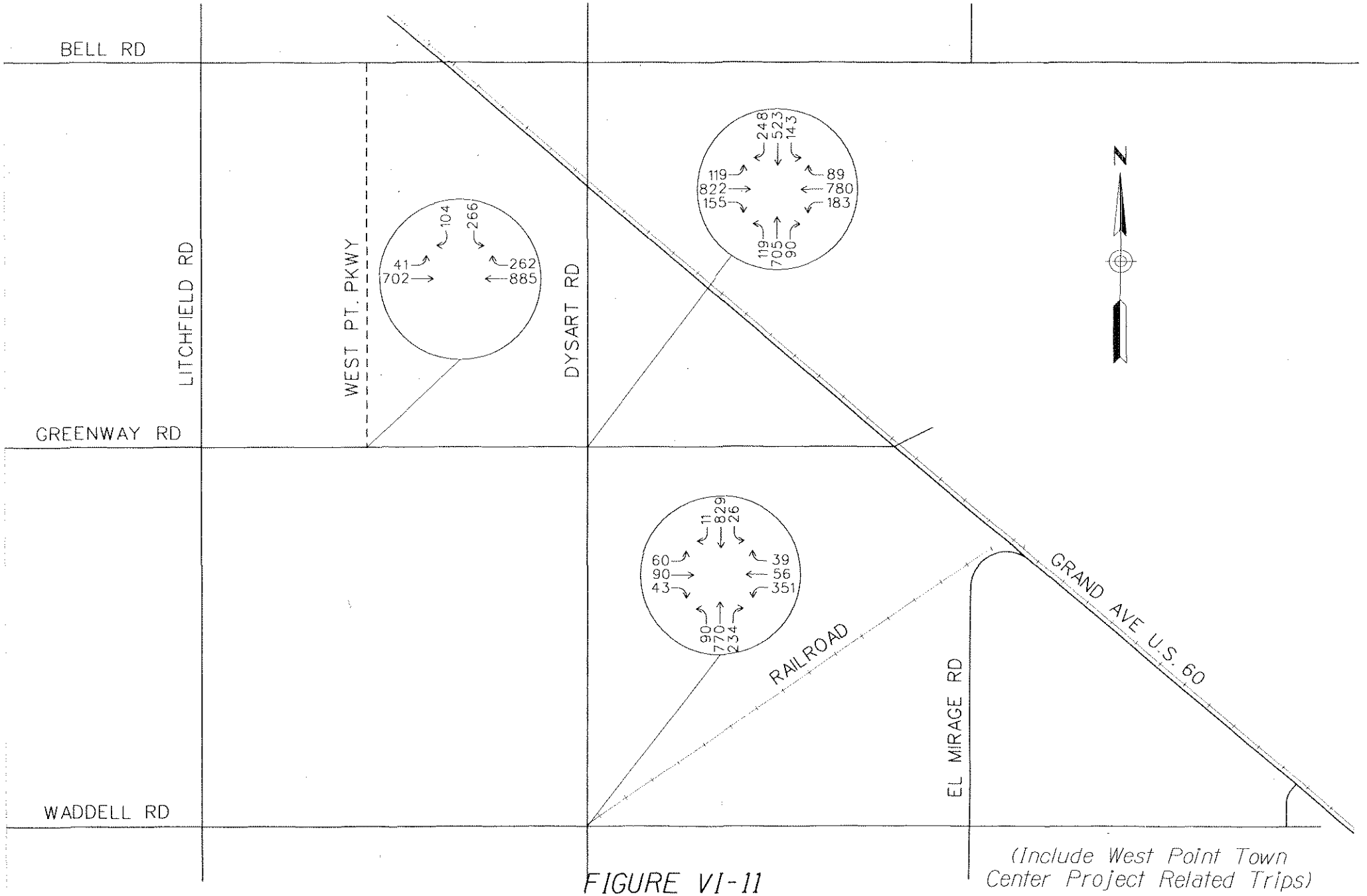
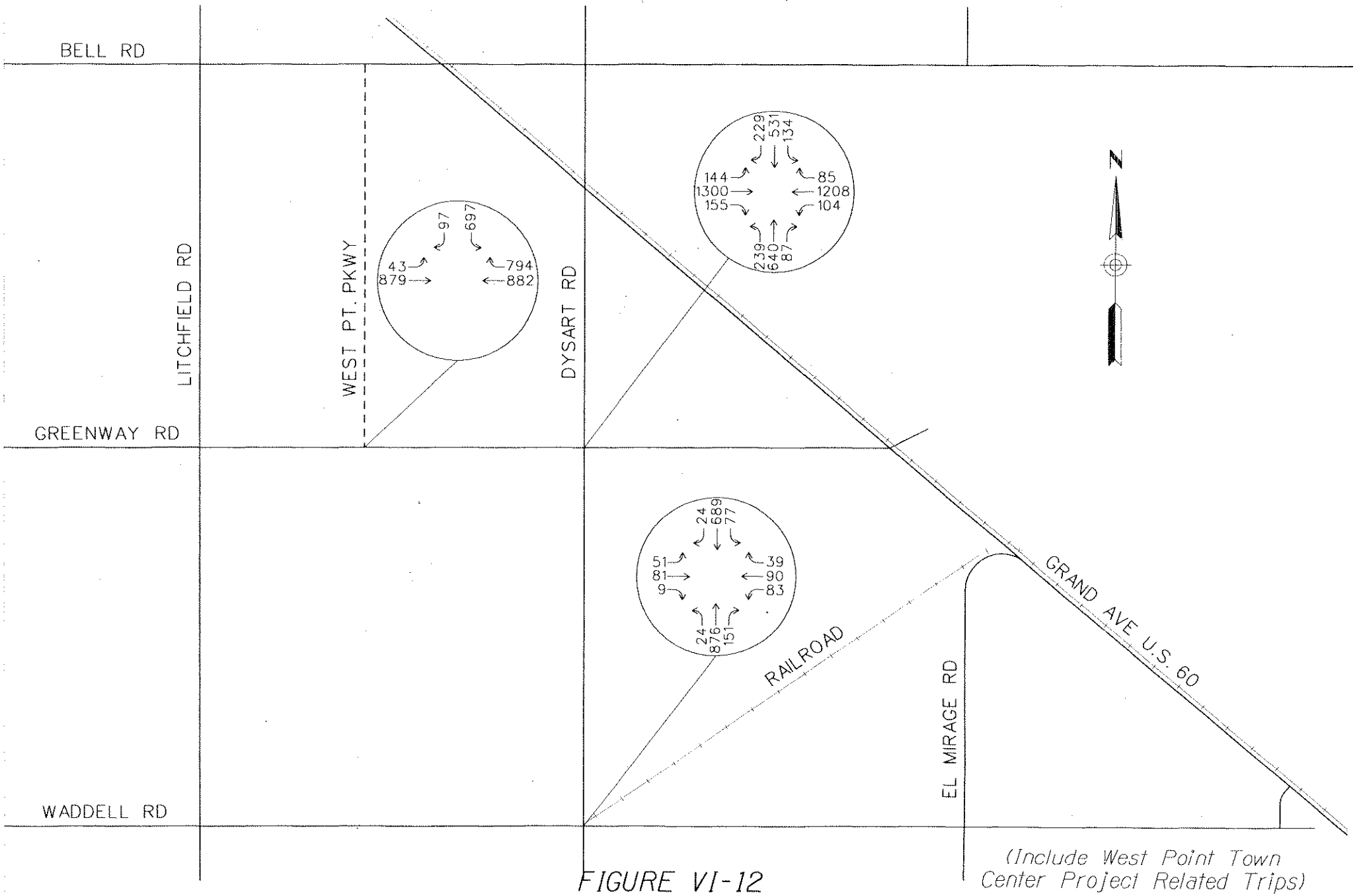


FIGURE VI-11
AM Peak-Hour 2015 Traffic Volumes
Without The Project

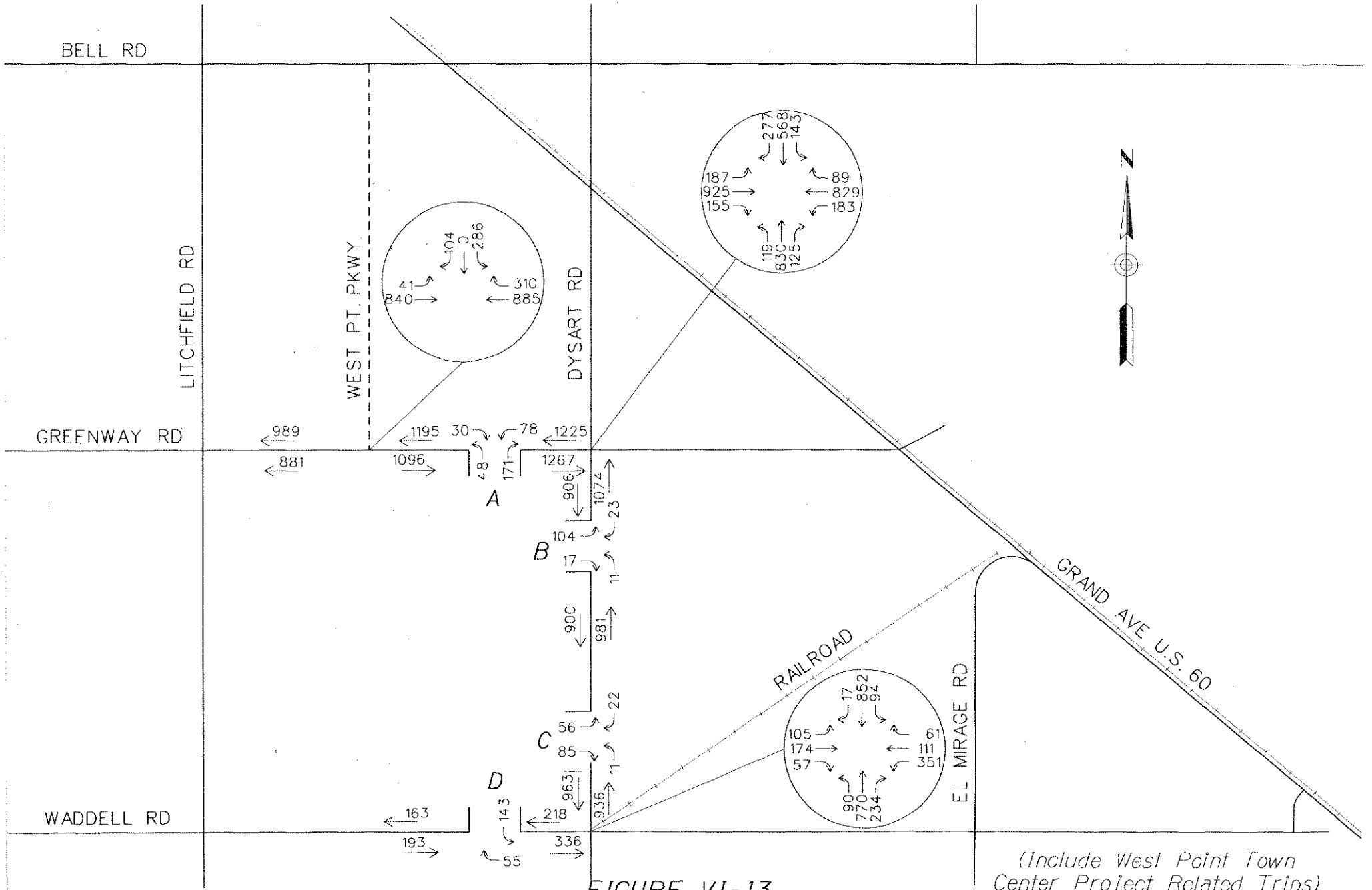
DMJM



(Include West Point Town Center Project Related Trips)

FIGURE VI-12
PM Peak-Hour 2015 Traffic Volumes
Without The Project

DMJM



(Include West Point Town Center Project Related Trips)

FIGURE VI-13
AM Peak-Hour 2015 Traffic Volumes
With The Project

DMJM

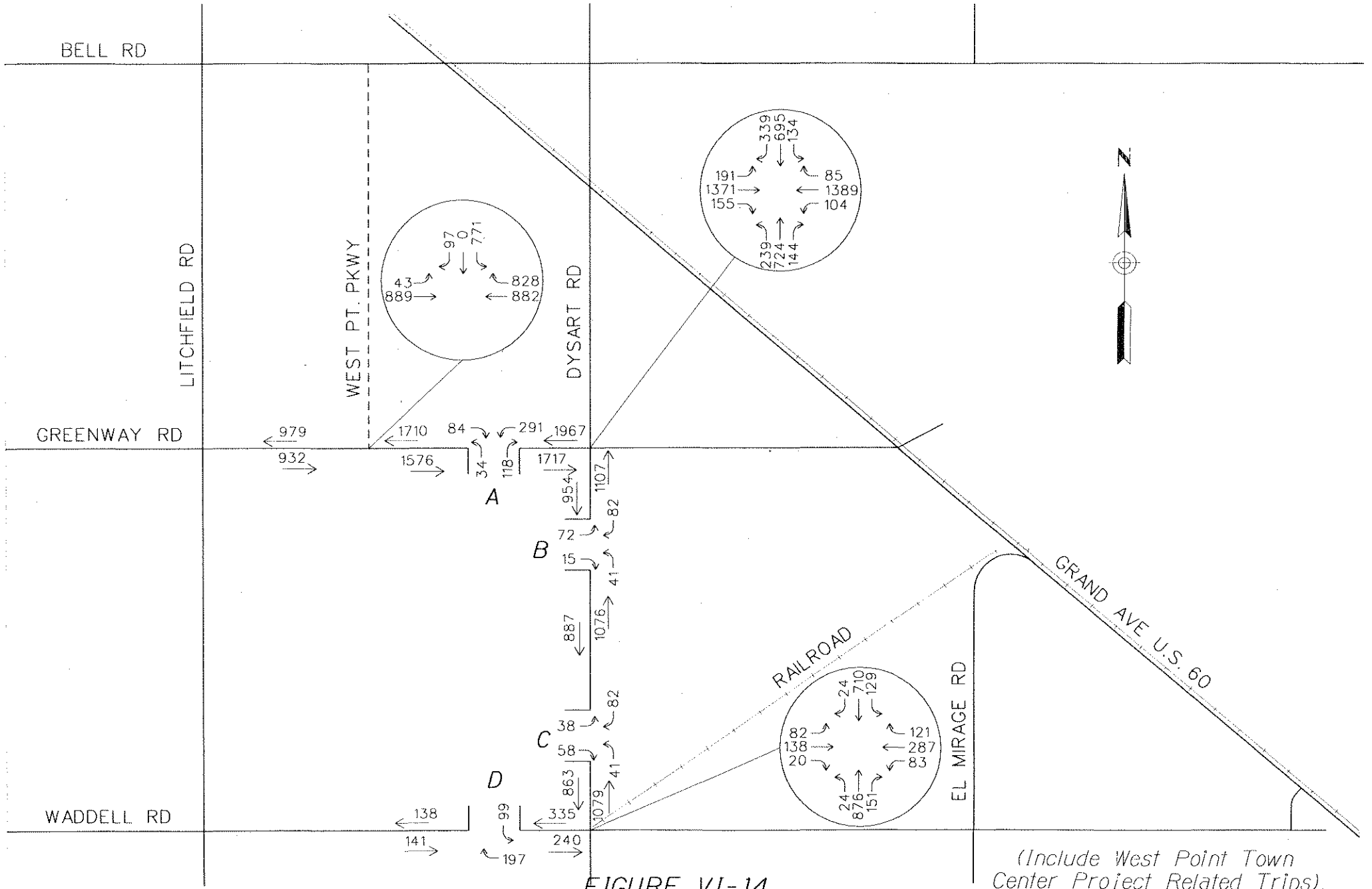


FIGURE VI-14
PM Peak-Hour 2015 Traffic Volumes
With The Project

DMJM

Table VI-4 Capacity Analysis Results

					Without the Project				With the Project				Without the Project				With the Project			
	EXISTING 1996				OPENING DAY 2002				HORIZON YEAR 2002				OPENING DAY 2015				HORIZON YEAR 2015			
	AM PEAK		PM PEAK		AM PEAK		PM PEAK		AM PEAK		PM PEAK		AM PEAK		PM PEAK		AM PEAK		PM PEAK	
	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS
Signalized Intersections																				
Greenway @ Dysart									11.0	B	19.9	C					19.6	C	23.5	C
Waddell @ Dysart									10.7	B	10.5	B					10.3	B	15.8	C
Greenway @ West Point Parkway									5.7	B	13.5	B					9.3	B	11.5	B
Unsignalized Intersection	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS	SEC/ VEH	LOS
Dysart / Greenway	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
WBL	6.5	B	5.2	B	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SBL	2.8	A	0.3	A	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Dysart / Waddell Road	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
EBL	7.1	B	6.1	B	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
WBL	10.4	C	5.9	B	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NBL	2.8	A	0.1	A	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SBL	2.9	A	0.3	A	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
Greenway / Street A	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
NBL	----	----	----	----	----	----	----	----	52.1	F	*	F	----	----	----	----	*	F	*	F
NBR	----	----	----	----	----	----	----	----	5.2	B	6.2	B	----	----	----	----	7.1	B	9.2	B
WBL	----	----	----	----	----	----	----	----	6.1	B	40.5	E	----	----	----	----	11.2	C	*	F
Dysart / Street B	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
EBL	----	----	----	----	----	----	----	----	*	F	*	F	----	----	----	----	*	F	*	F
ER	----	----	----	----	----	----	----	----	4.1	A	3.7	A	----	----	----	----	4.6	A	4.5	A
NBL	----	----	----	----	----	----	----	----	5.5	B	4.6	A	----	----	----	----	6.8	B	7.1	B
Dysart / Street C	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
EBL	----	----	----	----	----	----	----	----	46.3	F	32.1	E	----	----	----	----	*	F	*	F
EBR	----	----	----	----	----	----	----	----	4.5	A	3.8	A	----	----	----	----	5.1	B	4.6	A
NBL	----	----	----	----	----	----	----	----	5.4	B	4.2	A	----	----	----	----	6.7	B	6.5	B
Waddell / Street D	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----	----
SBL	----	----	----	----	----	----	----	----	4.6	A	4.3	A	----	----	----	----	5.9	B	5.2	B
SBR	----	----	----	----	----	----	----	----	3.1	A	3.0	A	----	----	----	----	3.3	A	3.1	A
EBL	----	----	----	----	----	----	----	----	2.4	A	2.3	A	----	----	----	----	2.6	A	2.5	A

Final Traffic Impact Analysis

APPENDIX C.1

TECHNICAL DATA

Street A and Greenway Road

Center For Microcomputers In Transportation
University of Florida
512 Weil Hall
Gainesville, FL 32611-2083
Ph: (904) 392-0378

Streets: (N-S) STREET A (E-W) GREENWAY
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes		709	9	78	735		15		171			
PHF		.95	.95	.95	.95		.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	373	
Potential Capacity: (pcph)	896	
Movement Capacity: (pcph)	896	
Prob. of Queue-Free State:	0.78	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	746	
Potential Capacity: (pcph)	682	
Movement Capacity: (pcph)	682	
Prob. of Queue-Free State:	0.87	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	1602	
Potential Capacity: (pcph)	100	
Major LT, Minor TH Impedance Factor:	0.87	
Adjusted Impedance Factor:	0.87	
Capacity Adjustment Factor due to Impeding Movements	0.87	
Movement Capacity: (pcph)	87	

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB	L	18	87		52.1	0.8	F	8.9
NB	R	198	896		5.2	1.0	B	
WB	L	90	682		6.1	0.5	B	0.6

Intersection Delay = 1.2 sec/veh

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Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes		1081	33	291	1257		10		118			
PHF		.95	.95	.95	.95		.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	569	
Potential Capacity: (pcph)	713	
Movement Capacity: (pcph)	713	
Prob. of Queue-Free State:	0.81	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	1138	
Potential Capacity: (pcph)	420	
Movement Capacity: (pcph)	420	
Prob. of Queue-Free State:	0.20	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2766	
Potential Capacity: (pcph)	18	
Major LT, Minor TH Impedance Factor:	0.20	
Adjusted Impedance Factor:	0.20	
Capacity Adjustment Factor due to Impeding Movements	0.20	
Movement Capacity: (pcph)	4	

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB	L	12	4		*	4.8	F	439.0
NB	R	136	713		6.2	0.8	B	
WB	L	337	420		40.5	9.7	E	7.6

Intersection Delay = 24.4 sec/veh

* The calculated value was greater than 999.9.

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	577	
Potential Capacity: (pcph)	706	
Movement Capacity: (pcph)	706	
Prob. of Queue-Free State:	0.72	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	1154	
Potential Capacity: (pcph)	412	
Movement Capacity: (pcph)	412	
Prob. of Queue-Free State:	0.78	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	2444	
Potential Capacity: (pcph)	29	
Major LT, Minor TH Impedance Factor:	0.78	
Adjusted Impedance Factor:	0.78	
Capacity Adjustment Factor due to Impeding Movements	0.78	
Movement Capacity: (pcph)	23	

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB	L	18	23		469.6	3.3	F	44.4
NB	R	198	706		7.1	1.3	B	
WB	L	90	412		11.2	0.9	C	0.7

Intersection Delay = 3.6 sec/veh

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Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	0	2	1	1	2	0	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes		1576	33	291	1676		10		118			
PHF		.95	.95	.95	.95		.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's				1.10			1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)	830	
Potential Capacity: (pcph)	526	
Movement Capacity: (pcph)	526	
Prob. of Queue-Free State:	0.74	

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)	1659	
Potential Capacity: (pcph)	221	
Movement Capacity: (pcph)	221	
Prob. of Queue-Free State:	0.00	

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)	3728	
Potential Capacity: (pcph)	4	
Major LT, Minor TH Impedance Factor:	0.00	
Adjusted Impedance Factor:	0.00	
Capacity Adjustment Factor due to Impeding Movements	0.00	
Movement Capacity: (pcph)	0	

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
NB L	12	0		*	*	F	*
NB R	136	526		9.2	1.2	B	
WB L	337	221		*	63.0	F	148.9

Intersection Delay = *

* The calculated value was greater than 999.9.

Dysart Road and Street B

Center For Microcomputers In Transportation
University of Florida
512 Weil Hall
Gainesville, FL 32611-2083
Ph: (904) 392-0378

Streets: (N-S) DYSART ROAD (E-W) STREET B
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	11	601			722	23	104		17			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		380
Potential Capacity: (pcph)		889
Movement Capacity: (pcph)		889
Prob. of Queue-Free State:		0.98

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		760
Potential Capacity: (pcph)		670
Movement Capacity: (pcph)		670
Prob. of Queue-Free State:		0.98

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1405
Potential Capacity: (pcph)		134
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		131

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	120	131		177.8	10.1	F	153.4
EB	R	20	889		4.1	0.0	A	
NB	L	13	670		5.5	0.0	B	0.1

Intersection Delay = 12.6 sec/veh

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Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	41	659			563	82	72		15			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		296
Potential Capacity: (pcph)		980
Movement Capacity: (pcph)		980
Prob. of Queue-Free State:		0.98

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		593
Potential Capacity: (pcph)		824
Movement Capacity: (pcph)		824
Prob. of Queue-Free State:		0.94

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1330
Potential Capacity: (pcph)		149
Major LT, Minor TH Impedance Factor:		0.94
Adjusted Impedance Factor:		0.94
Capacity Adjustment Factor due to Impeding Movements		0.94
Movement Capacity: (pcph)		141

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	84	141		61.4	3.9	F	51.5
EB	R	18	980		3.7	0.0	A	
NB	L	47	824		4.6	0.0	A	0.3

Intersection Delay = 3.3 sec/veh

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512 Weil Hall
Gainesville, FL 32611-2083
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Streets: (N-S) DYSART ROAD (E-W) STREET B
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	11	970			883	23	104		17			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		464
Potential Capacity: (pcph)		806
Movement Capacity: (pcph)		806
Prob. of Queue-Free State:		0.98

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		929
Potential Capacity: (pcph)		544
Movement Capacity: (pcph)		544
Prob. of Queue-Free State:		0.98

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1962
Potential Capacity: (pcph)		59
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		58

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	120	58		*	33.4	F	*
EB	R	20	806		4.6	0.0	A	
NB	L	13	544		6.8	0.0	B	0.1

Intersection Delay = 108.8 sec/veh

* The calculated value was greater than 999.9.

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Streets: (N-S) DYSART ROAD (E-W) STREET B
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	41	1035			872	82	72		15			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		459
Potential Capacity: (pcph)		811
Movement Capacity: (pcph)		811
Prob. of Queue-Free State:		0.98

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		918
Potential Capacity: (pcph)		551
Movement Capacity: (pcph)		551
Prob. of Queue-Free State:		0.91

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		2050
Potential Capacity: (pcph)		52
Major LT, Minor TH Impedance Factor:		0.91
Adjusted Impedance Factor:		0.91
Capacity Adjustment Factor due to Impeding Movements		0.91
Movement Capacity: (pcph)		48

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	84	48		*	21.0	F	*
EB	R	18	811		4.5	0.0	A	
NB	L	47	551		7.1	0.2	B	0.3

Intersection Delay = 54.0 sec/veh

* The calculated value was greater than 999.9.

Dysart Road and Street C

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Streets: (N-S) DYSART ROAD (E-W) STREET C
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	11	556			717	22	56		85			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		378
Potential Capacity: (pcph)		891
Movement Capacity: (pcph)		891
Prob. of Queue-Free State:		0.89

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		755
Potential Capacity: (pcph)		674
Movement Capacity: (pcph)		674
Prob. of Queue-Free State:		0.98

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1352
Potential Capacity: (pcph)		145
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		142

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	65	142		46.3	2.5	F	21.1
EB	R	98	891		4.5	0.4	A	
NB	L	13	674		5.4	0.0	B	0.1

Intersection Delay = 2.1 sec/veh

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Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	41	662			496	82	38		58			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		261
Potential Capacity: (pcph)		1021
Movement Capacity: (pcph)		1021
Prob. of Queue-Free State:		0.93

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		522
Potential Capacity: (pcph)		899
Movement Capacity: (pcph)		899
Prob. of Queue-Free State:		0.95

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1262
Potential Capacity: (pcph)		165
Major LT, Minor TH Impedance Factor:		0.95
Adjusted Impedance Factor:		0.95
Capacity Adjustment Factor due to Impeding Movements		0.95
Movement Capacity: (pcph)		156

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	44	156		32.1	1.3	E	15.0
EB	R	67	1021		3.8	0.1	A	
NB	L	47	899		4.2	0.0	A	0.2

Intersection Delay = 1.2 sec/veh

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Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	11	925			878	22	56		85			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		462
Potential Capacity: (pcph)		808
Movement Capacity: (pcph)		808
Prob. of Queue-Free State:		0.88

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		924
Potential Capacity: (pcph)		547
Movement Capacity: (pcph)		547
Prob. of Queue-Free State:		0.98

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1910
Potential Capacity: (pcph)		64
Major LT, Minor TH Impedance Factor:		0.98
Adjusted Impedance Factor:		0.98
Capacity Adjustment Factor due to Impeding Movements		0.98
Movement Capacity: (pcph)		62

Intersection Performance Summary

Movement	Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB L	65	62		435.5	9.3	F	176.0
EB R	98	808		5.1	0.4	B	
NB L	13	547		6.7	0.0	B	0.1

Intersection Delay = 12.6 sec/veh

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Streets: (N-S) DYSART ROAD (E-W) STREET C
Major Street Direction.... NS
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Northbound			Southbound			Eastbound			Westbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	1	0	1	0	0	0
Stop/Yield			Y			Y						
Volumes	41	1038			805	82	38		58			
PHF	.95	.95			.95	.95	.95		.95			
Grade		0			0			0				
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10						1.10		1.10			

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	WB	EB
Conflicting Flows: (vph)		424
Potential Capacity: (pcph)		844
Movement Capacity: (pcph)		844
Prob. of Queue-Free State:		0.92

Step 2: LT from Major Street	SB	NB
Conflicting Flows: (vph)		847
Potential Capacity: (pcph)		602
Movement Capacity: (pcph)		602
Prob. of Queue-Free State:		0.92

Step 4: LT from Minor Street	WB	EB
Conflicting Flows: (vph)		1983
Potential Capacity: (pcph)		57
Major LT, Minor TH Impedance Factor:		0.92
Adjusted Impedance Factor:		0.92
Capacity Adjustment Factor due to Impeding Movements		0.92
Movement Capacity: (pcph)		53

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
EB	L	44	53		268.4	5.4	F	109.1
EB	R	67	844		4.6	0.2	A	
NB	L	47	602		6.5	0.2	B	0.2

Intersection Delay = 5.2 sec/veh

Street D and Waddell Road

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Streets: (N-S) STREET D (E-W) WADDELL ROAD
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	0	0	1	0	1
Stop/Yield			Y			Y						
Volumes	0	103			87	55				0		143
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		46
Potential Capacity: (pcph)		1312
Movement Capacity: (pcph)		1312
Prob. of Queue-Free State:		0.87

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		92
Potential Capacity: (pcph)		1530
Movement Capacity: (pcph)		1530
Prob. of Queue-Free State:		1.00

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		200
Potential Capacity: (pcph)		789
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		789

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB	L	0	789		4.6	0.0	A	3.1
SB	R	166	1312		3.1	0.4	A	
EB	L	0	1530		2.4	0.0	A	0.0

Intersection Delay = 1.2 sec/veh

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Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2002 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	0	0	1	0	1
Stop/Yield			Y			Y						
Volumes	0	74			74	197				0		99
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		39
Potential Capacity: (pcph)		1323
Movement Capacity: (pcph)		1323
Prob. of Queue-Free State:		0.91

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		78
Potential Capacity: (pcph)		1557
Movement Capacity: (pcph)		1557
Prob. of Queue-Free State:		1.00

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		156
Potential Capacity: (pcph)		842
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		842

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB	L	0	842		4.3	0.0	A	3.0
SB	R	114	1323		3.0	0.2	A	
EB	L	0	1557		2.3	0.0	A	0.0

Intersection Delay = 0.7 sec/veh

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Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....AM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	0	0	1	0	1
Stop/Yield			Y			Y						
Volumes	0	193			163	55				0		143
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		86
Potential Capacity: (pcph)		1252
Movement Capacity: (pcph)		1252
Prob. of Queue-Free State:		0.87

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		172
Potential Capacity: (pcph)		1386
Movement Capacity: (pcph)		1386
Prob. of Queue-Free State:		1.00

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		375
Potential Capacity: (pcph)		610
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		610

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB	L	0	610		5.9	0.0	B	3.3
SB	R	166	1252		3.3	0.5	A	
EB	L	0	1386		2.6	0.0	A	0.0

Intersection Delay = 0.9 sec/veh

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Streets: (N-S) STREET D (E-W) WADDELL ROAD
Major Street Direction.... EW
Length of Time Analyzed... 60 (min)
Analyst..... MSE
Date of Analysis..... 6/4/97
Other Information.....PM PEAK YEAR 2015 W\PROJECT
Two-way Stop-controlled Intersection

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	0	0	2	1	0	0	0	1	0	1
Stop/Yield			Y			Y						
Volumes	0	141			138	197				0		99
PHF	.95	.95			.95	.95				.95		.95
Grade		0			0						0	
MC's (%)												
SU/RV's (%)												
CV's (%)												
PCE's	1.10									1.10		1.10

Adjustment Factors

Vehicle Maneuver	Critical Gap (tg)	Follow-up Time (tf)
Left Turn Major Road	5.50	2.10
Right Turn Minor Road	5.50	2.60
Through Traffic Minor Road	6.50	3.30
Left Turn Minor Road	7.00	3.40

Worksheet for TWSC Intersection

Step 1: RT from Minor Street	NB	SB
Conflicting Flows: (vph)		72
Potential Capacity: (pcph)		1273
Movement Capacity: (pcph)		1273
Prob. of Queue-Free State:		0.91

Step 2: LT from Major Street	WB	EB
Conflicting Flows: (vph)		145
Potential Capacity: (pcph)		1433
Movement Capacity: (pcph)		1433
Prob. of Queue-Free State:		1.00

Step 4: LT from Minor Street	NB	SB
Conflicting Flows: (vph)		292
Potential Capacity: (pcph)		689
Major LT, Minor TH Impedance Factor:		1.00
Adjusted Impedance Factor:		1.00
Capacity Adjustment Factor due to Impeding Movements		1.00
Movement Capacity: (pcph)		689

Intersection Performance Summary

Movement		Flow Rate (pcph)	Move Cap (pcph)	Shared Cap (pcph)	Avg. Total Delay (sec/veh)	95% Queue Length (veh)	LOS	Approach Delay (sec/veh)
SB	L	0	689		5.2	0.0	B	3.1
SB	R	114	1273		3.1	0.2	A	
EB	L	0	1433		2.5	0.0	A	0.0

Intersection Delay = 0.5 sec/veh

HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-04-1997
Center For Microcomputers In Transportation

Streets: (E-W) 17EENWAY ROAD (N-S) WEST PT. PKWY
Analyst: MSE File Name:
Area Type: Other 6-4-97 AM PEAK
Comment: 2002 W/PROJECT

DELETED

	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	29	515	10	10	549	201	10	30	10	203	11	60
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR 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

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
WB Left	*				SB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	34.0A				Green	20.0A			
Yellow/AR	3.0				Yellow/AR	3.0			

Cycle Length: 60 secs Phase combination order: #1 #5

Intersection Performance Summary

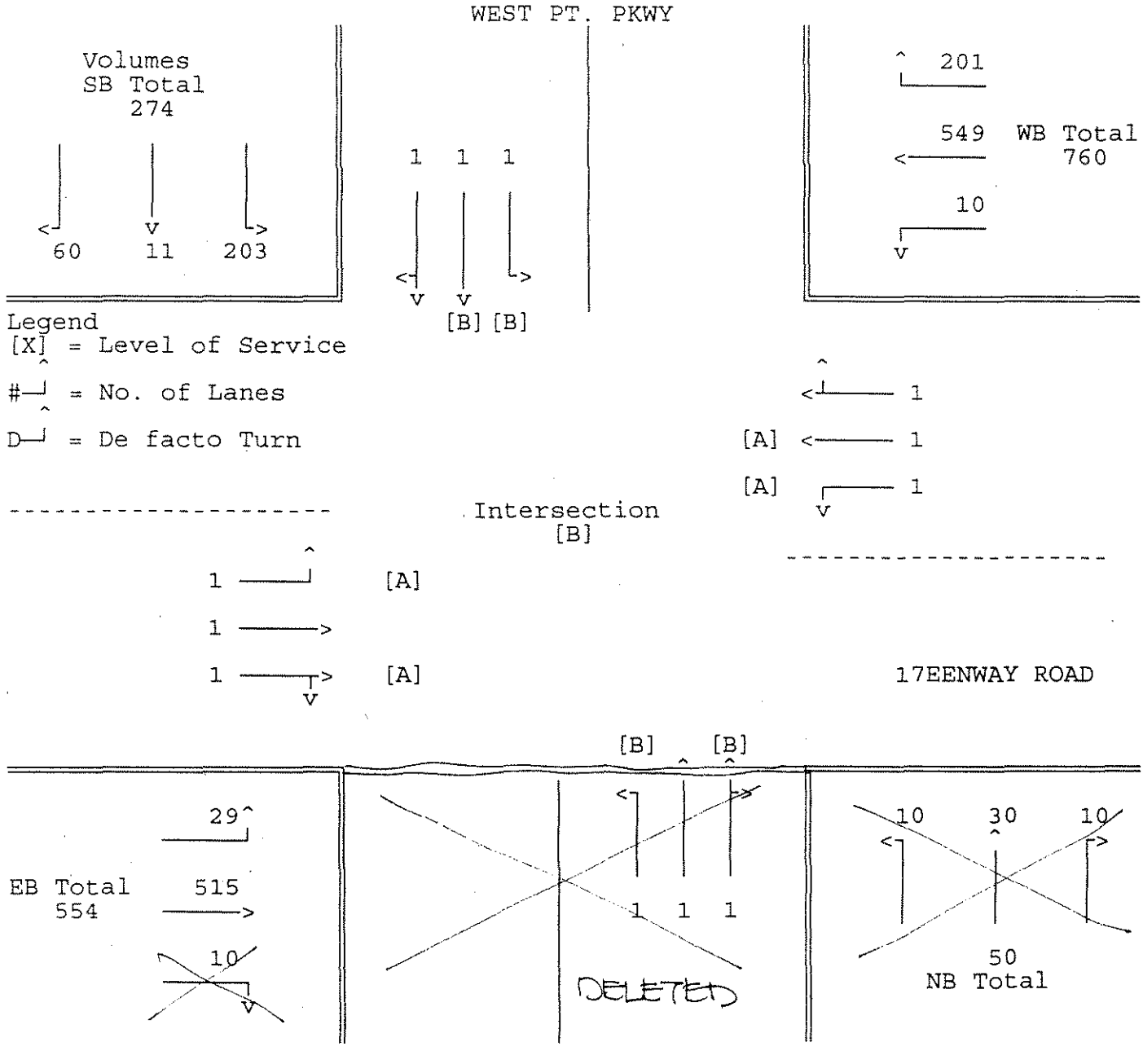
	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	195	344	0.159	0.567	4.0	A	4.4	A
	TR	1994	3519	0.291	0.567	4.4	A		
WB	L	332	586	0.033	0.567	3.7	A	4.9	A
	TR	1919	3387	0.432	0.567	4.9	A		
NB	L	464	1393	0.024	0.333	8.7	B	8.7	B
	TR	1131	3394	0.040	0.333	8.7	B		
SB	L	501	1503	0.427	0.333	10.4	B	10.0	B
	TR	1028	3085	0.077	0.333	8.8	B		

Intersection Delay = 5.7 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.430

INTERSECTION DIAGRAM

Intersection: 17EENWAY ROAD and WEST PT. PKWY
Time period: AM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-04-1997
Center For Microcomputers In Transportation

Streets: (E-W) 17EENWAY ROAD (N-S) WEST PT. PKWY
Analyst: MSE File Name:
Area Type: Other 6-4-97 PM PEAK
Comment: 2002 W/PROJECT DELETED

	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	37	565	10	10	742	525	10	24	10	549	41	61
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*				NB	Left	*			
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*					Peds	*			
WB	Left	*				SB	Left	*			
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*					Peds	*			
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		28.0A				Green		26.0A			
Yellow/AR		3.0				Yellow/AR		3.0			

Cycle Length: 60 secs Phase combination order: #1 #5

Intersection Performance Summary

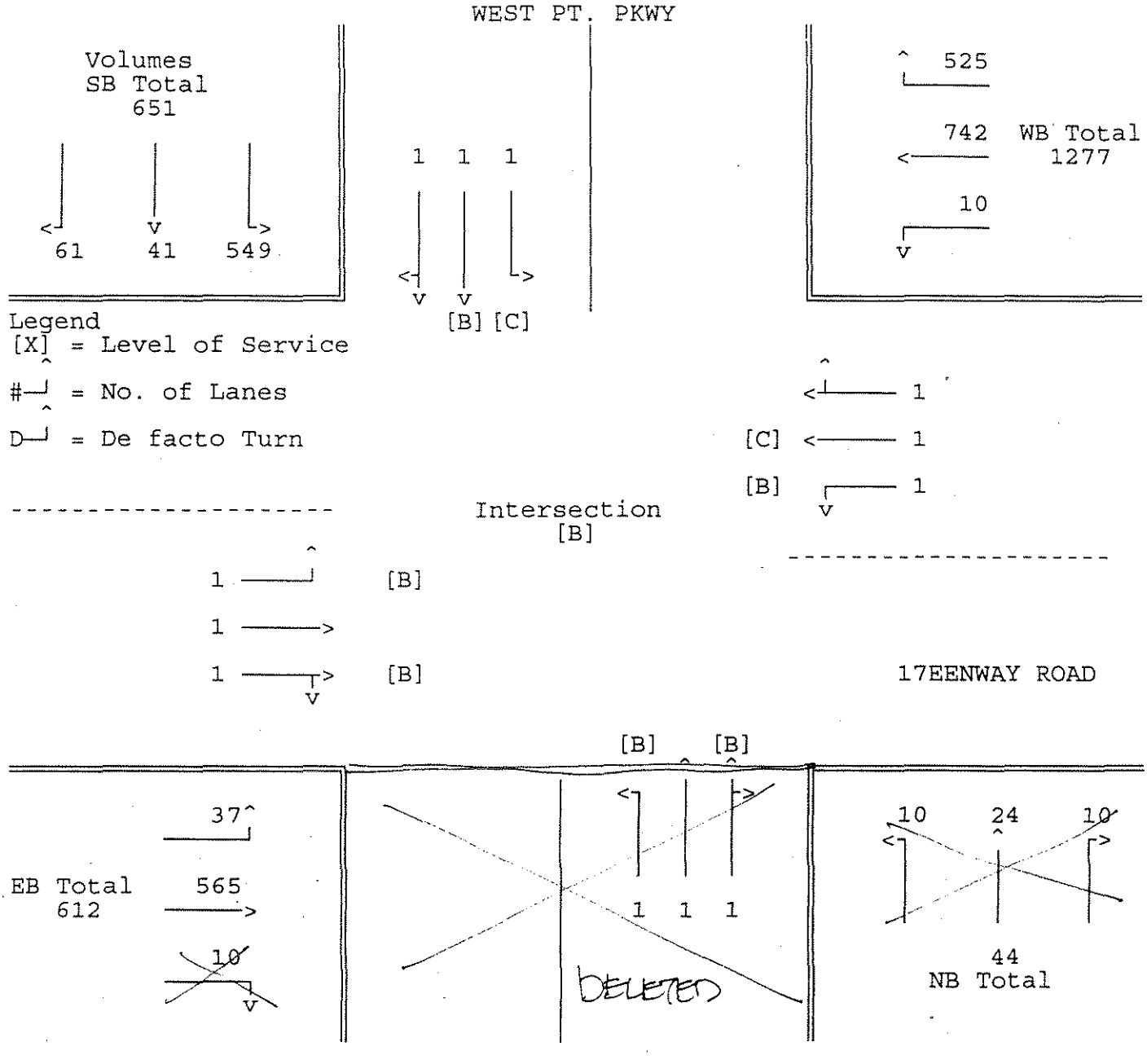
	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	120	252	0.325	0.467	7.1	B	6.8	B
	TR	1643	3520	0.387	0.467	6.8	B		
WB	L	228	488	0.048	0.467	5.6	B	15.4	C
	TR	1545	3310	0.907	0.467	15.4	C		
NB	L	563	1299	0.020	0.433	6.3	B	6.3	B
	TR	1459	3368	0.026	0.433	6.3	B		
SB	L	663	1529	0.872	0.433	18.6	C	16.7	C
	TR	1392	3213	0.080	0.433	6.4	B		

Intersection Delay = 13.5 sec/veh Intersection LOS = B

Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.890

INTERSECTION DIAGRAM

Intersection: 17EENWAY ROAD and WEST PT. PKWY
Time period: PM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-04-1997
Center For Microcomputers In Transportation

Streets: (E-W) 17EENWAY ROAD (N-S) WEST PT. PKWY
Analyst: MSE File Name:
Area Type: Other 6-4-97 AM PEAK
Comment: 2015 W/PROJECT

DELETED

	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	41	830	10	10	885	277	10	33	10	275	11	104
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR 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

Signal Operations

Phase Combination	1	2	3	4		5	6	7	8
EB Left	*				NB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
WB Left	*				SB Left	*			
Thru	*				Thru	*			
Right	*				Right	*			
Peds	*				Peds	*			
NB Right					EB Right				
SB Right					WB Right				
Green	28.0A				Green	26.0A			
Yellow/AR	3.0				Yellow/AR	3.0			

Cycle Length: 60 secs Phase combination order: #1 #5

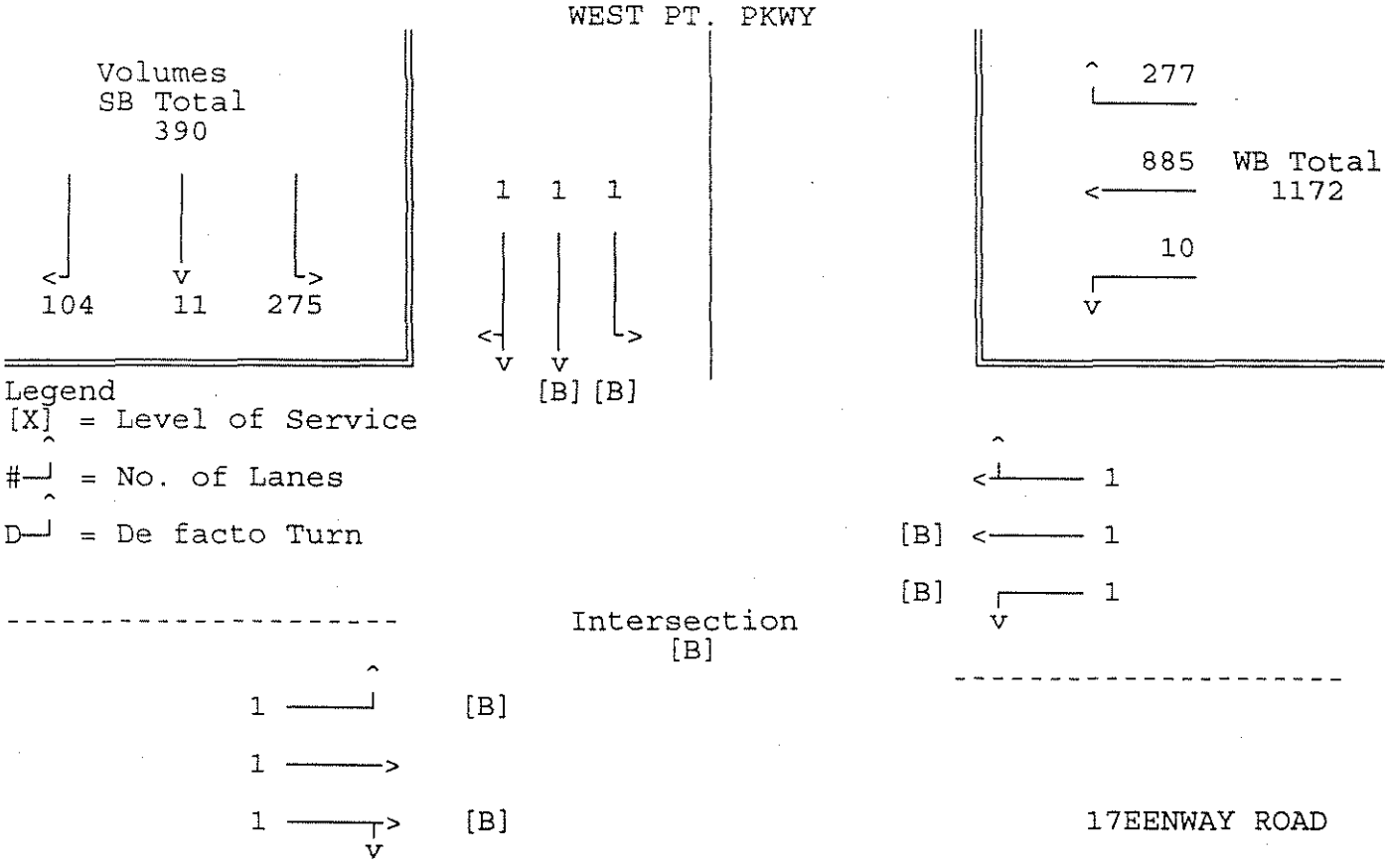
Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	120	252	0.358	0.467	7.4	B	7.8	B
	TR	1644	3523	0.565	0.467	7.8	B		
WB	L	120	252	0.092	0.467	5.8	B	11.1	B
	TR	1588	3403	0.809	0.467	11.2	B		
NB	L	546	1261	0.020	0.433	6.3	B	6.3	B
	TR	1475	3403	0.033	0.433	6.3	B		
SB	L	647	1493	0.447	0.433	8.1	B	7.6	B
	TR	1323	3053	0.096	0.433	6.5	B		

Intersection Delay = 9.3 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.635

INTERSECTION DIAGRAM

Intersection: 17EENWAY ROAD and WEST PT. PKWY
Time period: AM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) GREENWAY ROAD (N-S) WEST PT. PKWY
Analyst: MSE File Name:
Area Type: Other 6-5-97 PM PEAK
Comment: 2015 W/PROJECT DELETED

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	<	1	2	< 1	1	2	<	1	> 2	1
Volumes	43	879	10	10	882	804	10	24	10	730	41	97
Lane W (ft)	12.0	12.0		12.0	12.0	12.0	12.0	12.0		12.0	12.0	12.0
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*				NB	Left	*			
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*					Peds	*			
WB	Left	*				SB	Left	*			
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*					Peds	*			
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		40.0A				Green		34.0A			
Yellow/AR		3.0				Yellow/AR		3.0			

Cycle Length: 80 secs Phase combination order: #1 #5

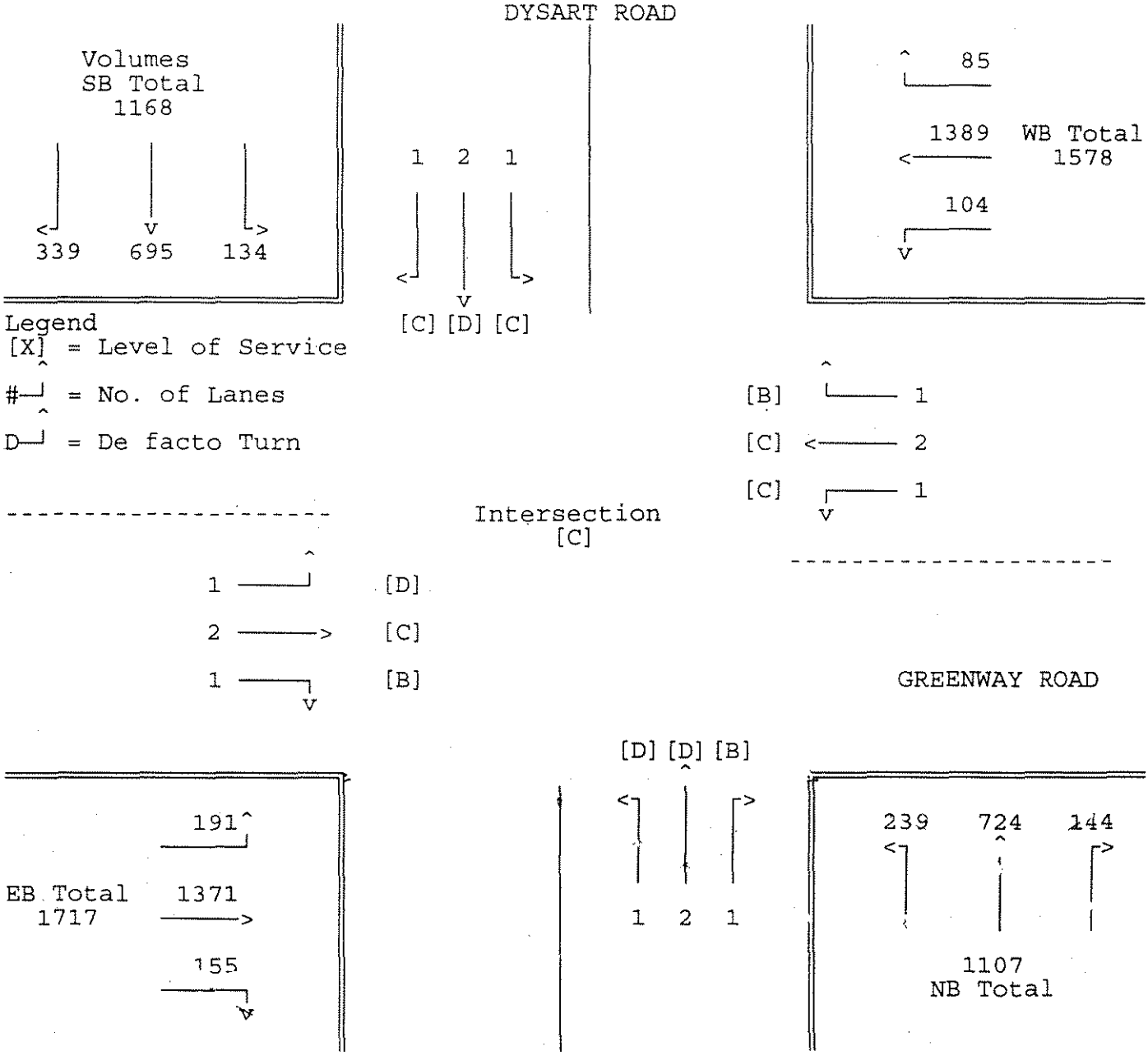
Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	90	176	0.500	0.500	12.2	B	9.4	B
	TR	1762	3523	0.558	0.500	9.3	B		
WB	L	102	205	0.107	0.500	6.8	B	12.2	B
	TR	1705	3410	0.738	0.500	11.5	B		
	R	750	1500	0.767	0.500	13.8	B		
NB	L	630	1483	0.017	0.425	8.6	B	8.6	B
	TR	1431	3368	0.027	0.425	8.6	B		
SB	DfL	1144	2691	0.692	0.425	13.4	B	12.7	B
	T	750	1765	0.057	0.425	8.8	B		
	R	638	1500	0.160	0.425	9.2	B		

Intersection Delay = 11.5 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.732

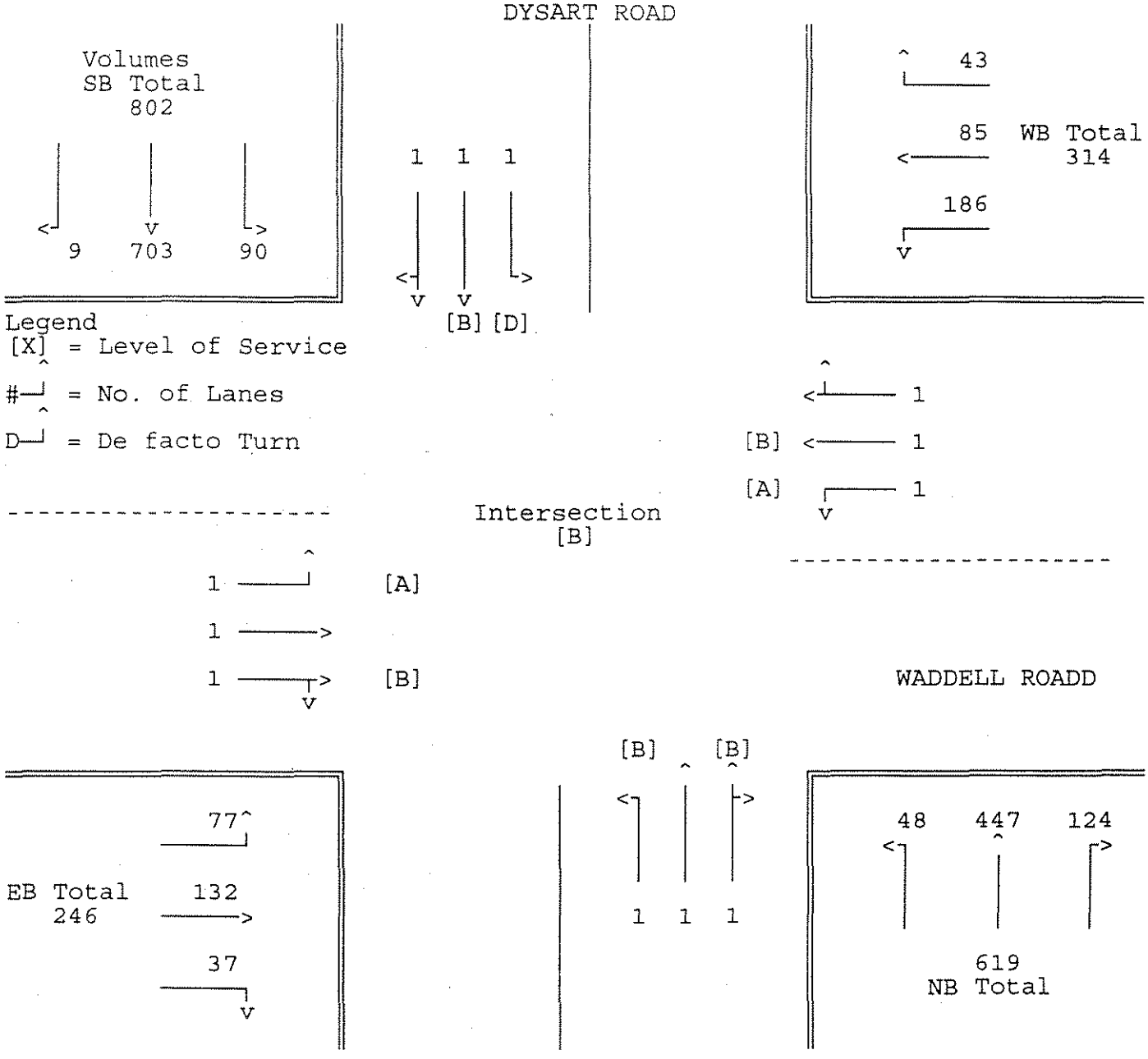
INTERSECTION DIAGRAM

Intersection: GREENWAY ROAD and DYSART ROAD
Time period: PM PEAK



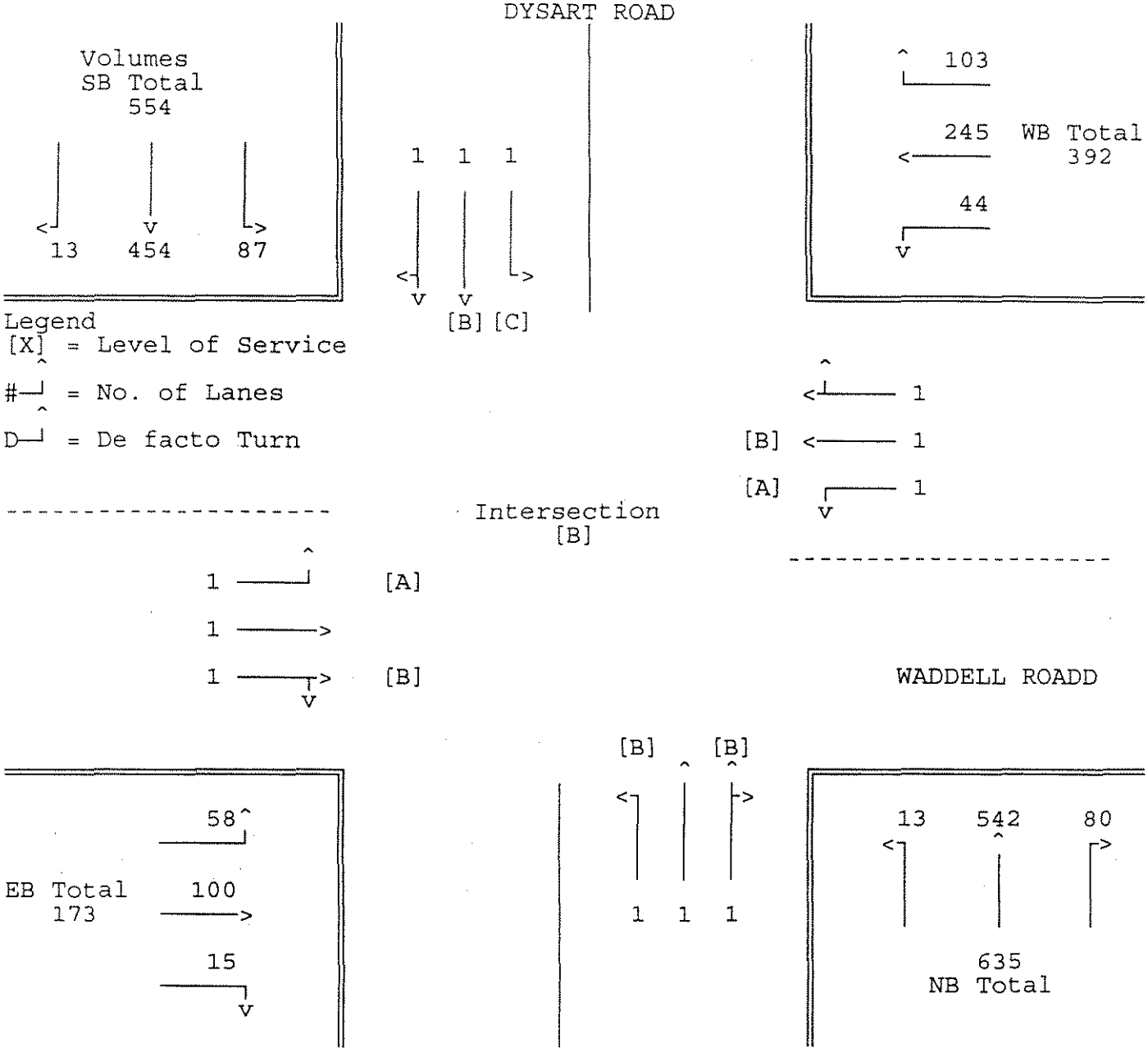
INTERSECTION DIAGRAM

Intersection: WADDELL ROADD and DYSART ROAD
Time period: AM PEAK



INTERSECTION DIAGRAM

Intersection: WADDELL ROADD and DYSART ROAD
Time period: PM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) WADDELL ROADD (N-S) DYSART ROAD
Analyst: MSE File Name:
Area Type: Other 6-5-97 AM PEAK
Comment: 2015 W/PROJECT

	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	105	174	57	351	111	61	90	770	234	94	852	17
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*			
	Thru		*				Thru	*			
	Right		*				Right	*			
	Peds	*	*				Peds	*			
WB	Left	*	*			SB	Left	*			
	Thru		*				Thru	*			
	Right		*				Right	*			
	Peds	*	*				Peds	*			
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		9.0A	12.0A			Green		30.0A			
Yellow/AR		3.0	3.0			Yellow/AR		3.0			

Cycle Length: 60 secs Phase combination order: #1 #2 #5

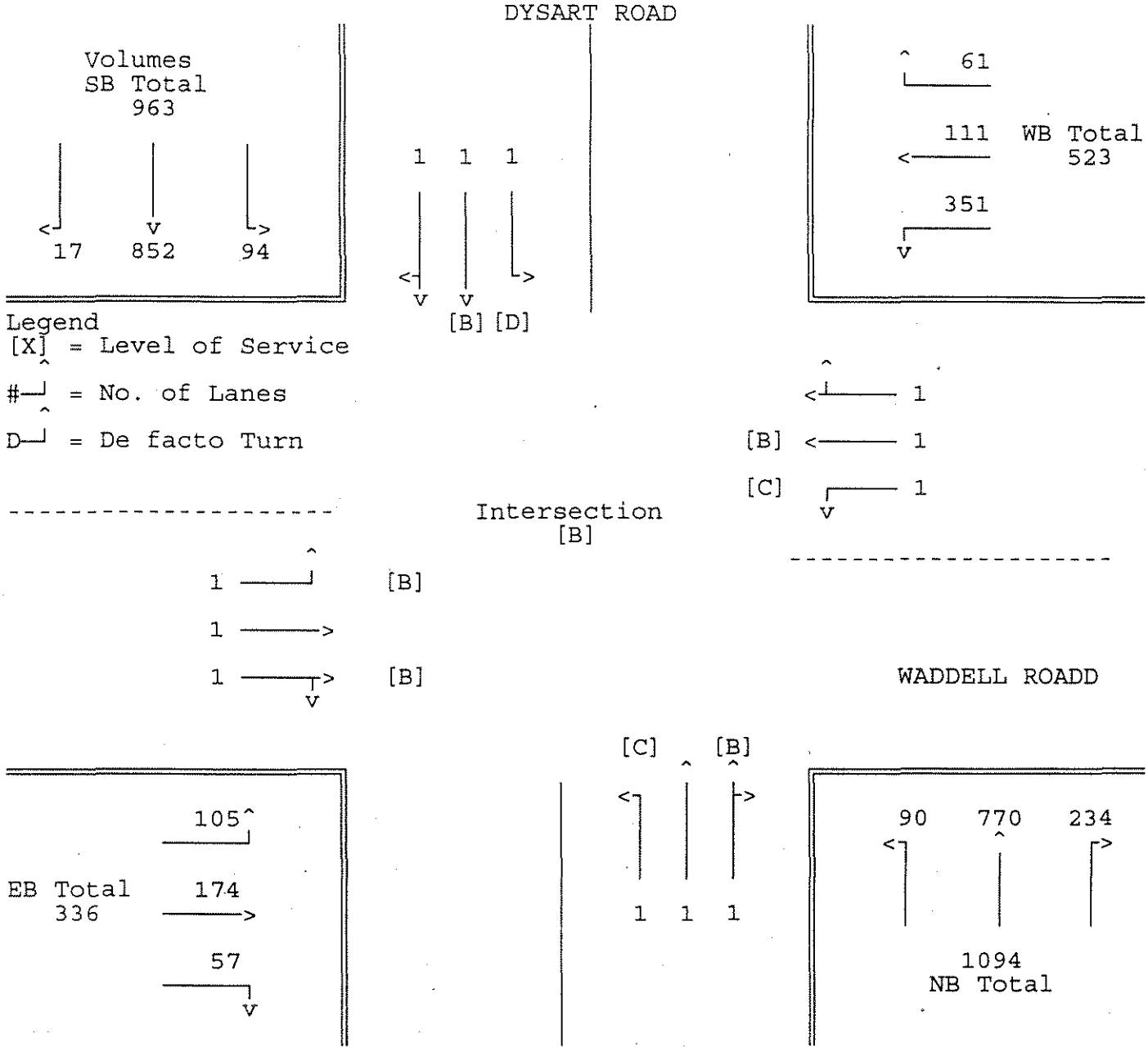
Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	545	1770	0.204	0.400	7.5	B	11.7	B
	TR	718	3588	0.355	0.200	13.5	B		
WB	L	452	1770	0.816	0.400	16.7	C	15.5	C
	TR	706	3528	0.269	0.200	13.2	B		
NB	L	124	248	0.766	0.500	23.9	C	8.8	B
	TR	1798	3595	0.618	0.500	7.5	B		
SB	L	124	248	0.798	0.500	27.6	D	8.7	B
	TR	1857	3714	0.518	0.500	6.7	B		

Intersection Delay = 10.3 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.764

INTERSECTION DIAGRAM

Intersection: WADDELL ROADD and DYSART ROAD
Time period: AM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) WADDELL ROADD (N-S) DYSART ROAD
Analyst: MSE File Name:
Area Type: Other 6-5-97 PM PEAK
Comment: 2015 W/PROJECT

	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	82	138	20	83	287	121	24	876	151	129	710	24
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*	*		
	Thru		*				Thru	*			
	Right		*				Right	*			
	Peds	*	*				Peds	*			
WB	Left	*	*			SB	Left	*	*		
	Thru		*				Thru	*			
	Right		*				Right	*			
	Peds	*	*				Peds	*			
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		9.0A	9.0A			Green		21.0A	9.0P		
Yellow/AR		3.0	3.0			Yellow/AR		3.0	3.0		

Cycle Length: 60 secs Phase combination order: #1 #2 #5 #6

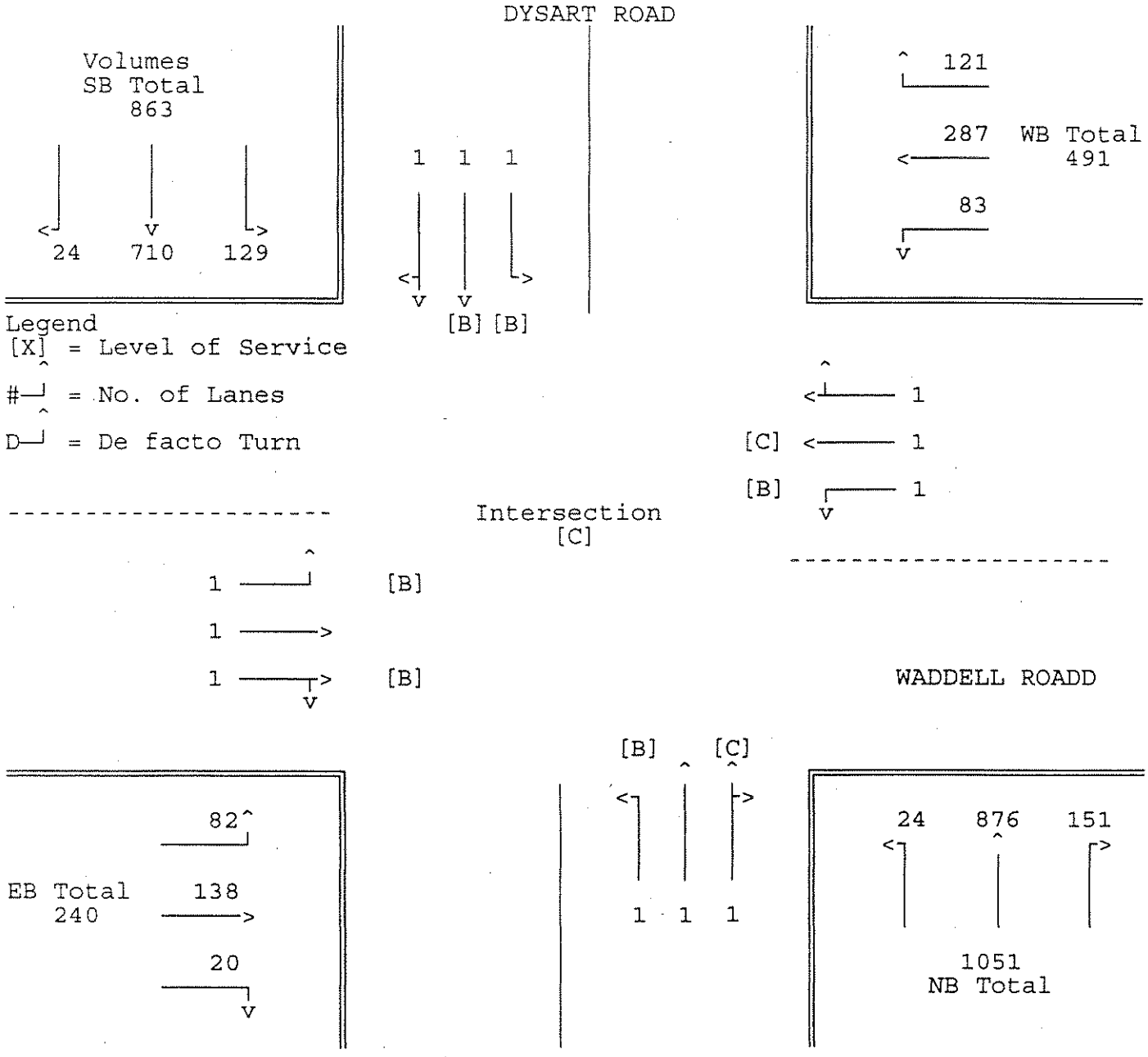
Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	390	1770	0.221	0.350	9.0	B	12.9	B
	TR	548	3655	0.317	0.150	14.8	B		
WB	L	496	1770	0.175	0.350	8.6	B	21.7	C
	TR	534	3560	0.843	0.150	24.2	C		
NB	L	478	1770	0.052	0.550	7.0	B	17.5	C
	TR	1275	3643	0.890	0.350	17.7	C		
SB	L	478	1770	0.285	0.550	10.7	B	11.1	B
	TR	1297	3707	0.625	0.350	11.2	B		

Intersection Delay = 15.8 sec/veh Intersection LOS = C
Lost Time/Cycle, L = 9.0 sec Critical v/c(x) = 0.625

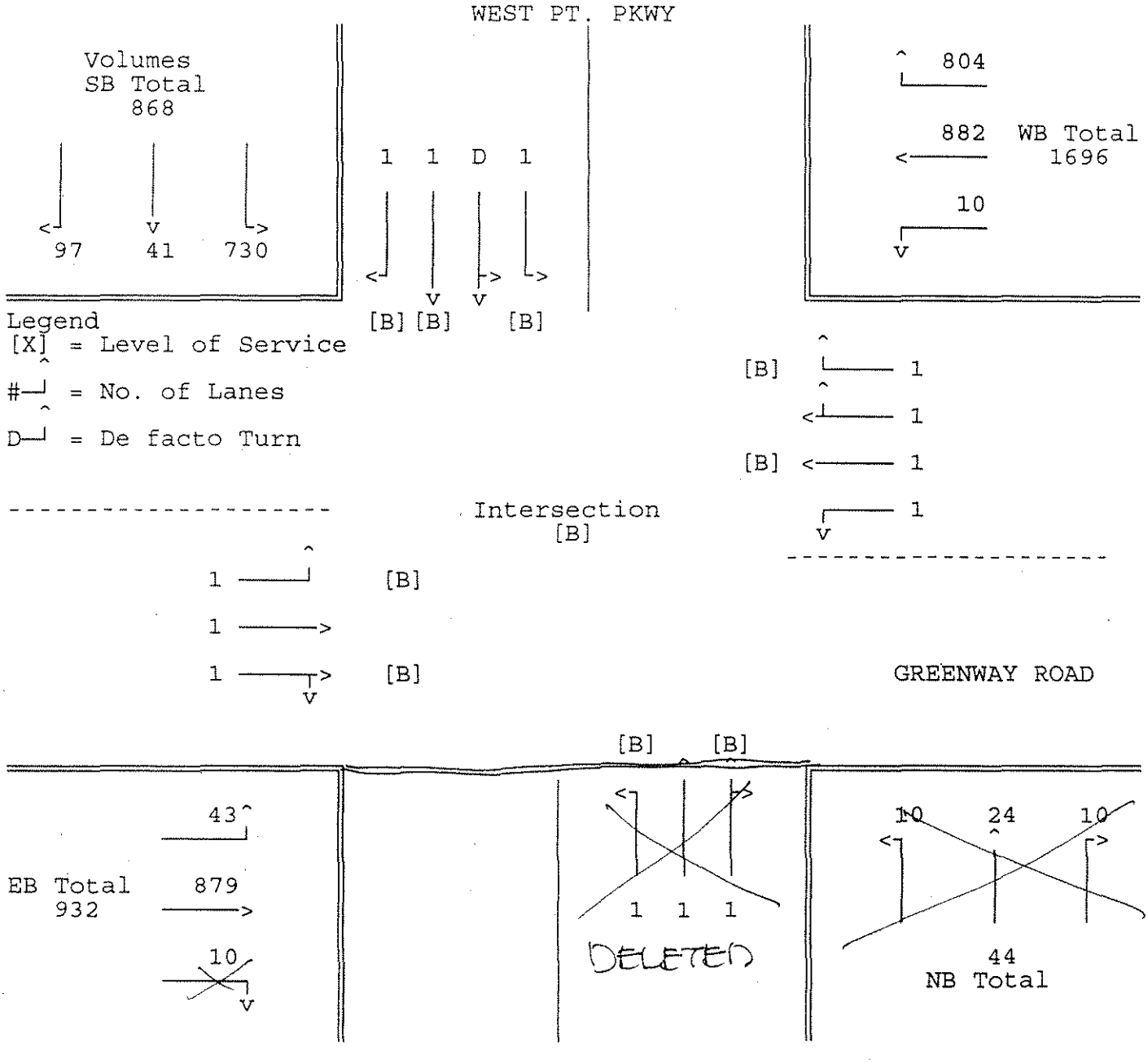
INTERSECTION DIAGRAM

Intersection: WADDELL ROADD and DYSART ROAD
Time period: PM PEAK



INTERSECTION DIAGRAM

Intersection: GREENWAY ROAD and WEST PT. PKWY
Time period: PM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) GREENWAY ROAD (N-S) DYSART ROAD
Analyst: MSE File Name:
Area Type: Other 6-5-97 AM PEAK
Comment: 2002 W/PROJECT

	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	151	592	137	128	549	53	82	540	83	92	480	182
Lane W (ft)	12.0	12.0		12.0	12.0		12.0	12.0		12.0	12.0	
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*				NB	Left	*			
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*					Peds	*			
WB	Left	*				SB	Left	*			
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*					Peds	*			
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		44.0A				Green		30.0A			
Yellow/AR		3.0				Yellow/AR		3.0			

Cycle Length: 80 secs Phase combination order: #1 #5

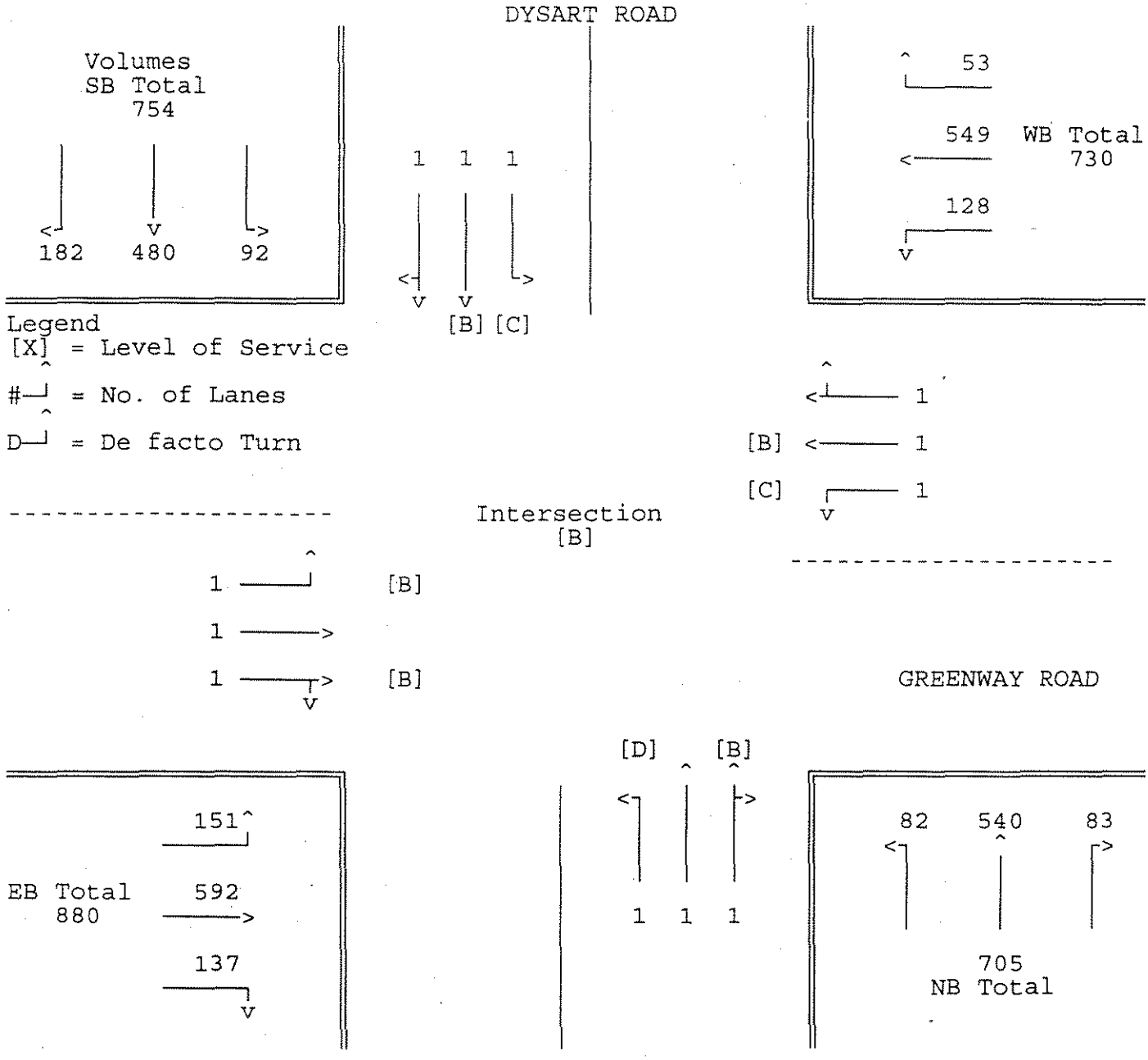
Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	260	472	0.612	0.550	10.9	B	7.6	B
	TR	1886	3430	0.427	0.550	6.9	B		
WB	L	195	354	0.693	0.550	15.3	C	8.0	B
	TR	1916	3483	0.348	0.550	6.5	B		
NB	L	121	322	0.712	0.375	25.5	D	14.3	B
	TR	1297	3459	0.530	0.375	12.9	B		
SB	L	136	364	0.711	0.375	24.2	C	14.6	B
	TR	1269	3384	0.577	0.375	13.4	B		

Intersection Delay = 11.0 sec/veh Intersection LOS = B
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.701

INTERSECTION DIAGRAM

Intersection: GREENWAY ROAD and DYSART ROAD
Time period: AM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) GREENWAY ROAD (N-S) DYSART ROAD
Analyst: MSE File Name:
Area Type: Other 6-5-97 PM PEAK
Comment: 2002 W/PROJECT

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Volumes	163	909	127	58	1110	57	164	464	103	103	460	274
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*	*		
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*	*				Peds	*	*		
WB	Left	*	*			SB	Left	*	*		
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*	*				Peds	*	*		
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		32.0A	10.0A			Green		16.0A	10.0A		
Yellow/AR		3.0	3.0			Yellow/AR		3.0	3.0		

Cycle Length: 80 secs Phase combination order: #1 #2 #5 #6

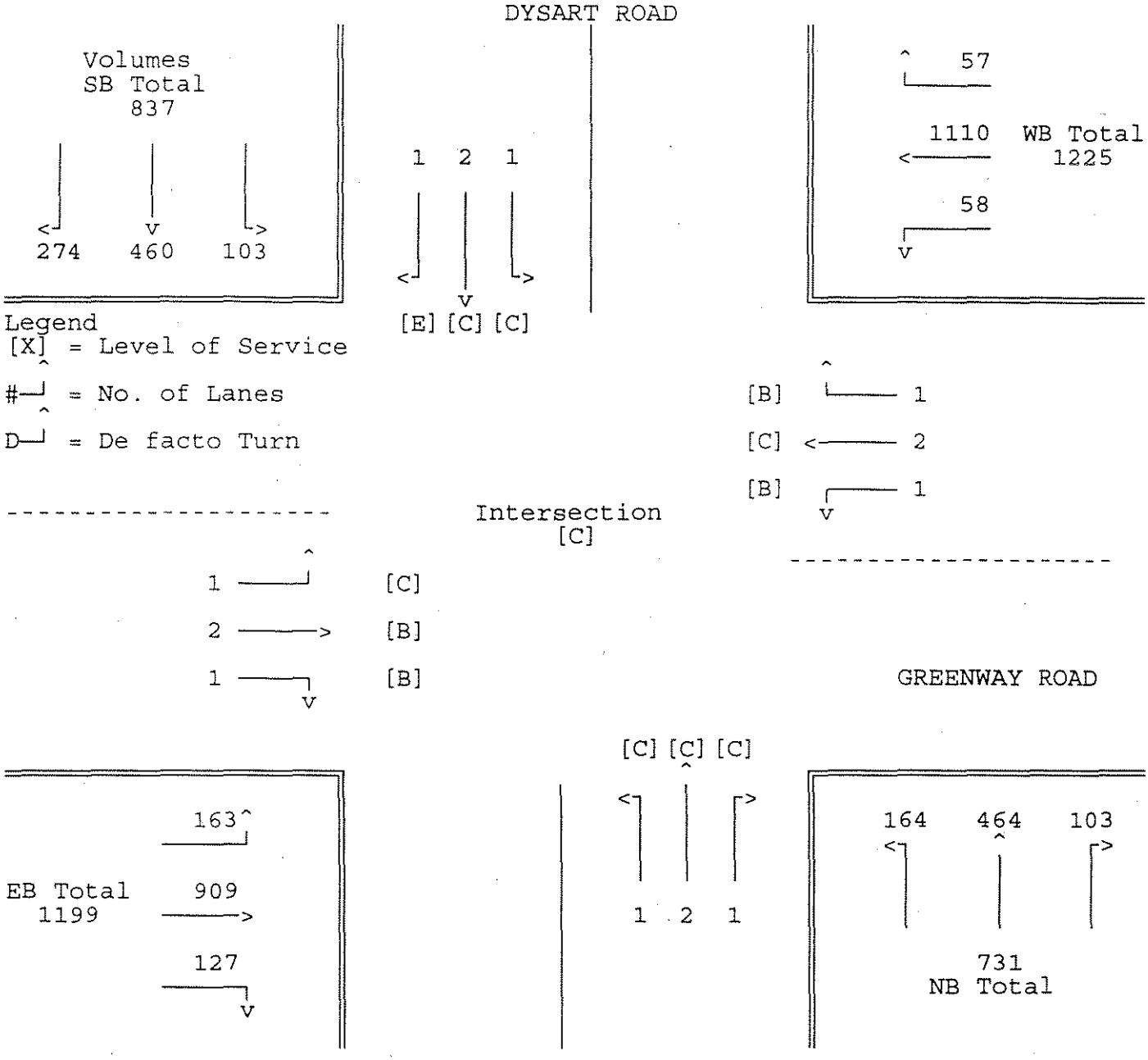
Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	361	1676	0.476	0.563	17.5	C	14.2	B
	T	1412	3529	0.712	0.400	14.2	B		
	R	600	1500	0.223	0.400	10.2	B		
WB	L	361	1676	0.169	0.563	12.1	B	17.9	C
	T	1412	3529	0.869	0.400	18.6	C		
	R	600	1500	0.100	0.400	9.7	B		
NB	L	361	1676	0.479	0.363	17.8	C	20.5	C
	T	706	3529	0.725	0.200	21.9	C		
	R	300	1500	0.360	0.200	18.2	C		
SB	L	361	1676	0.299	0.363	16.1	C	30.3	D
	T	706	3529	0.720	0.200	21.8	C		
	R	300	1500	0.960	0.200	50.7	E		

Intersection Delay = 19.9 sec/veh Intersection LOS = C
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.755

INTERSECTION DIAGRAM

Intersection: GREENWAY ROAD and DYSART ROAD
Time period: PM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) GREENWAY ROAD (N-S) DYSART ROAD
Analyst: MSE File Name:
Area Type: Other 6-5-97 AM PEAK
Comment: 2015 W/PROJECT

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Volumes	187	925	155	183	829	89	119	830	125	143	568	277
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left	*	*			NB	Left	*	*		
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*	*				Peds	*	*		
WB	Left	*	*			SB	Left	*	*		
	Thru	*					Thru	*			
	Right	*					Right	*			
	Peds	*	*				Peds	*	*		
NB	Right					EB	Right				
SB	Right					WB	Right				
Green		26.0A	9.0A			Green		24.0A	9.0A		
Yellow/AR		3.0	3.0			Yellow/AR		3.0	3.0		

Cycle Length: 80 secs Phase combination order: #1 #2 #5 #6

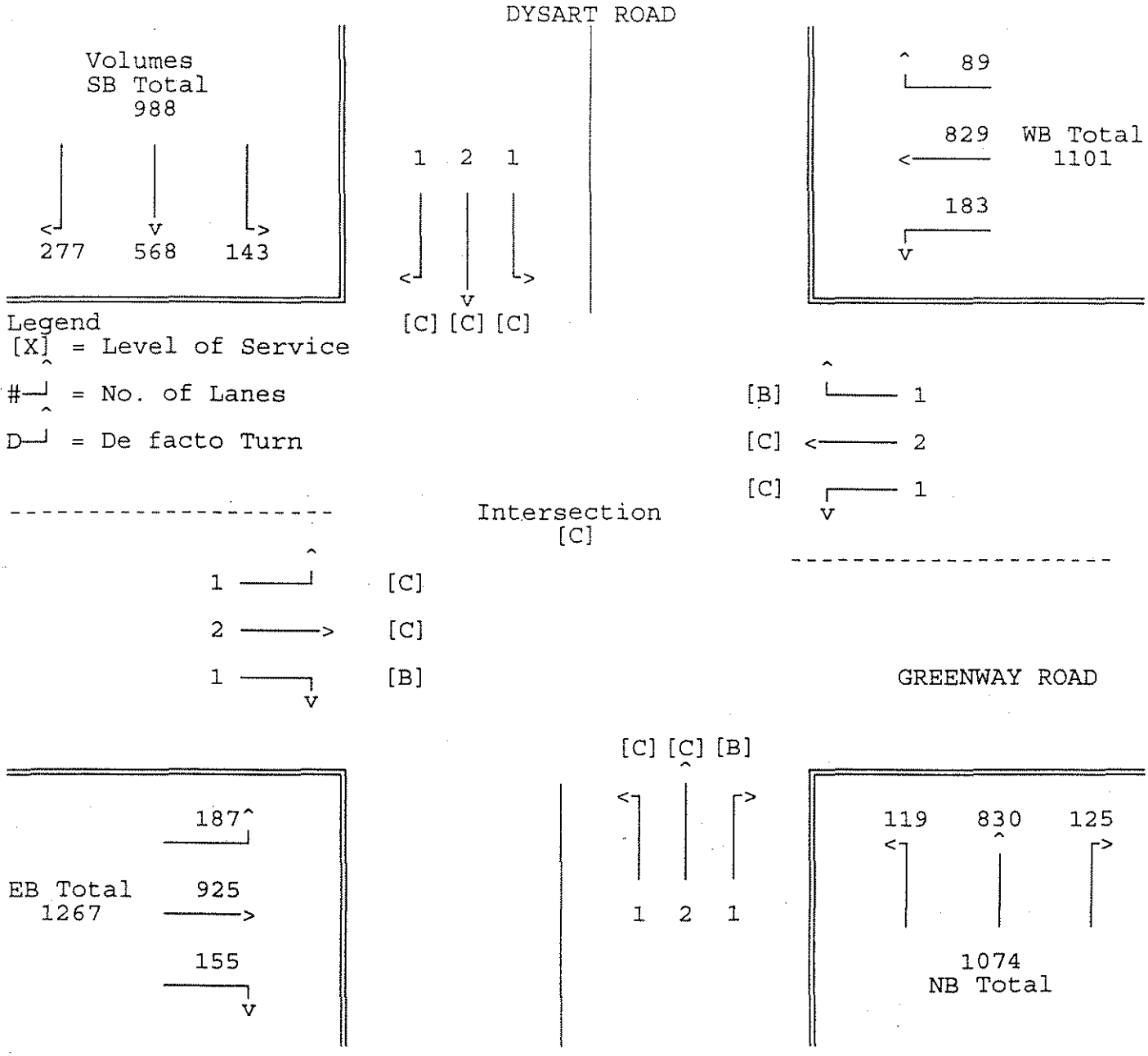
Intersection Performance Summary

	Lane Group: Mvmts	Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	339	1676	0.581	0.475	19.5	C	21.4	C
	T	1147	3529	0.892	0.325	23.1	C		
	R	487	1500	0.334	0.325	13.4	B		
WB	L	339	1676	0.569	0.475	19.8	C	18.5	C
	T	1147	3529	0.800	0.325	18.8	C		
	R	487	1500	0.193	0.325	12.6	B		
NB	L	340	1676	0.368	0.450	15.6	C	20.9	C
	T	1059	3529	0.867	0.300	22.6	C		
	R	450	1500	0.293	0.300	14.0	B		
SB	L	340	1676	0.444	0.450	18.0	C	16.9	C
	T	1059	3529	0.593	0.300	16.1	C		
	R	450	1500	0.649	0.300	18.0	C		

Intersection Delay = 19.6 sec/veh Intersection LOS = C
Lost Time/Cycle, L = 6.0 sec Critical v/c(x) = 0.786

INTERSECTION DIAGRAM

Intersection: GREENWAY ROAD and DYSART ROAD
Time period: AM PEAK



HCM: SIGNALIZED INTERSECTION SUMMARY Version 2.4d 06-05-1997
Center For Microcomputers In Transportation

Streets: (E-W) GREENWAY ROAD (N-S) DYSART ROAD
Analyst: MSE File Name:
Area Type: Other 6-5-97 PM PEAK
Comment: 2015 W/PROJECT

	Eastbound			Westbound			Northbound			Southbound		
	L	T	R	L	T	R	L	T	R	L	T	R
No. Lanes	1	2	1	1	2	1	1	2	1	1	2	1
Volumes	191	1371	155	104	1389	85	239	724	144	134	695	339
Lane W (ft)	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0	12.0
RTOR 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

Signal Operations

Phase Combination		1	2	3	4			5	6	7	8
EB	Left		*	*		NB	Left	*	*	*	
	Thru		*	*			Thru		*	*	
	Right		*	*			Right		*	*	
	Peds	*	*				Peds	*	*		
WB	Left	*	*			SB	Left	*	*	*	
	Thru	*	*				Thru			*	
	Right	*	*				Right			*	
	Peds	*	*				Peds	*	*		
NB	Right	*				EB	Right	*	*		
SB	Right	*		*		WB	Right	*			
Green		7.0A	35.0A	9.0A		Green		8.0A	1.0A	22.0A	
Yellow/AR		3.0	3.0	3.0		Yellow/AR		3.0	3.0	3.0	

Cycle Length: 100 secs Phase combination order: #1 #2 #3 #5 #6 #7

Intersection Performance Summary

	Lane Mvmts	Group: Cap	Adj Sat Flow	v/c Ratio	g/C Ratio	Delay	LOS	Approach: Delay	LOS
EB	L	287	1770	0.700	0.470	30.3	D	18.8	C
	T	1751	3725	0.865	0.470	18.8	C		
	R	981	1583	0.166	0.620	5.2	B		
WB	L	198	1770	0.551	0.450	16.8	C	21.5	C
	T	1676	3725	0.916	0.450	22.7	C		
	R	839	1583	0.106	0.530	7.6	B		
NB	L	287	1770	0.878	0.370	34.0	D	26.7	D
	T	968	3725	0.826	0.260	26.7	D		
	R	570	1583	0.267	0.360	14.7	B		
SB	L	216	1770	0.653	0.370	20.3	C	30.2	D
	T	820	3725	0.938	0.220	38.0	D		
	R	602	1583	0.593	0.380	17.2	C		

Intersection Delay = 23.5 sec/veh Intersection LOS = C
Lost Time/Cycle, L = 12.0 sec Critical v/c(x) = 0.922

APPENDIX D

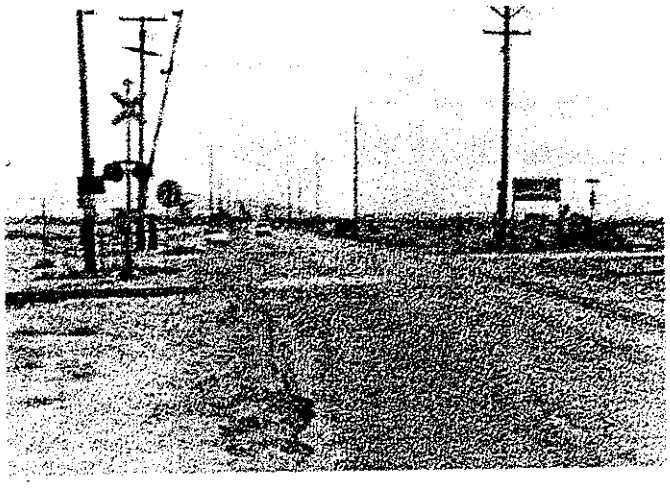
PRE-FINAL MCDOT DYSART CORRIDOR IMPROVEMENT PLAN SUMMARY

* Contact City of Surprise Engineering Department for
Final Corridor Improvement Plan

CC: Arena 6551.10
GRE
B. Collins
D. Lutzky
J. Minch
M. El Darwiche
B. Reyes
PHX. HOLDINGS II

PRE-FINAL
CORRIDOR IMPROVEMENT REPORT
FOR
DYSART ROAD - NORTHERN AVENUE TO GREENWAY ROAD
OLIVE AVENUE - LITCHFIELD ROAD TO EL MIRAGE ROAD

WORK ORDER NO. 80516



Prepared for:

MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION
TRANSPORTATION PLANNING DIVISION
2901 West Durango Street
Phoenix, Arizona 85009

Prepared by:

HNTB Corporation
Two Renaissance Square
40 North Central Avenue, Suite 300
Phoenix, Arizona 85004
Tel. (602) 528-4300

December 4, 1997

Registered Professional Engineer (Civil)
CERTIFICATE NO.
20957
BAILANG SUN
Date Signed 12-4-97
ARIZONA, U. S. A.

CORRIDOR IMPROVEMENT REPORT
FOR
DYSART ROAD - NORTHERN AVENUE TO GREENWAY ROAD
OLIVE AVENUE - LITCHFIELD ROAD TO EL MIRAGE ROAD

Sections 2, 3, 10, 11, 14, 15, 22, 23, 25~28 & 33~36 of T3N, R1W, and Sections 2 & 3 of T2N, R1W, G&SRB&M

MCDOT TRANSPORTATION PLANNING DIVISION

WORK ORDER NO. 80516

December 4, 1997

Project Name: Improvement Study Dysart Road & Olive Avenue	**Project Termini:** Approx. 8.0 Km (5 Miles) between Northern Ave. & Greenway Rd. along Dysart Rd. Approx. 3.2 Km (2 Miles) between Litchfield and El Mirage Rds. Along Olive Ave.
Requested by: Maricopa County Department of Transportation	
Improvement Requested: Widen Dysart Road and Olive Avenue from 2 Lanes to 5 Lanes with 42.672 Meters (140 Feet) of right-of-way for the ultimate 7 Lanes	
PM_{10} Area? Yes	**Length:** 11.2 Kilometers
Estimated Project Cost: $ 20,190,000	

EXECUTIVE SUMMARY:

This improvement study for Dysart Road from Northern Avenue to Greenway Road and Olive Avenue from Litchfield to El Mirage Roads includes analyzing the feasibility of the ultimate seven lane roadway section as shown in Urban Roads of Regional Significance and proposed improvements to accommodate projected year 2020 traffic volumes and safety requirements (**Reference 1**). The existing two lane section of Dysart Road and Olive Avenue does not allow for safe access to the Dysart schools and a railroad crossing at the intersection of Dysart and Waddell (Thunderbird) Roads, and cannot accommodate the future year 2020 traffic volumes. In addition, the existing pavement in many places is in poor condition and will require extensive maintenance for restoration.

Some of key design concept guidelines per the Roads of Regional Significance are six lanes with left turn bays and bike lanes, limiting access to four per mile, creating landscape areas, and a 64 km/h (40 mph) posted speed. Major design considerations in this project are safe school access to Dysart Middle and High Schools, a major railroad crossing, and accommodating future development. Major design constraints for roadway improvements are a railroad crossing, Dysart Schools' four classroom buildings and five access points, an APS substation, a residential area east of Dysart Road and north of Peoria Avenue, and 69kv and 12kv APS powerlines.

A traffic analysis was performed to determine the lane requirements and lane configurations at each of eight intersections for years 2005 and 2020 traffic requirements. The basis of our traffic analysis was the field-collected current traffic volumes and turning movements, and the MCDOT projected year 2020 traffic volumes. In addition, year 2005 projected traffic volumes were interpolated based on the current traffic distribution, and the current and projected year 2020 traffic data. Based on the results of traffic analysis, we are recommending a five lane roadway section on Dysart Road and Olive Avenue that will operate at Level of Service (LOS) B and C for the year 2020 traffic requirements. For the projected year 2005 traffic volumes a three lane roadway section on Dysart Road and Olive Avenue will operate at LOS A and B.

Three railroad crossing alternatives were developed and evaluated; Railroad Crossing Alternative 1 is the preferred alternative which shifts Dysart Road to the west and centers the intersection on Waddell (Thunderbird) Road at the railroad crossing. This alternative increases safety, eliminates one of the two railroad crossings, maintains accesses to existing properties, minimizes the impacts to operation of the railroad crossing during construction, and obtains the majority of right-of-way needed from undeveloped areas.

The Full Cost Alternative for the improvements of Dysart Road and Olive Avenue was developed based on a five lane roadway section and a right-of-way of 42.672 meters (140 feet) for the ultimate seven lane roadway section. This five lane roadway section is per the MCDOT Rural Principal Arterial Road with the modification on a wider right-of-way. The proposed five lane section on Dysart Road is consistent with existing roadway sections at the north and south termini. The proposed roadway centerline will be shifted to the west from north of Olive Avenue to north of Dysart Schools and at the railroad crossing at the Dysart Road and Waddell (Thunderbird) Road intersection. Curb and gutter, and sidewalk are proposed along the Dysart Schools. The proposed alignment will also be shifted to the east in the vicinity of APS substation to avoid expensive relocation costs. More than the typical proposed 21.336 meters of right-of-way are required at Dysart Schools and the railroad crossing at the intersection of Dysart and Waddell Roads due to the alignment shifts.

The 69kv APS powerlines, and irrigation ditches and structures will need to be relocated outside of the proposed right-of-way for the improvements of Dysart Road and Olive Avenue. The on-site drainage improvements are required to drain roadside ditches and eventually discharge into the Lower El Mirage Wash and its tributary, and Dysart Drain Tributary. The existing irrigation ditches and delivery systems will be either relocated or become underground pipe systems. Project cost estimates including construction, design, right-of-way, and utility relocation costs were performed for the Full Cost Alternative.

I. INTRODUCTION

1. Background

The study segments of Dysart Road and Olive Avenue are located northwest of the Phoenix Metropolitan area. The project site runs north along Dysart Road from Northern Avenue to Greenway Road and east along Olive Avenue from Litchfield Road to El Mirage Road. The Dysart Road portion is approximately 8.0 km (5 miles) long, while the Olive Avenue portion is approximately 3.2 km (2 miles) for a total length of 11.2 km (7 miles) (See **Figure 1 - Location Map**). The horizontal alignment for Dysart Road and Olive Avenue is relatively straight and the change in elevation is minimal. Dysart Road is in an agricultural area excluding Dysart Schools and a few residential areas on the east, while Olive Avenue runs through mostly agricultural areas. Dysart Road is primarily in the City of El Mirage with the Greenway Road intersection in the City of Surprise. A few minor portions are within the County and City of Glendale. Olive Avenue is partially in the County, City of Glendale, and City of Surprise. **Figure 2** shows cities' and county boundary limits for the study area.

The existing pavement in many places is in poor condition and will require extensive maintenance for restoration. There are six adjoining streets along Dysart Road. These intersections are signalized intersections at Northern and Olive Avenues, t-intersection at Cactus Road, two way stop intersection at Peoria Avenue, and four way stop intersections at Waddell (Thunderbird) Road and Greenway Road. A Burlington Northern Santa Fe Railroad (BN-SFRR) spur runs southwest from the east side of Grand Avenue (US 60) across Waddell (Thunderbird) Road and Dysart Road near their intersection.

Dysart Road and Olive Avenue are classified as Urban Roads of Regional Significance (RRS) in the RRS network (**Reference 1**). The Urban RRS has a seven lane roadway section, a 42.672 meter (140 foot) right-of-way, bike lanes and landscape buffers. This RRS network was developed to complement the MAG Freeway/Expressway Plan by providing a grid of roads built into a high level of design. These roadways of RRS would help to relieve peak hour congestion, ensure a high level of mobility throughout the Valley, and provide access into and out of the region.

The purpose of this improvement study is to assess the existing corridor conditions, identify appropriate improvements to these roadways, evaluate the feasibility of the ultimate seven lane roadway section, and evaluate the traffic volumes for years 2005 and 2020. Major concerns include Dysart Schools access, a railroad crossing at the intersection of Waddell (Thunderbird) and Dysart Roads, and current residential development east of Dysart Road and north of Peoria Avenue. Three horizontal alignment alternatives are to be developed and evaluated at the railroad crossing at Dysart and Waddell (Thunderbird) Roads.

2. Drainage

The study site is located within the White Tank/Agua Fria Area Drainage Master Study (ADMS) area which covers a 550.4 square km (215 square mile) watershed area (**Reference 5**). The study was completed by The WLB Group, Inc. in December 1994 for the Flood Control District of Maricopa County (FCDMC). The study site is located within two of ten major drainage basins for the White Tank/Agua Fria ADMS. These two drainage basins are Lower El Mirage Watershed and Dysart Drain Watershed. **Figure 4** shows the off-site drainage area map. It should be noted that a small cross hatched area on Dysart Road in proximity of Cactus Road in **Figure 4** drains directly to the Agua Fria River. The general drainage in the study drainage area is from northwest to southeast toward Agua Fria River and Dysart Drain. The Agua Fria River is the outfall for Dysart Drain.

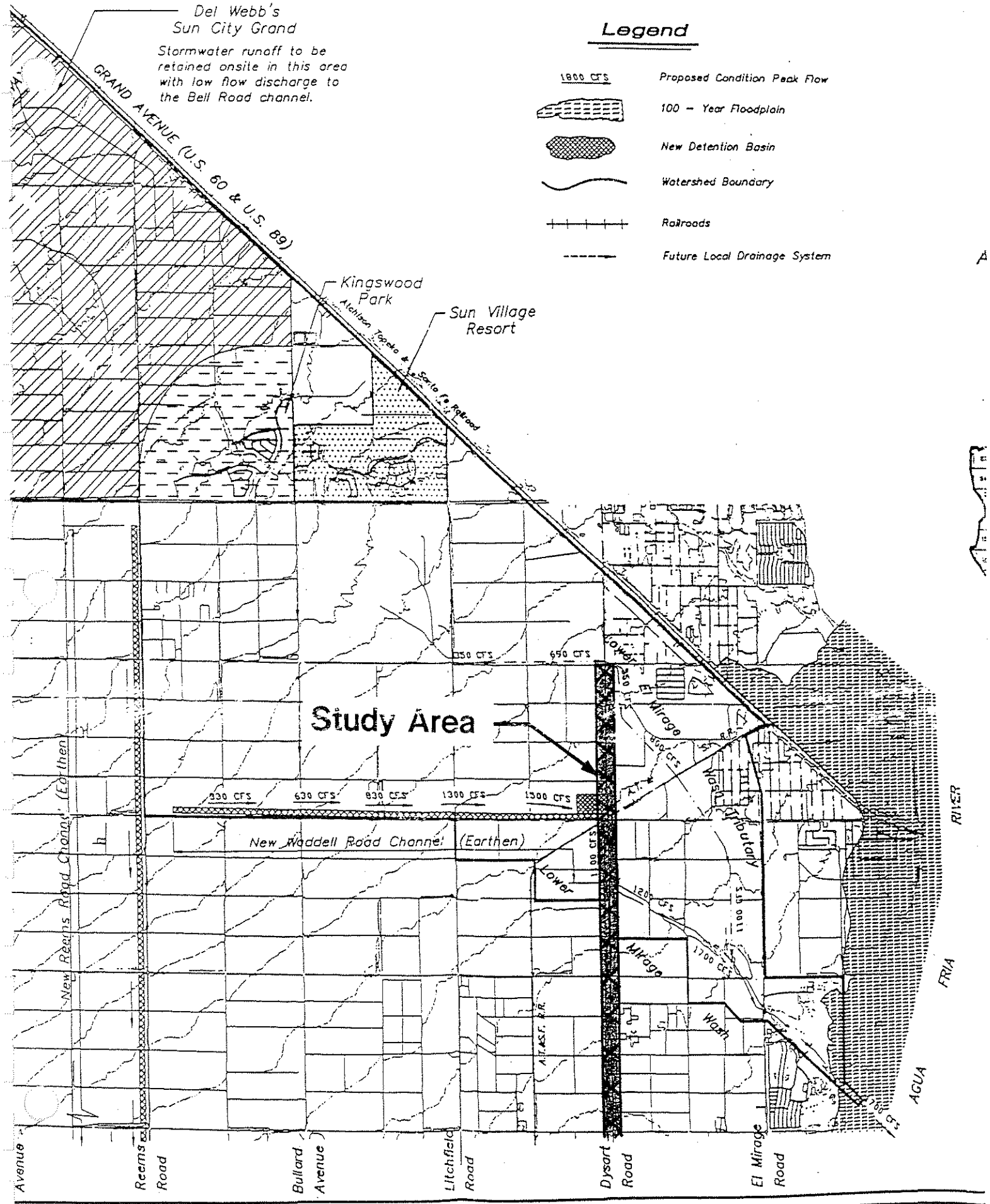
Lower El Mirage Wash Watershed

The Lower El Mirage Wash Watershed consists of two washes, Lower El Mirage Wash and Lower El Mirage Wash Tributary. The Lower El Mirage Wash Tributary collects the overland flows, crosses the intersection of Dysart and Greenway Roads, and then heads toward southeasterly eventually joining Lower El Mirage Wash just northwest of the intersection of Cactus and El Mirage Roads. Based upon the White Tank/Agua Fria ADMS, a Waddell Road Channel is planned on Waddell (Thunderbird) Road west of Dysart Road and a regional detention basin is also planned at the northwest corner of the intersection of Dysart and Waddell (Thunderbird) Roads. The outlet for the Waddell (Thunderbird) Road Detention Basin is proposed on Dysart Road and drains into the Lower El Mirage Wash. **Figure 5** shows the planned improvements and the 100-year peak flows for Lower El Mirage Wash Watershed.

Dysart Drain Watershed

Dysart Drain is a major drainage channel that collects and conveys floodwaters from the contributing drainage area downstream of McMicken Dam. It is located along the north boundary of Luke AFB, beginning at Reems Road and flowing easterly to the Agua Fria River. The FCDMC recently completed the improvements to the Dysart Drain concrete lined channel and constructed a 160-acre detention basin located at the northeast corner of Reems Road and Northern Avenue (**References 6, 7 & 8**). Luke AFB is currently maintaining the Dysart Drain facilities.

Dysart Drain Tributary is a natural occurring wash that discharges to Dysart Drain approximately 0.8 km (0.5 mile) upstream of Dysart Drain's outlet to the Agua Fria River. This tributary follows the Dysart Road alignment from Cactus Road to Olive Avenue, then draining southeasterly toward Dysart Drain. **Figure 6** shows the planned improvements and the 100-year peak flows for Dysart Drain Watershed.


Del Webb's
Sun City Grand
Stormwater runoff to be retained onsite in this area with low flow discharge to the Bell Road channel.
GRAND AVENUE (U.S. 60 & U.S. 89)
Kingswood Park
Sun Village Resort
Atchison Topeka & Santa Fe Railroad
Legend
1800 CFS
Proposed Condition Peak Flow
100 - Year Floodplain
New Detention Basin
Watershed Boundary
Railroads
Future Local Drainage System
Study Area
New Waddell Road Channel (Earthen)
New Reems Road Channel (Earthen)
330 CFS
630 CFS
830 CFS
1300 CFS
1500 CFS
650 CFS
1100 CFS
1200 CFS
1700 CFS
Lower El Mirage Wash Tributary
Lower El Mirage Wash
A.T.&S.F. R.R.
Avenue
Reems Road
Bullard Avenue
Litchfield Road
Dysart Road
El Mirage Road
AGUA FRIA RIVER

3. **Design:** This project will require design. Traffic analysis will be required to determine intersections for signalization. Drainage analysis and design should be incorporated with FCDMC off-site drainage improvement plans and include the 100-year flood plain considerations.

4. **Cost Estimate:** The project cost estimate for the recommended Full Cost Alternative (five lane roadway section) is $20,183,000.

5. **Design Concept Report (DCR):** A DCR is recommended.

6. **Improvement Sequencing:** The segment of Dysart Road near the Dysart Schools should be constructed first if funding is not available for the whole project. This would allow for improved safety access to the schools as well as maintaining the flow of traffic. Dysart Schools may also be able to contribute some funding to improve the school accesses. The project cost estimate for the recommended improvements on Dysart Road at the Dysart Schools is $3,720,000.

V. ALTERNATIVES

Two alternatives, No Build and Full Cost Alternatives, for Dysart Road and Olive Avenue were developed for the study area. Under Full Cost Alternatives, three horizontal alignment alternatives were developed and evaluated at the railroad crossing at the intersection of Dysart and Waddell (Thunderbird) Roads. Following is the description of each of the alternatives. Proposed plans for three horizontal alignment alternatives at the railroad crossing are shown in **Appendix B**.

1. No Build Alternative

The No Build alternative will retain the existing roadway with no capital improvements. This alternative was considered and rejected since it does not improve the safety and efficiency of the roadways at the BN-SFRR crossing at the intersection of Dysart and Waddell (Thunderbird) Roads as well as the Dysart Schools access problem. Although the existing roadway will operate at LOS B or better up to the projected year 2005 traffic volumes, it will require at least some maintenance for pavement restoration. In addition, it appears that the motorists in the area fail to yield and follow the signs, especially in the school zone. Therefore, a wider roadway section is needed to improve the efficiency and safety of the roadways.

2. Full Cost Alternative

This alternative addresses the improvements needed for the study segments of Dysart Road and Olive Avenue for the year 2020 traffic volumes. Based on the results of our traffic analysis, a LOS F will occur at four intersections with the existing roadway section. These four intersections are Dysart Road at Northern Avenue, Dysart Road at Waddell (Thunderbird) Road, Olive Avenue at Litchfield Road, and Olive Avenue at El Mirage Road.

Therefore, the improvements are necessary for the study roadways to achieve a LOS C or better at these four intersection.

All eight intersections will operate at LOS B or better based on the results of our analysis with the existing roadway sections and the projected year 2005 traffic volumes. The only exception is at the intersection of Dysart Road and Northern Avenue where a leading left turn signal phase is required for the heavy west turning movement. With a three lane roadway section, the intersection delay is reduced at most of these intersections. The study intersections will operate at LOS B and C based on a five lane roadway section and the projected year 2020 traffic volumes.

The proposed improvement for Dysart Road and Olive Avenue is the five lane roadway section which is the MCDOT Rural Principal Arterial Road with the modification on the right-of-way width. This five lane roadway section is consistent with the roadway sections at the south and north termini. **Figure 7a** shows the proposed five lane roadway section for Dysart and Olive Avenue except at Dysart Schools. **Figure 7b** shows the proposed roadway section at Dysart Schools which has the curb and gutter, and sidewalk along the schools. **Figure 7c** presents the roadway section with curb and gutter for Waddle Road to accommodate the railroad crossing gates and signs. **Figure 7d** presents the five lane section to be used for any new development proposed after the completion of this roadway improvement. Since the Dysart Road and Olive Avenue are classified as part of the RRS network, an ultimate seven lane roadway section is required within a total of 42.672 meters (140 feet) right-of-way. **Figure 8** presents the ultimate seven lane roadway section per the RRS requirements which is the modified from MCDOT Roadway Design Manual, Figure 5-7 on the 42.672 meter (140 foot) right-of-way.

There are three key areas of considerations in the study roadways:

<u>BN-SFRR Crossing:</u> At this railroad crossing, three horizontal alignment alternatives were developed and evaluated to improve the efficiency and safety of this intersection. The railroad crossing at Dysart and Waddell (Thunderbird) Roads is a spur for the BN-SFRR from the main tracks along the east side of Grand Avenue (US 60). The existing crossing does not cross at the center of the intersection of Dysart and Waddell (Thunderbird) Roads, which creates sight distance and safety problems. The spur crosses Dysart Road just north of the intersection and then crosses Waddell (Thunderbird) Road just west of the intersection. Southbound traffic along Dysart has difficulty seeing westbound traffic along Waddell (Thunderbird) Road due to the stop sign being placed approximately 30 meters (98 feet) north of the intersection. The existing railroad crossing is an at-grade intersection. The BN-SFRR owns 22.860 meters (75 feet) of easement in the northeast section and 30.480 meters (100 feet) of easement in the southwest section, and Dysart Road only has an easement to cross the railroad. Therefore, all the improvements and modifications to this crossing will require conceptual approval from BN-SFRR.

In development of these three alternatives, two other alternatives were evaluated and rejected. An above grade intersection was considered to be too costly and is not one of the three alternatives shown. First, the widening of the existing alignment was rejected because it will still result in an offset intersection which will not resolve the sight distance and safety

problems. Second, an alternative of realigning the railroad itself was rejected because of its length of relocation (up to 6.4 km or 4 miles) and associated construction/right-of-way costs.

The proposed five lane roadway section on Dysart Road and three lane roadway section on Waddell (Thunderbird) Road is used on each of the three alternatives developed for this railroad crossing. Each alternative is comprised of various combinations of roadway horizontal alignments and intersection locations in order to provide a basis of determining the impacts of the proposed construction on project cost, right-of-way acquisition, constructability, and traffic service. **Figures 9 through 11** in **Appendix B** show the layout plans for the three Railroad Crossing Alternatives. Following is a description of these three alternatives:

A. **Railroad Crossing Alternative 1:** This alternative shifts Dysart Road to the west and realigns the new intersection to the railroad crossing at Waddell (Thunderbird) Road.

Advantages:

- Resolves sight distance and safety issues.
- Provides accesses to two properties adjacent to Dysart and Waddell Roads.
- Presents minimum impacts to two existing properties on the east side of Dysart.
- Minimizes the impacts to the existing crossing because no detour is needed for most of the Dysart Road realignment work.
- Acquire the additional right-of-way needed from undeveloped areas.

Disadvantages:

- Needs substantial right-of-way.
- Obtains additional easements from the railroad for the new intersection.
- Requires to meet special design considerations and criteria for railroad crossing signals and signs.

B. **Railroad Crossing Alternative 2: :** This alternative shifts Dysart Road to the west and shifts Waddell Road to the north for a new intersection at the railroad crossing.

Advantages:

- Resolves sight distance and safety issues.
- Require a minimum additional right-of-way from the property east of Dysart Road and south of Waddell Road.

Disadvantages:

- Requires to acquire the whole right-of-way take and relocation of the property east of Dysart Road and north of Waddell Road.
- Presents a major impact to the existing railroad crossing and detours are required during the entire construction period.
- Obtains additional easements from the railroad for the new intersection.
- Requires to meet special design considerations and criteria for railroad crossing signals and signs.

C. Railroad Crossing Alternative 3: This alternative shifts Waddell (Thunderbird) Road to the north and realign the new intersection to the railroad crossing at Dysart Road.

Advantages:

- Resolves sight distance and safety issues.
- provides the access to the property east of Dysart Road and south of Waddell Road.

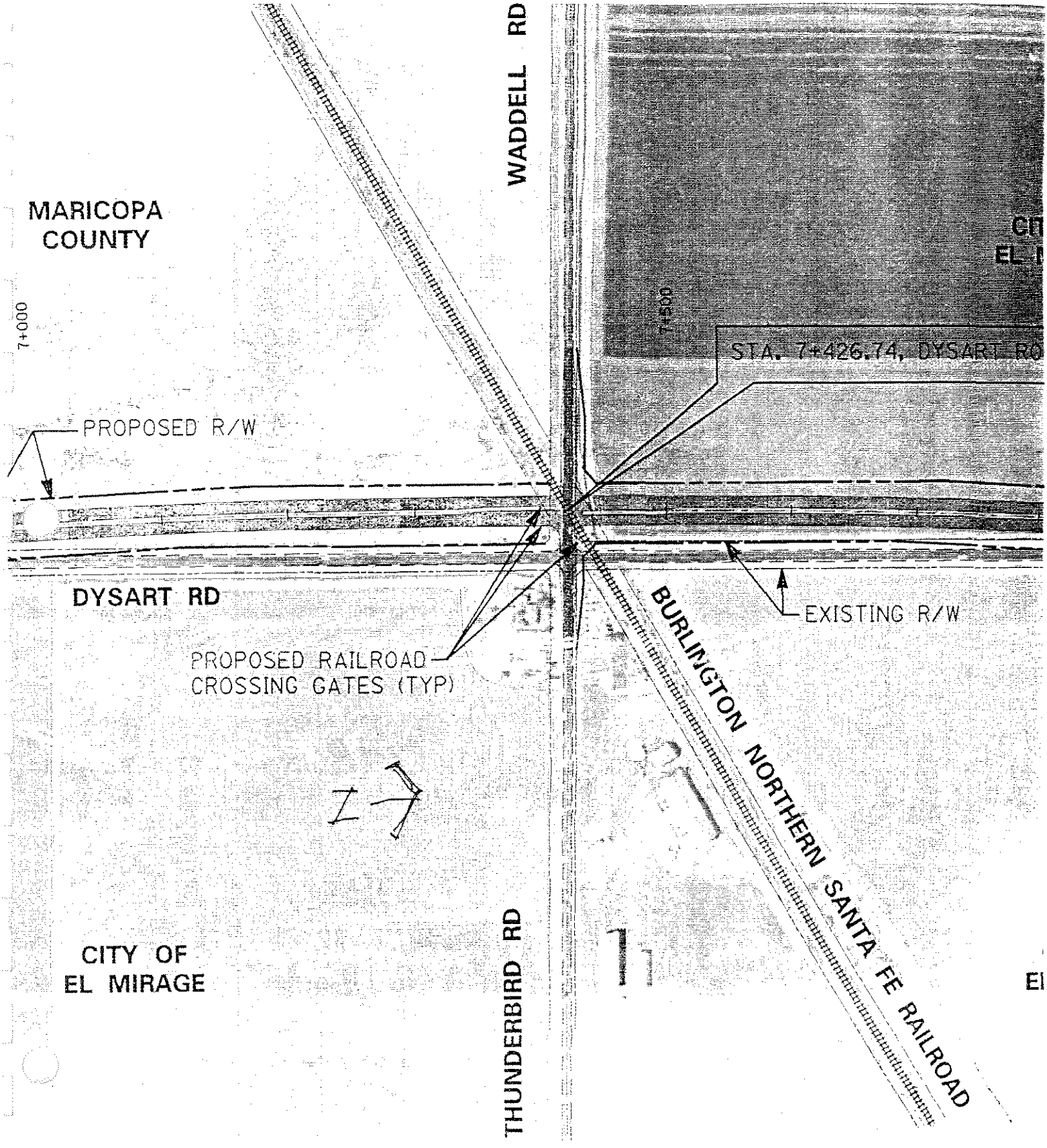
Disadvantages:

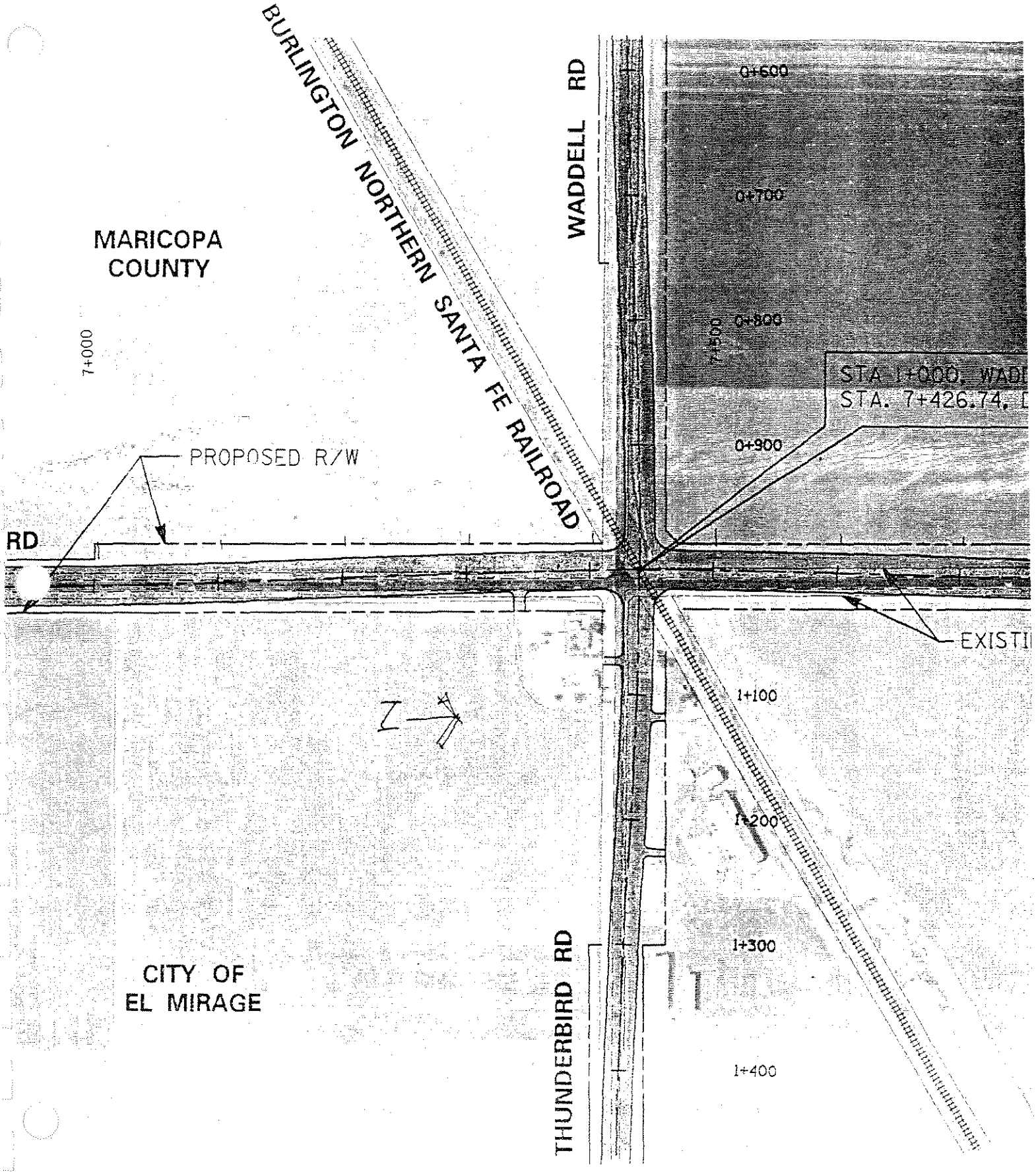
- Requires to acquire the whole right-of-way take and relocation of the property east of Dysart Road and north of Waddell Road.
- Needs additional right-of-way from the property east of Dysart Road.
- Obtains additional easements from the railroad for the new intersection.
- Requires to meet special design considerations and criteria for railroad crossing signals and signs.

The recommended alternative is Railroad Crossing Alternative 1 with the alignment shifted to the west and the future intersection located at the existing intersection of the railroad and Waddell (Thunderbird) Road. Alternative 1 offers the least interruption to the operation of existing railroad crossing, maintains the accesses to two properties east of Dysart Road, and acquires additional right-of-way from the undeveloped areas. Two curves were designed on each side of intersection for Dysart Road using 7000 meter (22,966 foot) radii. Per the BN-SFRR requirements, there must be a 2.7 meter (9 feet) minimum wide raised median for their signs and gate structures. Dysart Road will require two railroad crossing gates in both directions at the intersection **(See Figure 9 in Appendix B)**. Waddell (Thunderbird) Road will be a three lane roadway section **(See Figure 7c)** and will only require one railroad crossing gate in each direction. Special design considerations will be needed for the layout of these signs and gate structures when the ultimate seven lane roadway section is warranted.

Any changes to the existing alignment will require full cooperation from the BN-SFRR. Roadway designs will have to be approved by the railroad. BN-SFRR will perform the railroad design. The design may take up to one year to complete and then must be approve by the Arizona Corporate Commission, which could take approximately two months. Materials and supplies will have to be ordered and could take six months to one year. The actual construction will take approximately one to two months. The contractor doing the work will have to obtain railroad insurance and a right of entry for hauling through the railroad easement. It should also be noted that all signing and striping design and work will be done by the roadway designer and contractor (this does not include the railroad crossing gates and signals).

<u>Dysart Schools Access:</u> The existing Dysart Middle and High Schools has five access roads, and the Schools would like to keep all of the accesses. It is not feasible to purchase additional right-of-way from the Schools because it will require construction of four new classrooms at $279 per square meter ($85 per square foot). Therefore, the new alignment will be shifted to


MARICOPA
COUNTY
7+000
WADDELL RD
7+500
STA. 7+426.74, DYSART RO
PROPOSED R/W
DYSART RD
EXISTING R/W
PROPOSED RAILROAD
CROSSING GATES (TYP)
BURLINGTON NORTHERN SANTA FE RAILROAD
CITY OF
EL MIRAGE
THUNDERBIRD RD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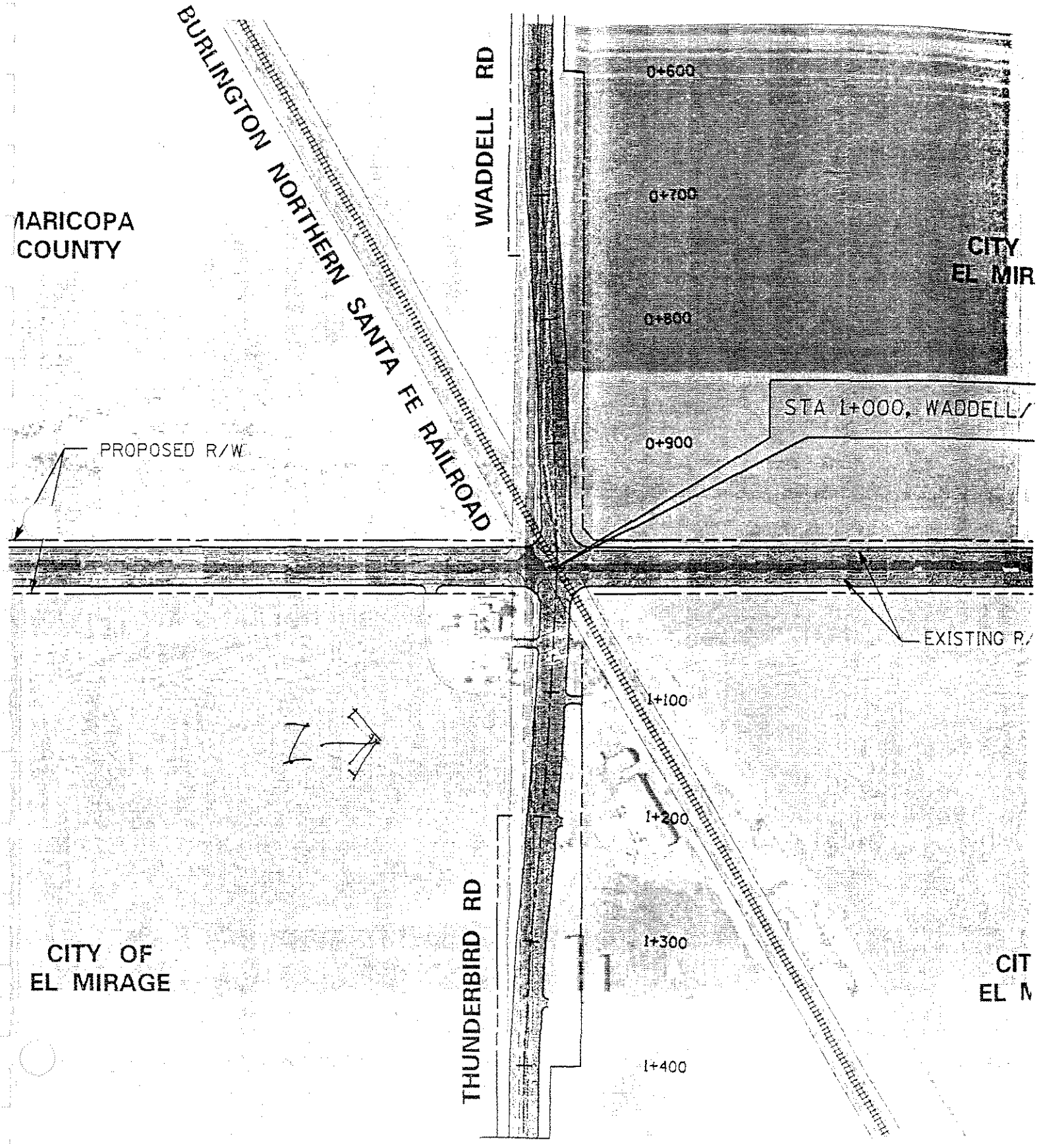
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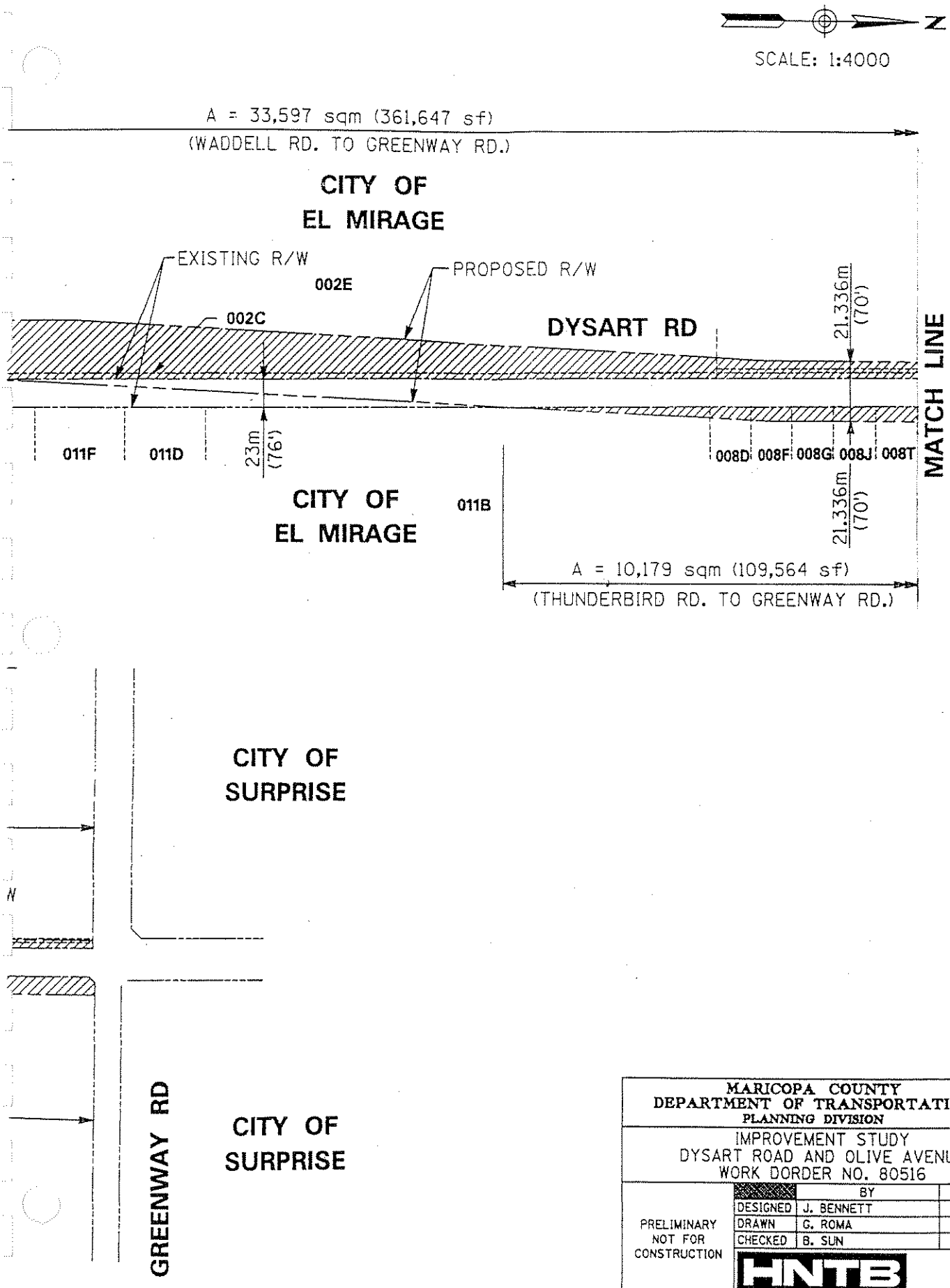
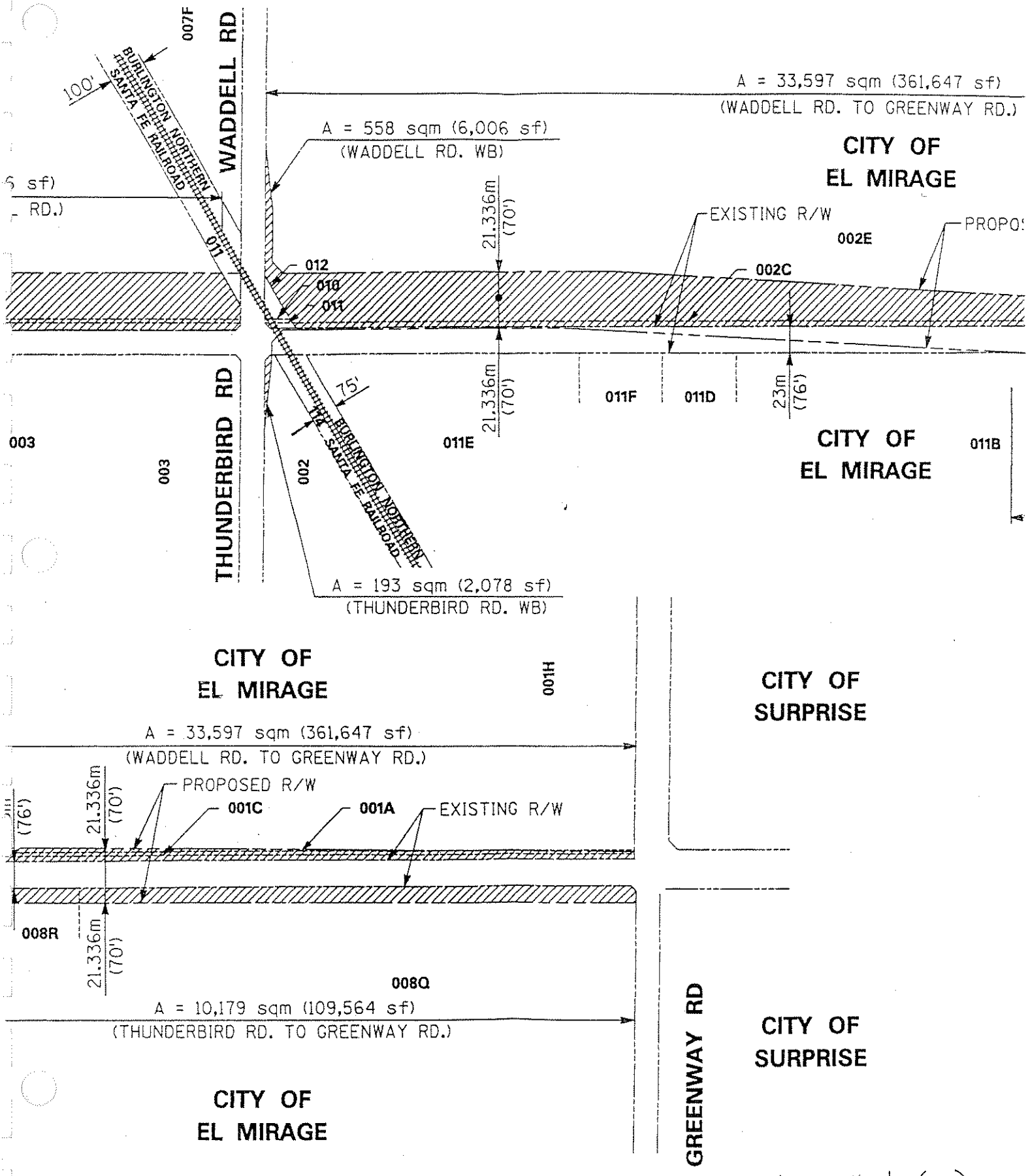


MARICOPA COUNTY DEPARTMENT OF TRANSPORTATION PLANNING DIVISION			
IMPROVEMENT STUDY DYSART ROAD AND OLIVE AVENUE WORK DORDER NO. 80516			
PRELIMINARY NOT FOR CONSTRUCTION		BY	DATE
	DESIGNED	J. BENNETT	12/1/97
	DRAWN	G. ROMA	12/1/97
	CHECKED	B. SUN	12/1/97
	HNTB		
LOW COST ALTERNATIVE			SHEET 3 OF 5

ALT 1(A)


007F
WADDELL RD
100'
BURLINGTON NORTHERN SANTA FE RAILROAD
A = 33,597 sqm (361,647 sf)
(WADDELL RD. TO GREENWAY RD.)
A = 558 sqm (6,006 sf)
(WADDELL RD. WB)
CITY OF
EL MIRAGE
21.336m (70')
EXISTING R/W
002E
002C
012
010
011
THUNDERBIRD RD
75'
21.336m (70')
011F
011D
23m (76')
003
011E
002
CITY OF
EL MIRAGE
011B
A = 193 sqm (2,078 sf)
(THUNDERBIRD RD. WB)
CITY OF
EL MIRAGE
001H
CITY OF
SURPRISE
A = 33,597 sqm (361,647 sf)
(WADDELL RD. TO GREENWAY RD.)
PROPOSED R/W
001C
001A
EXISTING R/W
21.336m (70')
008R
008Q
A = 10,179 sqm (109,564 sf)
(THUNDERBIRD RD. TO GREENWAY RD.)
GREENWAY RD
CITY OF
SURPRISE
CITY OF
EL MIRAGE

ALT. #1 (B)

APPENDIX E

WATER FACILITIES DESIGN MEMORANDUM

"WATER FACILITIES DESIGN MEMORANDUM"
ARENA PROPERTY, SURPRISE, ARIZONA

* Project has been renamed Roseview

Prepared for

PHOENIX HOLDING II, L.L.C.
3228 East Indian School Road, Suite 1
Phoenix, Arizona 85018

January 13, 1997

Prepared by

DMJM
300 West Clarendon Avenue, Suite 400
Phoenix, Arizona 85013
(602) 264-1397

(DMJM Project No. 6531.10)

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Registered Professional Engineer (Sanitary)
CERTIFICATE NO.
29366
BUDDY W.
REYES
Date Signed 1-13-97
ARIZONA, U.S.A.

I. INTRODUCTION

DMJM has been engaged by Phoenix Holdings II, L.L.C. (DMJM Project No. 6531.10) to prepare a Water Facilities Development Design Memorandum for the Arena Property Residential Development (Arena Development), a 308 acre Planned Area Development (PAD). This Design Memorandum includes water system capacity sizing criteria, system specifications outlines and Order-Of-Magnitude Cost Estimates. The Design Memorandum will be used by the City of Surprise to evaluate Arena's proposed Water Facilities and as a guide in the future development of water system infrastructures.

The project site is located south of the City of Surprise between Greenway Road to the north, Waddell Road to the south, Dysart Road to the east and West Point Parkway to the west.

The proposed PAD will be constructed in four phases with a total of 1500 housing units. Each of the four phases will be constructed independently with approximately one year's time between the construction of each phase. Phase 1 will consist of 367 houses in the northern quarter of the 308 acre parcel. Phases 2, 3 and 4 will consist of 415, 381 and 337 houses, respectively.

The proposed Water Facilities, that will service all of the Arena property, will be located adjacent to the stormwater retention basin (see Attachment-"A", Preliminary Water Facilities Site Plan), that is located in the southeast corner of the Phase 1 property.

The Arena Development water supply, storage and pumping facilities, depicted in Attachment-"B", Water Facilities Piping and Instrumentation Diagram, will be constructed at the expense of the development, and will become the property of the City of Surprise upon completion and acceptance by the City. For emergency situations, the Arena Development's water main will be connected to the Citizen's Utility Company's West Point Town Center water main at a point just north of the northern edge of the Arena parcel.

II. OBJECTIVES

The objectives of this design memorandum are to describe the preliminary design basis, physical features and costs for the Arena Development Water Facilities and to determine the extent that the facilities could be oversized to service other areas within the City of Surprise and the associated costs. The major components of the Water Facilities include a water well, storage tanks, a hydropneumatic tank, water booster pumps and fire water pumps. The following delineates the specific items that this Design Memorandum includes, which describe the Arena Water Facilities and describe to what extent they could be oversized.

A. Arena Property Water Facilities

- Water Facilities Design Criteria
- Preliminary Water Facilities Site Plan
- Preliminary Piping and Instrumentation Diagram (P&ID).
- Summary Specifications Outline
- Order-Of-Magnitude Cost Estimate

B. Oversizing of Water Facilities

- Determine the Limitations of Water Facilities to Oversizing
- Order-Of-Magnitude Cost Estimate

III. DESIGN CRITERIA AND SYSTEM COMPONENTS

A. Water Well

Water supply for the Arena Development will be provided by the construction of a new well in Phase I of the development. This well will be sized to provide the Peak Day demand of water for the development. Criteria for the calculations of water demand are as follows:

- Per Capita Annual Average Day Demand (ref. 5) = 140 gal/capita/day (gpcd)
- Per Capita Peak Day Demand = 1.5[1] x 140 gpcd = 210 gpcd
- Buildout of Arena Development = 1,500 lots
- Water well Capacity Required = Peak Day Demand

  = 1,500 lots x 3.2 capita/lot x 210 gpcd

  = 700 gpm

The Peak Day water demand for the Arena Development, based on the above, is 700 gpm. This could be provided by a single deep well vertical turbine-type pump with a design capacity of 700 gpm.

The well will be designed to minimize the migration of groundwater from the upper part of the aquifer that is suspected of being the source of nitrates from farming activities. The additional costs associated with testing and engineering services to minimize nitrates is reflected in the cost estimate for the well.

Oversizing -- For the Arena Development water supply system to be oversized to service other areas, the limiting factor is the maximum allowable groundwater that can be pumped within 100 years, without lowering the water table below 1,000 feet. The 1,000 foot limit is an Arizona Department of Water Resources imposed limitation designed to protect groundwater resources.

As determined from reference 7, the maximum volume of groundwater that can be pumped is 4,726 acre-feet/year for the 100 year period. This equates to an annual average pumping rate of 2,930 gpm. The Peak Daily flow needed for the Arena development is 700 gpm. A single well could be sized to deliver as much as 1,500 gpm, which would provide an additional 800 gpm for oversizing.

To take full benefit of the maximum permissible groundwater pumping rate of 2,930 gpm, a second well would be required. However, for two wells to operate properly without the

[1] Peaking Factor for Peak Day -- ref. 6

drawdown of one well influencing the performance of the other, several hundred feet of separation is required. Due to the space limitations, explained below, the Arena Water Facilities site cannot accommodate this separation requirement. Therefore, well oversizing is limited to the well capacity for one well, which is approximately 1,500 gpm.

B. Water Storage Tank

Steel tanks have been selected for water storage vessels because they are less expensive and the simpler to construct compared to concrete reservoirs. The design criteria used to size the above ground water storage tanks are as follows:

- Fire Flow Requirement = 1,000 gpm for 2 hours (ref.8) = 120,000 gallons
- Peak Month Average Daily Demand = 1.3[(2)] x 140 gpcd = 182 gpcd
- Minimum Volume of Storage = Peak Monthly Demand + Fire Flow Requirement

In addition to the above requirements, the tank(s) will be designed with a minimum of two feet of depth to maintain a positive suction head on the pump inlet. The tank will also provide for one foot of freeboard above the invert of the overflow pipe.

Table-"A" on page 4 includes the flow and the tank sizing calculations. The total domestic and fire water storage requirement for the Arena Development, including the volume reserved for the protection requirements described above, is 994,000 gallons. For aesthetic reasons, tank sizing was based on a standard tank height of 16 feet. The next standard size tank, which is 24 feet high, was believed to be too obtrusive within a residential complex.

When calculating the required tank diameters, the standard tank height of 16 feet was reduced by three feet, one foot for the overflow zone at the top of the tank and two feet at the bottom of the tank to protect the pump. The volume in between is referred to as the usable tank volume, as noted in the calculation sheet on page 4.

Three options were evaluated for sizing the water storage tanks, they are:

Option I Design one water tank large enough to service Phase I only, this tank includes an additional 120,000 gals for fire protection requirements. During Phase II, a second tank would be constructed to service the remaining three phases of the Arena Development.

Option II Design two equal size water tanks to service the entire Arena Development. The first tank will be constructed in Phase I and the second tank at the beginning of Phase II construction.

Option III Design and construct one tank to service the entire Arena Development during Phase I construction.

---

[2] Peaking Factor for Peak Month -- ref. 6

TABLE "A"
ARENA DEVELOPMENT WATER SUPPLY SYSTEM

FLOW CALCULATIONS

			GPCD[2]			Average[3] Daily Demand		Peak[4] Month Demand		Peak[5] Day Demand	
Phases	Housing Units	Population[1]	Yrly.Avg.	Peak Month	Peak Day	Gals/day	Gals/min	Gals/day	Gals/min	Gals/day	Gals/min
Phase I	367	1,174	140	182	210	164,416	114	213,741	148	246,624	171
Phase II	415	1,328	140	182	210	185,920	129	241,696	168	278,880	194
Cumulative	782	2,502				350,336	243	455,437	316	525,504	365
Phase III	381	1,219	140	182	210	170,688	119	221,894	154	256,032	178
Cumulative	1163	3,722				521,024	362	677,331	470	781,536	543
Phase IV	337	1,078	140	182	210	150,976	105	196,269	136	226,464	157
Cumulative	1500	4,800				672,000	467	873,600	607	1,008,000	700
Oversized System[10]						1,440,000	1,000	1,872,000	1,300	2,160,000	1,500

STORAGE TANK OPTIONS

		Option 1 -- Minimize Phase I Costs			Option 2 – Two Equal Sized Tanks All Phases			Option 3 -- One Tank All Phases		
Phases	Minimum Volume, Gals.	Tank Size Diam. x Ht., ft.	Tot.Tank Vol.[7] Gals.	Usable Volume[8] Gals.	Tank Size Diam. x Ht., ft.	Tot.Tank Vol.[7] Gals.	Usable Volume[8] Gals.	Tank Size Diam. x Ht., ft.	Tot.Tank Vol.[7] Gals.	Usable Volume[8] Gals.
Phase I[6]	333,741	67 x 16	421,938	342,824						
Phase I & II[9]	575,437				1 87 x 16	711,438	578,044			
Phase II, III, IV	659,859	93 x 16	812,951	660,523						
Tot. Phase I-IV	993,600			1,003,347	2 81 x 16	1,233,385	1,002,125	115 x 16	1,243,066	1,009,991
Oversized System[10]	1,992,000	2 tanks @ 115 x 16	1,243,103 Tot.Usbl.Vol.=	1,010,021 2,020,043						

NOTES:

1. @ 3.2 occupants/housing unit
2. Preliminary gallons per capita per day (GPCD) value from Citizen's Utility
3. Based on Yrly.Avg. GPCD Demand
4. Assumed peaking factor for highest daily demand for any one month (i.e. summer) = 1.3 x GPCD (Ylrly.Avg.)
5. Assumed peaking factor for highest demand for any one day of year = 1.5 x GPCD (Ylrly.Avg.)
6. Minimum Volume = total day'd demand GPCD (Peak Month) + fire flow req'd (1,000 gals/min, for 2 hrs)
7. Total Volume = entire volume of tank
8. Usable volume = total volume less 2 ft. below "low level" pump cut off and 1 ft. above invert of tank overflow pipe
9. Minimum size tank required to bring Phase I and II on line with fire protection.
10. The oversized system max.daily flow is limited by the well capacity of 1,500 gpm. The average annual and peak monthly flow values were derived from peaking factors (see notes 4 & 5 above) The minimum required storage volume is equal to the peak monthly volume + 120,000 gals. for fire water.

January 5, 1997

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Sheet = tank calcs

Option 1 is the recommended alternative for tank sizing since it will minimize the initial construction costs for Phase I. A 422,000 gallon tank, 67 feet in diameter by 16 feet high, will be required to service Phase I. The tank will provide 343,000 gallons of usable storage, which includes 120,000 gallons for fire protection. The second tank, required for servicing the three remaining phases, will be a 813,000 gallon tank (usable volume = 660,500 gallons) that is 93 feet in diameter and 16 feet high. The second tank will be constructed during Phase II.

Oversizing -- The water storage tank oversizing is based on the assumption that the maximum sized storage tanks and the pumping apparatus will be constructed in lieu of what is required for the Arena Development. This presumes that oversizing would minimize the total construction costs of the combined Water Facilities to fulfill Arena's and the City's needs. That is, upsizing the two tanks to the maximum allowable storage capacity would be less expensive than installing what is required just for the Arena Development and constructing additional tanks at some later date.

Oversizing of the water storage tank is dictated by well capacity and by the availability of land. As can be seen from the attached Preliminary Water Facilities Site Plans, Attachment-"A", the site was "carved out" of land adjacent to the stormwater retention basin. Therefore, oversizing of the storage tanks is limited by the amount of additional land that can be taken out of the retention basin while still providing adequate storage volume for the 100-year 2-hour storm event. The area of the stormwater retention basin that could be encroached upon is limited by a maximum depth of six feet, a side slope of four-to-one and by one foot of required freeboard.

Upon comparison of these two limitations to water storage tank oversizing, it was determined that the well pumping rate of 1,500 gpm was the limiting factor. Presuming that the well pump must satisfy the Peak Day water demand and that the storage tank's usable volume must equal the volume required for the Peak Month plus 120,000 gallons of fire water, a total tank usable volume of 1,992,000 gallons would be required. Two tanks, each with a size of 115 feet in diameter and 16 feet high, would satisfy this requirement.

C. Hydropneumatic Tank

When used in conjunction with booster pumps, the purpose of a hydropneumatic tank is to maintain water system pressure in the absence of an elevated water storage tank. In addition, it provides a nominal amount of storage capacity for instantaneous (Peak Hour) demand, as well as reduces the number of booster pump on and off cycles. Therefore its size is directly related to the size of the booster pumps and the number of connections it serves.

Design criteria used to size hydropneumatic tank are as follows:

- Maintain pump cycling in the range of 2 to 6 times per hour
- Supply instantaneous demand of water system for a minimum of 20 minutes
- Peak Hour demand = 4.0[3] x 467 gpm = 1,868 gpm

[3] Peaking Factor for Peak Hour -- ref. 6

Table-"B" on Page 7 includes calculations comparing 5,000 and 10,000 gallon hydropneumatic tanks. The calculations presume that: (a) 700 gpm booster pumps and 1,000 gpm fire water pumps would be provided, (b) the tanks are 8 feet in diameter horizontal tanks, (c) the tank would contain 50% air and 50% water, and (d) a pump would come on at the 1½ foot level and shut off at the 4 foot level. Various combinations of these pumps were evaluated. It was determined that either a combination of one booster pump, two fire pumps and a 10,000 gallon tank, or a combination of two booster pumps, two fire pumps and a 5,000 gallon tank would satisfy the requirements listed above.

Oversizing -- For the oversized system, a 10,000 tank will be required to reduce the number of pump cycles per hour. This presumes that the City will use the Arena Water System to serve other areas that will require additional peak demand capacity.

D. Booster pumps

The water booster pump sizing was based on providing a simultaneous Peak Day demand and fire flow demand, in conjunction with the hydropneumatic tank, satisfying the Peak Hour demand and fire flow demand and a reasonable amount of redundancy. Various combinations of booster pumps with a capacity equal to the Peak Day demand of 700 gpm, along with the fire flow pumps with a capacity of 1,000 gpm were considered in the sizing evaluation.

The booster pump evaluation was performed simultaneously with the hydropneumatic tank calculations because of their dependency on each other. Based on this evaluation, it was determined that two booster pumps, two fire pumps, and a 5,000 gallon hydropneumatic tank would satisfy all of the requirements.

Oversizing -- For the oversized system, Peak Day demand was increased to 1,500 gpm, the capacity of the well. It is recommended that two pumps, at 1,500 gpm capacity each, be provided for Peak Day demand and two pumps, at 1,000 gpm capacity, be provided for fire flow demand for the oversized system. With this combination, under Peak Hour demand conditions, one fire pump would still be available.

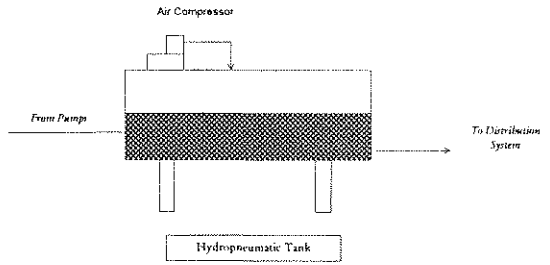
E. Chlorination System

Although, there is no State or Federal requirement for chlorination of groundwater, it is common practice to put chlorine feed equipment in small residential water systems to provide for disinfection in the event of well contamination. The chlorination equipment will be housed in a pre-fabricated storage shed that is designed specifically for the purpose of safety and function.

IV. SUMMARY AND CONCLUSIONS

Arena Water Facilities -- One 700 gpm Water Well is needed to service the Arena Water Facilities. The recommended option for water storage is to install one tank large enough to serve Phase I, including 120,000 gallons of fire water storage, at the onset of construction,

TABLE "B"
HYDROPNEUMATIC TANK SIZING CALCULATIONS
ARENA DEVELOPMENT, SURPRISE, ARIZONA



BASIC DATA

Booster Pump Capacity =	700	gpm	
Fire Pump Capacity =	1,000	gpm	
Average Demand[1] =	114	gpm	Phase I
	467	gpm	Phase IV
Peak Hour Demand[2] =	457	gpm	Phase I
	1,867	gpm	Phase IV
5,000 Gallon Tank			
Tank Dimen =	8' x 14'	approx.	
Tank Usable[3] Vol. =	1,820	gals	
10,000 Gallon Tank			
Tank Dimen =	8' x 27'	approx.	
Tank Usable[3] Vol. =	3,689	gals	

AVAILABLE VOLUME – UNDER PEAK HOUR[2] CONDITIONS

	Pk. Demand gpm	Pump Rate gpm	Pump Combination	5K GAL. Draw Down[4] mins.	10K GAL. Draw Down[4] mins.	Notes
Phase I	457	700	1-pmp @ 700 gpm	n/a	n/a	one booster pump exceeds peak demand – either size OK
			2-pmps @ 1,000 gpm			
Phase IV	1,867	1,700	1-pmp @ 700 gpm	1.0	24.3	avail. time OK for 10K tank but < 20 mins avail for 5k tank &
			2-pmps @ 1,000 gpm			pump rate is < peak demand
		2,700	1-pmp @ 700 gpm	n/a	n/a	3 pumps exceed peak demand but only 800 gpm reserve
			2-pmps @ 1,000 gpm			capacity remaining for fire protection – will not work
Oversized	4,000	4,000	2-pmps @ 1,500 gpm	n/a	n/a	this combination works for either size tank since 1 fire pump
System			2-pmps @ 1,000 gpm			is still available for backup

PUMP CYCLE TIME – UNDER AVERAGE CONDITIONS

	Avg.[1] Demand gpm	Pump Rate gpm	5,000 GALLON TANK Off Time[5] mins.	On Time[6] mins.	Cycle Time mins.	Cycles/hr	10,000 GALLON TANK Off Time[5] mins.	On Time[6] mins.	Cycle Time mins.	Cycles/hr	NOTES
Phase I	114	700	16.0	3.1	19.1	3.1	32.4	6.3	38.7	1.6	the 5K tank provides the most desirable cycle time
Phase IV	467	700	3.9	7.8	11.7	5.1	7.9	15.8	23.7	2.5	the 5K tank provides the most desirable cycle time
Oversized System	1,000	1,500	1.8	3.6	5.5	11.0	3.7	7.4	11.1	5.4	the 10K tank provides the most desirable cycle time

NOTES:
1. Average demand = annual volume (gals)/(365 days)(1,440 mins/day)
2. Peak hour = 4 x average demand
3. Usable volume equals 50% of total vol. less 1.5 ft. above bottom (i.e. 1.5 ft level to center of tank)
4. Drawdown time = time to empty tank w/o pumps + time to refill tank w/ pump(s)
5. Off time = average time to drawdown tank w/o pump running
6. On time = average time to refill tank w/ pump(s)

January 5, 1997

and to install a second tank to serve the remaining 3 Phases at the onset of Phase II construction.

It was determined that the combination of two booster pumps, two fire water pumps and a 5,000 gallon hydropneumatic tank would cost $5,000 less and provide a greater amount of redundancy than one booster pump, two fire pumps and a 10,000 gallon tank.

Attachment-"C", includes summary specifications for the major components and work associated with the Water Facilities. The specifications, like the other information contained in this design memorandum, have been included for the City of Surprise's preliminary review and acceptance.

The Order-Of-Magnitude Cost Estimate for the Water Facilities, summarized in Attachment-"D", is $1,000,000.00, which includes a 15% contingency due to the lack of design details. The following summarizes the preliminary design data for the Water Facilities:

1. Water Well
   a) Pump -- Vertical Turbine
   b) Pumping Capacity = 700 gpm (minimum)
   c) Well Depth = 1,000 feet (approximate)
   d) Well Diameter = 16 inches (approximate)

2. Water Storage Tanks
   a) Quantity = 2
   b) Dimensions: (approximate)

	Phase I	Phase II, III & IV
Size (diameter x height, feet):	67 x 16	93 x 16
Total Volume (gallons)	422,000	813,000
Usable Volume (gallons)	343,000	661,000

3. Hydropneumatic Tank
   a) Quantity = 1 (horizontal)
   b) Dimensions:

Size (diameter x length, feet):	8 x 14
Total Volume (gallons)	5,000
Usable Volume (gallons)	1,800

4. Booster Pumps
   a) Quantity = 2
   b) Type -- Vertical Turbine
   c) Pumping rate = 700 gpm (each)

5. Fire Water Pumps
   a) Quantity = 2
   b) Type -- Vertical Turbine
   c) Pumping rate = 1,000 gpm (each)

Oversizing -- The Water Facilities can be oversized to provide an additional 800 gpm of well water, 1,000,000 gallons of storage capacity, 1,600 gpm of pumping capacity and will require a 10,000 gallon hydropneumatic tank.

The Order-Of-Magnitude Cost Estimate for the oversized Water Facilities, summarized in Attachment-"D", is $1,500,000.00, which includes a 15% contingency due to the lack of design details. The estimate includes additional costs for oversizing of the well, tanks, increasing the main line from 8 to 12 inches in diameter from the Water Facilities site north to the West Point Town Center connection, associated costs for construction and costs for additional land. The following summarizes the preliminary design data for the oversized Water Facilities:

1. Water Well
   a) Pump -- Vertical Turbine
   b) Pumping Capacity = 1,500 gpm (minimum)
   c) Well Depth = 1,000 feet (approximate)
   d) Well Diameter = 24 inches (approximate)

2. Water Storage Tanks
   a) Quantity = 2
   b) Dimensions: (approximate)

	Phase I	Phase II, III & IV
Size (diameter x height, feet):	115 x 16	115 x 16
Total Volume (gallons)	1,243,000	1,243,000
Usable Volume (gallons)	1,010,000	1,010,000

3. Hydropneumatic Tank
   a) Quantity = 1 (horizontal)
   b) Dimensions:

Size (diameter x length, feet):	8 x 27
Total Volume (gallons)	10,000
Usable Volume (gallons)	3,700

4. Booster Pumps
   a) Quantity = 2
   b) Type -- Vertical Turbine
   c) Pumping rate = 1,500 gpm (each)

5. Fire Water Pumps
   a) Quantity = 2
   b) Type -- Vertical Turbine
   c) Pumping rate = 1,000 gpm (each)

V. REFERENCES

1. Arizona Department of Environmental Quality. Engineering Bulletin No. 10. Guidelines For The Construction Of Water Systems. May 1978.
2. Manual of Individual Water Supply System, USEPA Water Supply Division, 1975.
3. Arizona Administrative Code R18-4-503, ADEQ Safe Drinking Water Storage Requirements.

4. Recommended peaking factor for Peak Hour = (4 to 5) x average flow rate, per telecon between B. Reyes, DMJM and Janak Dasai, ADEQ, Technical Engineering Unit, Drinking Water Section, 1-3-97.
5. City of Surprise water conservation goal = 140 gpcd.
6. Civil Engineering Reference Manual, Sixth Edition, Michael R. Lindberg, P.E., 1992
7. Hydrology Study for the Arena Project, Surprise, Arizona, December 20, 1996, prepared by Brown and Caldwell
8. City of Surprise fire flow requirements

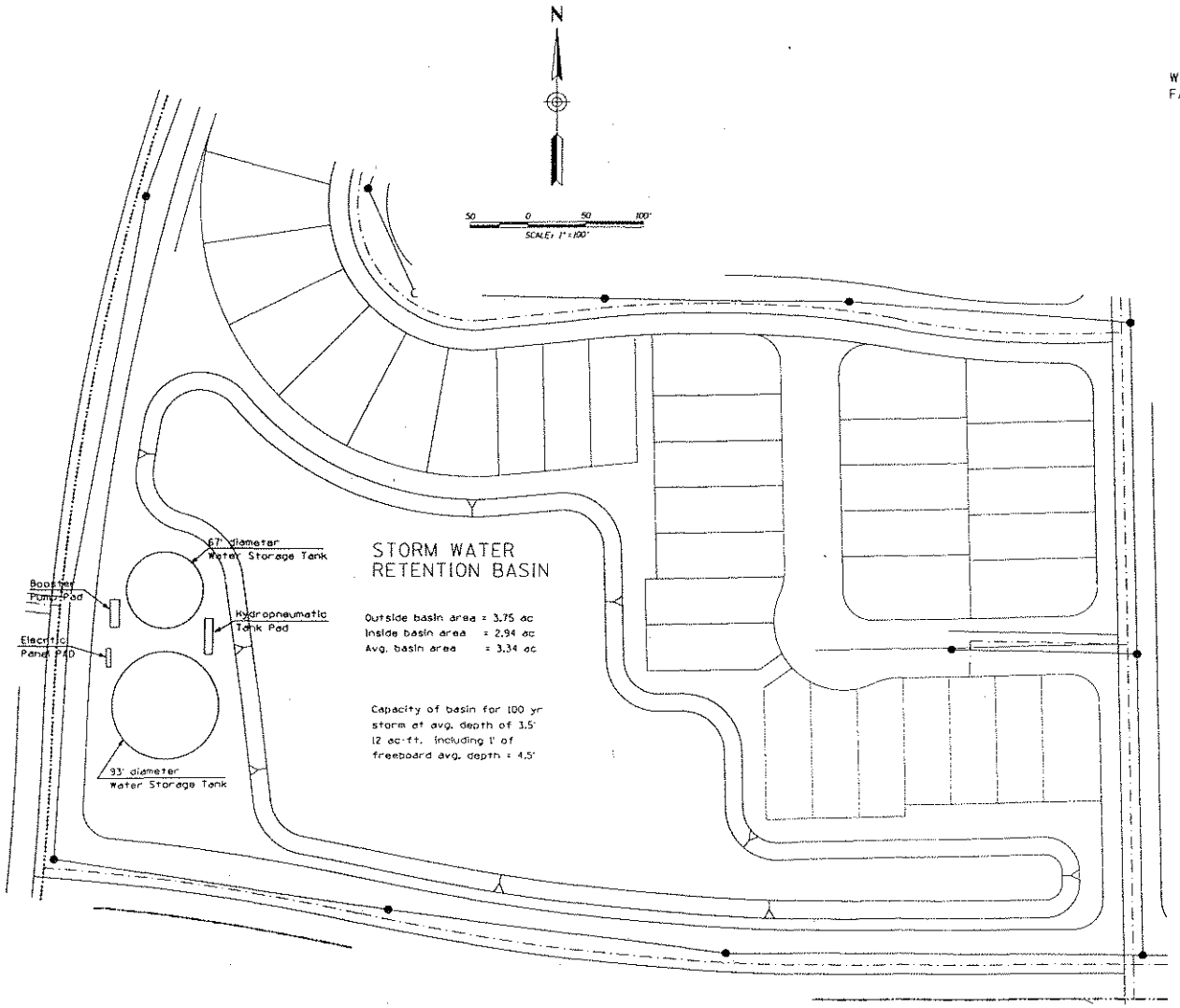
VI. ATTACHMENTS

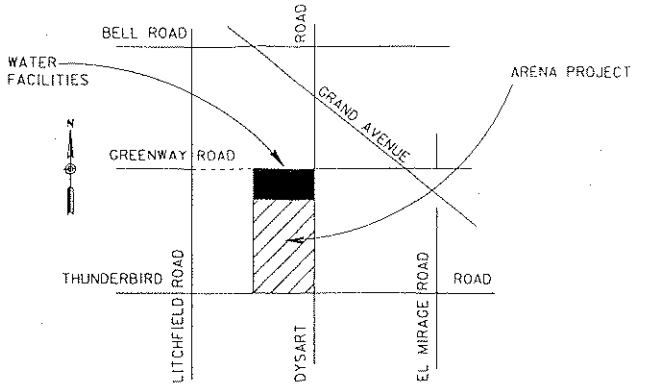
A. Preliminary Water Facilities Site Plans

B. Preliminary Piping and Instrumentation Diagram (P&ID)

C. Summary Specifications

D. Order-Of-Magnitude Cost Estimates





VICINITY MAP

ATTACHMENT - "A-1"

NO.	REVISION	BY	DATE
1			
2			
3			

PHOENIX HOLDING II, L.L.C.

ARENA RESIDENTIAL PROJECT

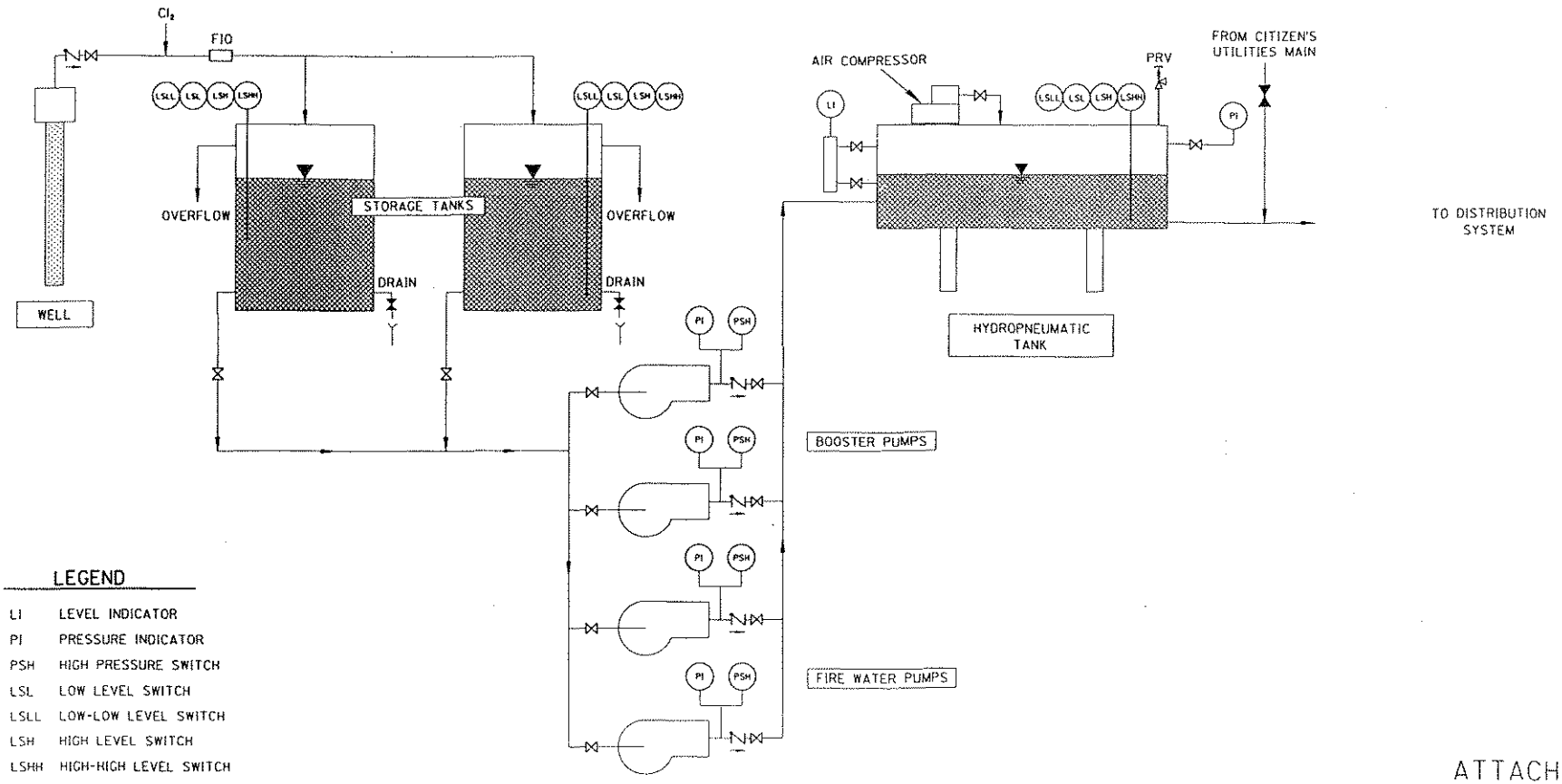
		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	D.B.L.	12/22/96
	DRAWN	D.B.L.	12/22/96
	CHECKED	B.R.	

DMJM ARIZONA, INC. 300 WEST CLARENDON SUITE 400 PHOENIX, AZ. 85013-3498 (602) 264-0251

PRELIMINARY WATER FACILITIES SITE PLAN

SHEET 1 OF 2

TRACS NO.



LEGEND

LI	LEVEL INDICATOR
PI	PRESSURE INDICATOR
PSH	HIGH PRESSURE SWITCH
LSL	LOW LEVEL SWITCH
LSLL	LOW-LOW LEVEL SWITCH
LSH	HIGH LEVEL SWITCH
LSHH	HIGH-HIGH LEVEL SWITCH
FIO	FLOW INDICATOR/TOTALIZER
CL_2	CHLORINE SOLUTION
	DIRECTION OF FLOW
	NORMALLY CLOSED VALVE
	NORMALLY OPEN VALVE
	CHECK VALVE
	PRESSURE RELIEF VALVE (PRV)

ATTACHMENT - "B"

NO.	REVISION	BY	DATE
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PHOENIX HOLDING II, L.L.C.

ARENA RESIDENTIAL PROJECT

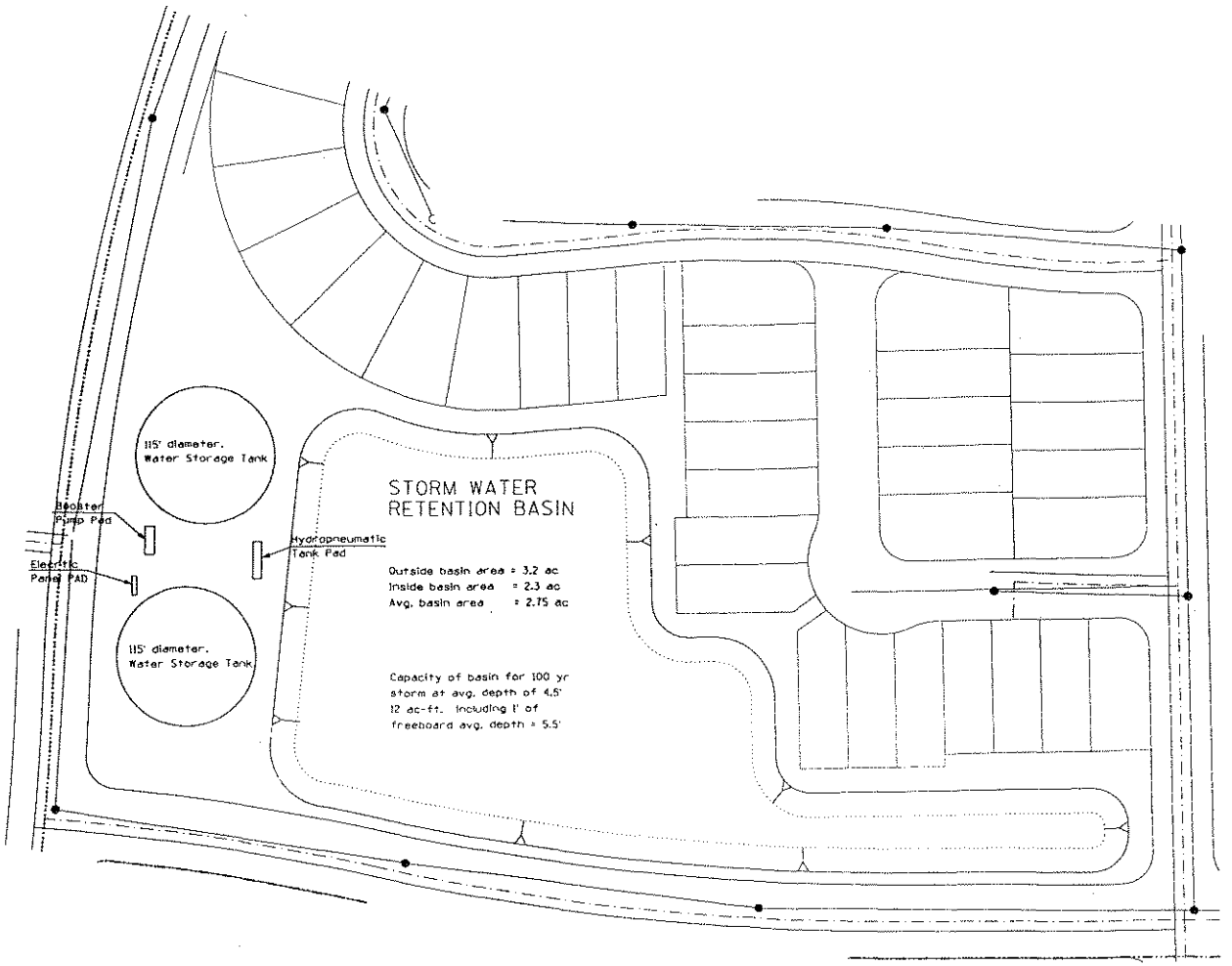
		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	D.B.L.	12/22/96
	DRAWN	D.B.L.	12/22/96
	CHECKED	B.R.	

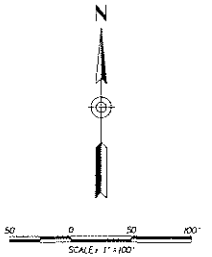
DMJM ARIZONA, INC. 300 WEST CLARKSON SUITE 400 PHOENIX, AZ. 85013-3499 (602) 264-0217

WATER FACILITIES
PIPING AND INSTRUMENTATION DIAGRAM

SHEET 1 OF 1

TRACS NO.





ATTACHMENT - "A-2"

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PHOENIX HOLDING II, L.L.C.

ARENA RESIDENTIAL PROJECT

		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	D.B.L.	12/22/96
	DRAWN	D.B.L.	12/22/96
	CHECKED	B.R.	

DMJM ARIZONA, INC. 300 WEST CLARENDON SUITE 400 PHOENIX, AZ. 85013-3499 (602) 264-6217

OVERSIZED WATER FACILITIES SITE PLAN

SHEET 2 OF 2

TRACS NO.

ARENA WATER FACILITIES
SUMMARY SPECIFICATIONS OUTLINE

The following paragraphs summarize the specifications for the conceptual design of the Arena Development Water Facilities. The specifications are intended to provide the reader with an understanding of the type of equipment and features that will be included with the Facilities. Therefore, these summary specifications do not contain the normal level of detail that the construction documents will contain.

DIVISION 1 -- GENERAL REQUIREMENTS: In general, the Arena Water Facilities Project will include, but is not necessarily limited to, the construction of a water well, a chlorination system, storage tanks, distribution and fire water pumping system, a hydropneumatic tank, site preparation and earthwork and security fencing.

The contractor will be required to meet all conventional requirements regarding coordination, field engineering, regulatory requirements, industry standards, submittals, quality control, materials and equipment and contract close-out.

DIVISION 2 -- SITE WORK: Specifications for site work will include site preparation, earthwork, utility trenching, backfilling and compaction and soil stabilization.

DIVISION 3 -- CONCRETE: All concrete work such as formwork, finishes, coatings, shores, supports and etcettera will be done in accordance with the applicable American Concrete Institute (ACI) standards.

DIVISION 4 -- MASONRY: All masonry construction such as fencing and associated grout and mortar work shall be done in accordance applicable ASTM standards for, but not necessarily limited to mixes, bond strengths, aggregates and block type.

DIVISION 5 -- METALS: All metals, structural steel and metal fabrication shall conform to applicable AISC and ASTM standards.

DIVISION 11 -- EQUIPMENT:

11000 General Requirements for Equipment: This section will describe the general requirements that all equipment and its associated components must meet such as, but not necessarily limited to, bearing life, seals, bolt, nut and pipe threads, flange ratings, coatings, safety features, equipment labeling and protection during shipping and storage.

11060 Electrical Motors: This section will include standards for low voltage motors (less than 600 volts) to be provided with motor driven equipment. Motors shall comply with UL 674, UL 1004, NEMA Standard MG1, and to specific requirements for the equipment they are providing service to.

11216 Water Storage Tanks: Two (2) water storage tanks will be constructed for the project. A 422,000 gallon tank, 67 feet in diameter by 16 feet high, will be required to service Phase 1 of the development. The tank will provide 343,000 gallons of usable storage which includes 120,000 gallons for the fire protection. The second tank, for the three remaining phases, will be a 813,000 gallon tank (usable volume of 660,500 gallons), 93

feet in diameter and 16 feet high. The water storage tanks will be constructed of steel plate and steel pipe waterline connections. The tanks will be constructed in accordance with the following standards and/or include, but necessarily be limited to, the following features:

a) AWWA D100-84, Welded Steel Tanks For Water Storage
b) AWWA D102-78, Painted Steel Water Storage Tanks
c) ADEQ Engineering Bulletin No. 8 "Part V, Water Main, Storage Tank and Well Disinfection"
d) ADEQ Engineering Bulletin No. 10, "Guidelines for Construction of Water Systems"
e) Arizona Administrative Code, R18, Article 5, ADEQ, Minimum Standards for Safe Drinking water Systems
f) Applicable OSHA, 29CFR, Part 1910, requirements for ladders and safety railing
g) Foundation: Type 5
h) One (1) inlet pipe
i) One (1) drain pipe
j) One (1) overflow pipe
k) One (1) outlet pipe
l) Two (2) 24" roof access manways
m) Inside ladders
n) Float operated level indicator
o) Outside ladder with safety hand rails on roof
p) Water level sensing elements for Low, Low-Low, High and High-High levels
q) Roof vent

11217 Hydropneumatic Tank: One (1) 5,000-gallon hydropneumatic tank will be provided. The tank will be constructed to the following standards and/or include, but necessarily be limited to, the following features:

a) ASME code requirements and stamped for a minimum working pressure of 150 psi and tested to 300 psi
b) One (1) 18" manhole on side of tank
c) One (1) 150 lb ANSI flanged inlet fitting
d) One (1) 150 lb ANSI flanged outlet fitting
e) One (1) air compressor to maintain air pad above water
f) Water level probes to control pump and air compressor operation
g) Pressure indicator
h) Pressure relief valve
i) Sight level glass
j) Painted in accordance with AWWA D102-78, Painted Steel Water Storage Tanks
k) ADEQ Engineering Bulletin No. 8 "Part V, Water Main, Storage Tank and Well Disinfection"

11311 Water Booster Pumps: One (2) 700-gpm and one (2) 1,000-gpm vertical turbine booster pumps, for normal service and for fire water service, respectively. The pumps will be built to the following standards and/or include, but necessarily be limited to, the following features:

a) 150 lb ANSI flanged fittings
b) Pressure indicators on the inlet and outlet headers
c) Controls panel
d) Non-slam discharge check valves
e) Inlet and outlet isolation valves
f) Associated piping that conforms to AWWA C900 standards
g) Motor shall conforms to the requirements of section 11060 of these specifications

11312 Deep Well and Vertical Turbine Pumps: The contractor shall drill a deep water well and provide a deep well pump. The well design will be based on testing and engineering analyses of the aquifer, the purpose of which will be to prevent irrigation water that is high in nitrate from entering well. The contractor shall construct the well exactly as shown on the project drawings. The pump will be built to the following standards and/or include, but necessarily be limited to, the following features:

a) Standards: ANSI, ASTM, AWWA E101-88, Deep Well Vertical Turbine Pumps - Line Shaft and Submersible Types and Hydraulic Institute Standards (HI)
b) Motor shall conforms to the requirements of section 11060 of these specifications
c) Well Diameter = 16 inches
d) Required pump flow rate = 500 gpm (approximate)
e) Acceptable Manufacturers – Fairbanks Morse, Layne-Bowler, Simmons, Byron-Jackson, Goulds or approved equal

11510 Chlorination Equipment and Accessories: The chlorine equipment shall generally include, but not necessarily be limited to: chlorine gas supply and feed equipment and a pre-fabricated equipment shed to house the equipment. The chlorine equipment and its shed will be built to the following standards and/or include, but necessarily be limited to, the following features:

a) Chlorinator - 100 lb/day feed capacity
b) Chlorine injector
c) Chlorine gas detector
d) 150 lb chlorine cylinder scale, for two cylinders, with automatic cylinder switching device
e) Chlorine leak kit for 150 lb cylinders
f) Supply water feed pump w/ backflow preventor, pressure gauges
g) Rotameter for feed water
h) Control Panel w/ alarm outputs for low vacuum and chlorine leak
i) The chlorine equipment shed shall be a pre-fabricated unit w/ all OSHA required safety features.

DIVISION 15 -- MECHANICAL

15000 Piping Systems and Valve: All piping systems will be specified to fit the application and meet one or more of the following applicable standards: ANSI, ASTM and AWWA.

DIVISION 16 -- ELECTRICAL: All electrical systems shall comply with UL, FS and NEC codes and standards, as applicable.

DIVISION 17 -- INSTRUMENTS & CONTROLS: In addition to the instrumentation shown on the Piping and Instrumentation Drawing, the controls for the Water Facility shall include, but not necessarily be limited to, the following features:

1 Well pump & supply tank controls: The well will be designed to operate manually or automatically. In the auto mode, the well pump will start when the water level in any supply tank reaches the "low level", which will be the upper level of the minimum volume needed for fire protection. The well pump will shut off when the tank reaches the "high level". An alarm will be energized if the tank level reaches the "High-high level" and if the "low-low level".

2 Chlorination Controls: The chlorine feed equipment will automatically start when the well pump starts and feed at a constant, operator-adjustable, rate. Alarms will be energized if there is a chlorine leak or low vacuum, which would indicate a problem with chlorine feed. The chlorine equipment shed will have a light and ventilation system that are automatically energized when the operator enters the room.

3 Booster Pumps/Hydropneumatic Tank: The hydropneumatic tank shall be equipped with level probes and pressure instrumentation to control the air compressor, booster pumps and fire water pumps. The booster pump and compressor will start and stop according to the tank level and/or pressure. Low level and/or pressure will energize an alarm.

4 Alarms -- All alarms, indicated in the paragraphs above, will be connected to a common alarm relay. The relay can be used to energize an auto-telephone-dialer or send signals to a remote location for a telemetry system, whichever the City determines to be desirable, at some future date when plans for their water system are complete. The alarms will include chlorine system trouble, storage tank level, pneumatic tank level/pressure and general power failure.

ATTACHMENT-"D"

Arena Development - Surprise, Arizona
Water Facilities (Complete Buildout)
Order-Of-Magnitude Construction Cost Estimate

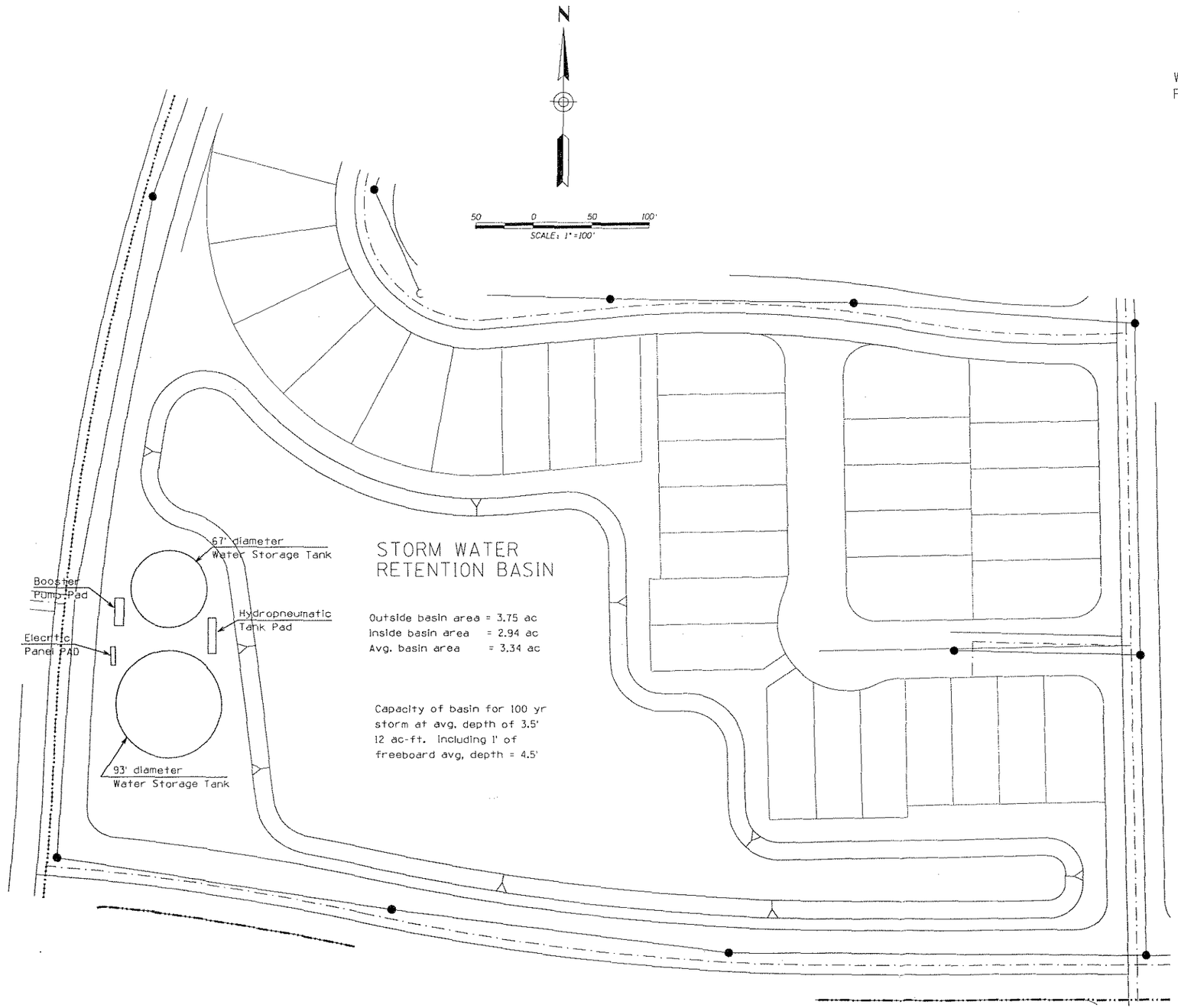
ITEM	QTY's	UNITS	UNIT COST	TOTAL
TANKS				
STORAGE TANK (67' x 16' -422,000 gal)	1	EA	$140,000	$140,000
STORAGE TANK (93' x 16' - 813,000 gal)	1	EA	$210,000	$210,000
STORAGE TANK FOUNDATIONS (TYPE 5)	2	EA	$10,000	$20,000
HYDROPNEUMATIC TANK (5,000 gal)	1	EA	$25,000	$25,000
MAJOR EQUIPMENT				
CHLORINATION SYSTEM	1	LS	$16,000	$16,000
FLOW METER (TURBINE TYPE)	1	EA	$4,000	$4,000
BOOSTER PUMPS	1	LS	$68,000	$68,000
WELL & PUMP	1	EA	$220,000	$220,000
STORAGE SHED (CHLORINE)	1	EA	$5,000	$5,000
AIR COMPRESSOR	1	EA	$500	$500
SITE WORK & YARD PIPING	1	LS	$70,000	$70,000
ELECTRICAL/I&C	1	LS	$80,000	$80,000
	SUBTOTAL			**$860,000**
	15% CONTINGENCY*			**$130,000**
	TOTAL CONSTRUCTION :			**$990,000**

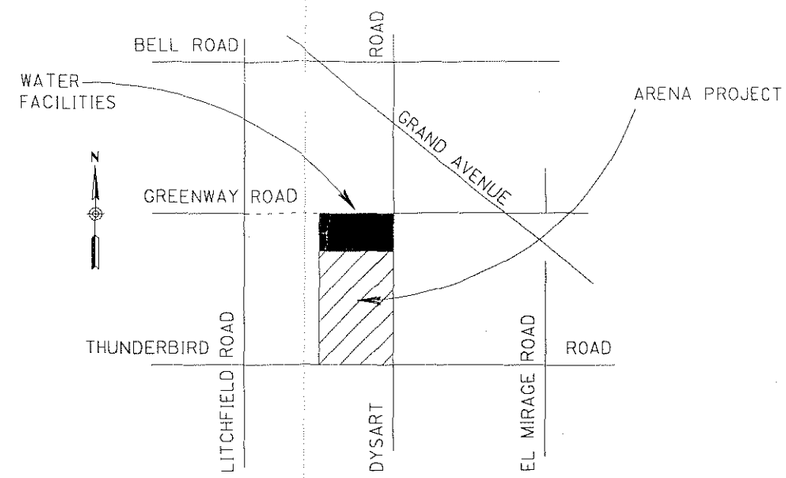
* unknowns at this time due to lack of design details

Arena Development - Surprise, Arizona
Oversized Water Facilities (Complete Buildout)
Order-Of-Magnitude Construction Cost Estimate

ITEM	QTY's	UNITS	UNIT COST	TOTAL
TANKS				
STORAGE TANK (115' x 16' -1,233,000 gal)	2	EA	$273,000	$546,000
STORAGE TANK FOUNDATIONS (TYPE 5)	2	EA	$35,000	$70,000
HYDROPNEUMATIC TANK (10,000 gal)	1	EA	$35,000	$35,000
MAJOR EQUIPMENT				
CHLORINATION SYSTEM	1	LS	$20,000	$20,000
FLOW METER (TURBINE TYPE)	1	EA	$5,000	$5,000
BOOSTER PUMPS	1	LS	$92,000	$92,000
WELL & PUMP	1	LS	$300,000	$300,000
STORAGE SHED (CHLORINE)	1	EA	$5,000	$5,000
AIR COMPRESSOR	1	EA	$800	$800
TRANSMISSION MAIN	1	LS	$10,000	$10,000
INCREASE MAIN FROM 8" to 12" -- 1,000'				
SITE WORK & YARD PIPING	1	LS	$110,000	$110,000
ELECTRICAL/I&C	1	LS	$120,000	$120,000
	SUBTOTAL			**$1,310,000**
	15% CONTINGENCY*			**$200,000**
	TOTAL CONSTRUCTION:			**$1,510,000**

* unknowns at this time due to lack of design details





VICINITY MAP

ATTACHMENT - "A-1"

NO.	REVISION	BY	DATE
3			
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PHOENIX HOLDING II, L.L.C.

ARENA RESIDENTIAL PROJECT

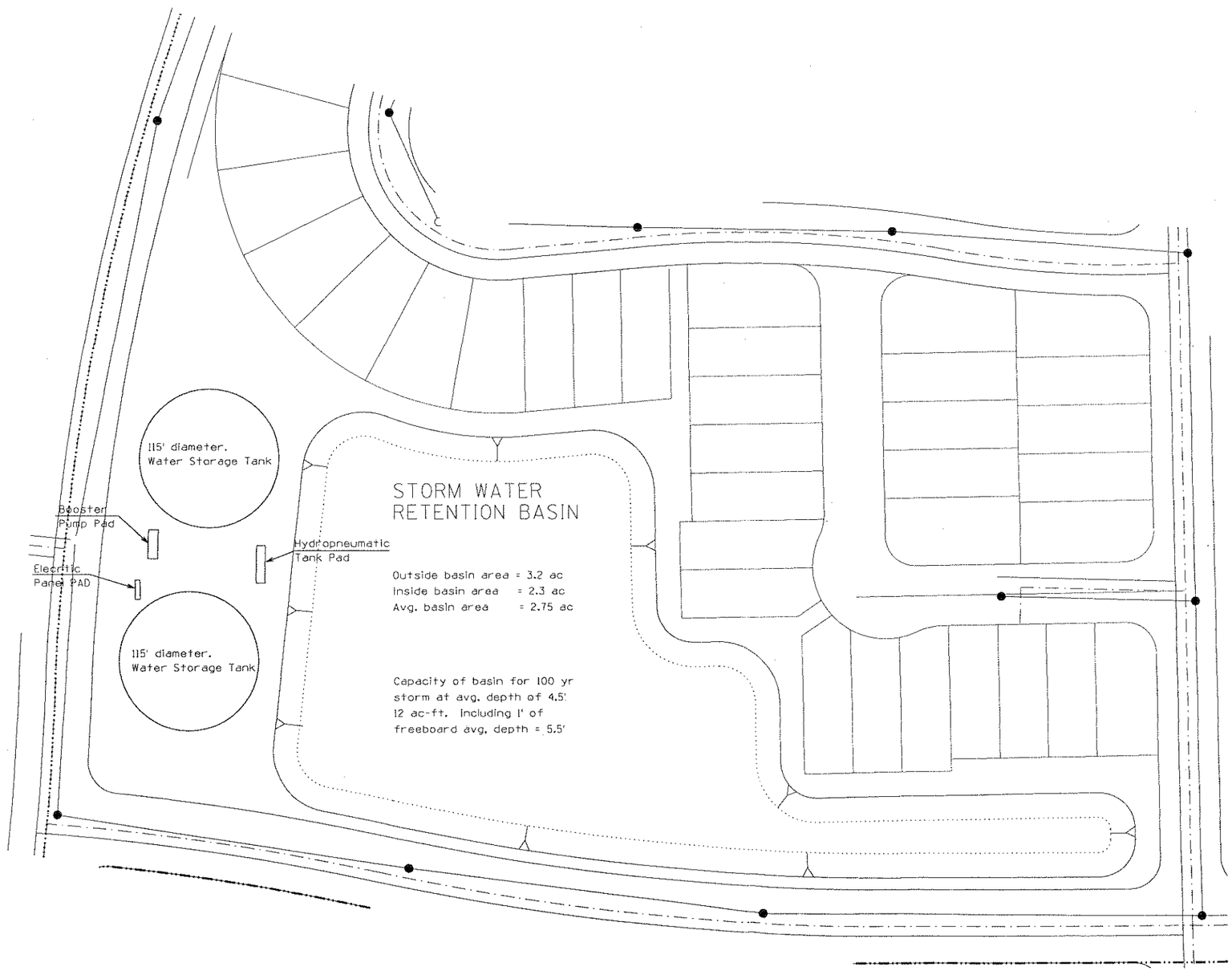
		BY	DATE
PRELIMINARY NOT FOR CONSTRUCTION	DESIGNED	D.B.L.	12/22/96
	DRAWN	D.B.L.	12/22/96
	CHECKED	B.R.	

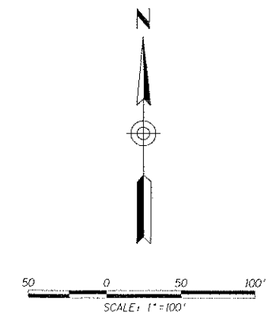
DMJM ARIZONA, INC. 300 WEST CLARENDON SUITE 400 PHOENIX, AZ. 85013-3499 (602) 264-0217

PRELIMINARY WATER FACILITIES SITE PLAN

SHEET 1 OF 2

TRACS NO.





ATTACHMENT - "A-2"

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PHOENIX HOLDING II, L.L.C.

ARENA RESIDENTIAL PROJECT

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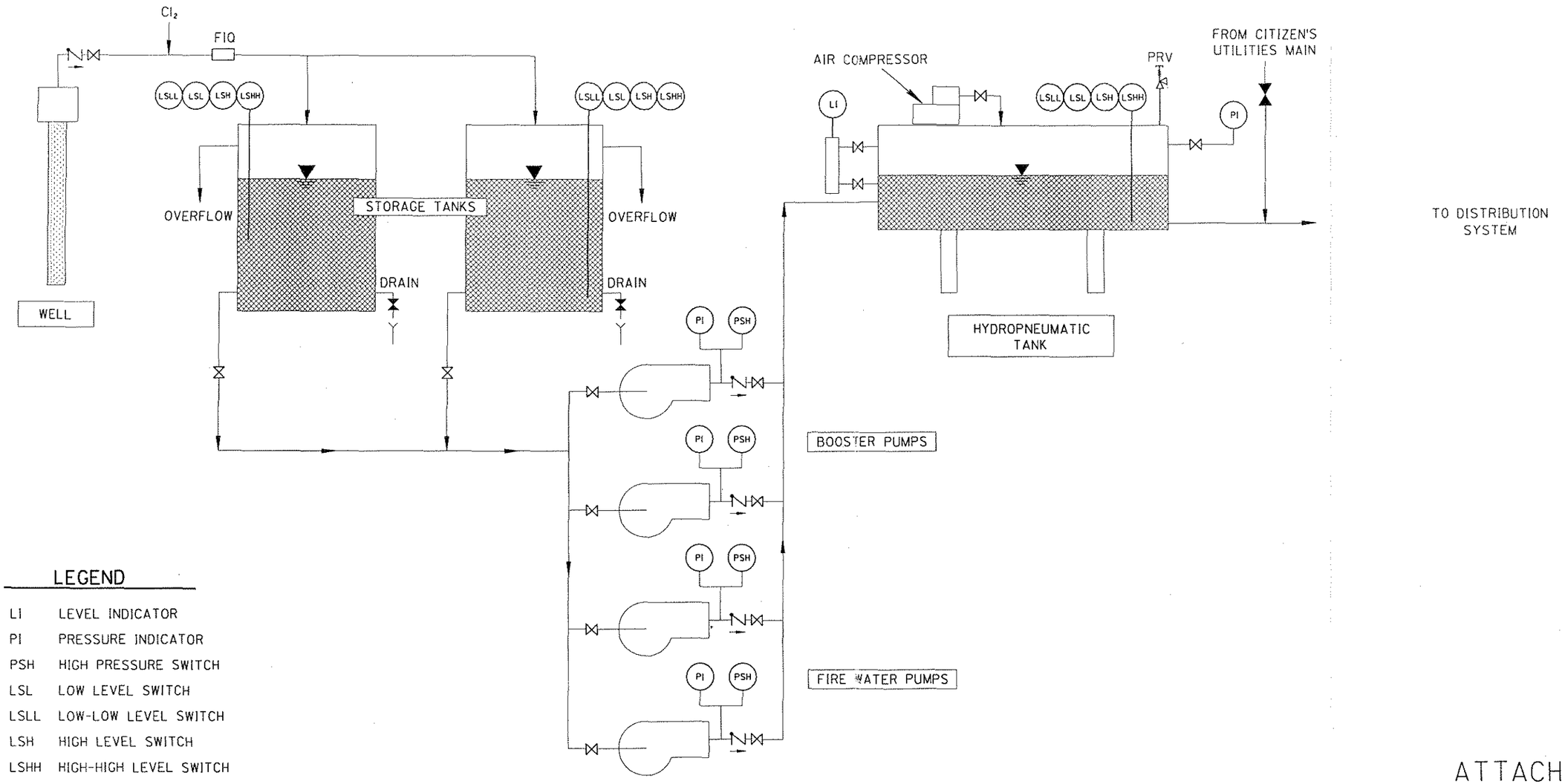
DMJM ARIZONA, INC.
300 WEST CLARENDON
SUITE 400
PHOENIX, AZ. 85013-3499
(602) 264-0217

OVERSIZED WATER FACILITIES
SITE PLAN

SHEET 2 OF 2

TRACS NO.



LEGEND

LI	LEVEL INDICATOR
PI	PRESSURE INDICATOR
PSH	HIGH PRESSURE SWITCH
LSL	LOW LEVEL SWITCH
LSLL	LOW-LOW LEVEL SWITCH
LSH	HIGH LEVEL SWITCH
LSHH	HIGH-HIGH LEVEL SWITCH
FIQ	FLOW INDICATOR/TOTALIZER
CL_2	CHLORINE SOLUTION
→	DIRECTION OF FLOW
⧗	NORMALLY CLOSED VALVE
⧖	NORMALLY OPEN VALVE
N	CHECK VALVE
	PRESSURE RELIEF VALVE (PRV)

ATTACHMENT - "B"

NO.	REVISION	BY	DATE
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PHOENIX HOLDING II, L.L.C.

ARENA RESIDENTIAL PROJECT

		BY	DATE
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DMJM ARIZONA, INC. 300 WEST CLARENDON SUITE 400 PHOENIX, AZ. 85013-3499 (602) 264-0217

WATER FACILITIES
PIPING AND INSTRUMENTATION DIAGRAM

SHEET 1 OF 1

TRACS NO.

CITY OF SURPRISE
COUNCIL AGENDA ACTION FORM

RECEIVED OCT 19 1999 CITY OF SURPRISE PLANNING AND ZONING DEPARTMENT

APPROVED
Case No: PADA99-074
P&Z Comm. Approval: ____
City Council Approval: 10/14/1999
B.O.A. Approval: ____
Stipulations: ____

XX Regular Meeting
___ Special Meeting
___ Workshop

MEETING SCHEDULED
Time: 7:00 p.m.
Date: October 14, 1999

Agenda Item - # 1 **OLD BUSINESS**

XX **Consent**
Regular

Title: Consideration and action to approve **Ordinance No. 99-17**: An Ordinance **changing the zoning** of ap property generally located South of Greenway Road, North of Waddell Road, West of Dysart Road, and East of the midsection line of Section 10. Located in the East half of Section 10, Township 3 North, Range 1 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona, from R1-43 (Single Family Residential) to Planned Area Development **(Roseview PAD)** as Application PADA99-74, to include 10 acres into the currently existing Roseview PAD (Woodside Homes) - **FINAL READING**.

Requested By: **Community Development Dept., - DCM Shirley Berg**

Action Requested: **Approve Ordinance No. 99-17 with Stipulations**

Attached: **Ordinance No. 99-17/Staff Report/Project Narrative**

Comments:

Fiscal Impact:____ Budgeted ____ Not Budgeted Acct: _____

Finance Director Initial: _____
City Manager's Recommendation: XX Approve ___ Disapprove ___ None

Council Action:

Motion/ Second	Councillor's Name	Vote	
	Shafer		
M	Montoya		
	Johnson		
	Villanueva		
	Anderson		
	Allen		
2nd	Smith		

Results:
For 6 Against 0
Abstained ___
Passed ___
Failed ___
Absent Johnson
Other ___

Legend: Motion-M, Second-S, Yes-Y, No-N, Abstain-A, Absent-X

Copy after approval: Agenda File ___ Original: City Clerk

Depts: Shelley Hohman
Fax to BPC + DNS

ORDINANCE NO. 99-17

AN ORDINANCE CHANGING THE ZONING OF A PROPERTY GENERALLY LOCATED SOUTH OF GREENWAY ROAD, NORTH OF WADDELL ROAD, WEST OF DYSART ROAD, AND EAST OF THE MIDSECTION LINE OF SECTION 10. LOCATED IN THE EAST HALF OF SECTION 10, TOWNSHIP 3 NORTH, RANGE 1 WEST, GILA AND SALT RIVER BASE AND MERIDIAN, MARICOPA COUNTY ARIZONA, FROM R1-43 (SINGLE FAMILY RESIDENTIAL) TO PLANNED AREA DEVELOPMENT (ROSEVIEW PAD) AS APPLICATION PADA99-74, TO INCLUDE 10 ACRES INTO THE CURRENTLY EXISTING ROSEVIEW PAD.

WHEREAS, this Ordinance has been properly noticed for public hearing and the necessary hearings have been completed; and

WHEREAS, changes have occurred in the vicinity of the East Half of Section 10, Township 3 North, Range 1 West, which require that the zoning of a parcel of land in that area be changed; and

WHEREAS, rezoning of the subject property will enhance the health, safety and welfare of the community, will not cause traffic congestion or depreciate surrounding property values and, at the same time is in harmony with the purposes and intent of the zoning ordinance, the plan for the area, and the Comprehensive Development Guide; and

WHEREAS, the Planning and Zoning Commission has recommended approval of this rezoning;

NOW THEREFORE BE IT ORDAINED, by the City Council of the City of Surprise, Arizona, that:

Section 1. This Ordinance is not of a general and permanent nature and shall not be codified.

Section 2. The property described in Exhibit A is rezoned from R1-43 (Single Family Residential) to Planned Area Development (PAD) with Preliminary Development Plan.

Section 3. The Preliminary Development Plan for the property described on Exhibit A, entitled "A Major Amendment to the Roseview P.A.D.," dated September 1, 1999, as application PADA99-74, a copy of which is on file in the Community Development Department, is approved.

Section 4. All present and future owners of the property described on Exhibit A shall develop the property only in accordance with the requirements of the Roseview P.A.D., and in compliance with the Stipulations contained in Exhibit B.

PASSED AND ADOPTED THIS 14th day of October, 1999

Joan St. Shafer
Mayor

ATTEST:

Sherry Ann Aguilar
City Clerk

APPROVED AS TO FORM:

City Attorney

YEAS: Mayor Shafer, Vice-Mayor Montoya, Councilmembers Villanueva, Smith, Allen & Anderson.

NEAS: Johnson was excused.

LEGAL DESCRIPTION FOR 10 ACRE ROSEVIEW P.A.D. AMENDMENT

That portion of the Southeast quarter of Section 10, Township 3 North, Range 1 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona, described as follows:

BEGINNING at the Southwest corner of said Southeast quarter:
Thence North 01 degrees 02 minutes 44 seconds West along the West line of said Southeast quarter a distance of 814.00 feet;
Thence North 89 degrees 46 minutes 22 seconds East parallel with the South line of said Southeast quarter a distance of 557.81 feet;
Thence South 01 degrees 02 minutes 44 seconds East parallel with said West line a distance of 814.00 feet to the south line of said Southeast quarter;
Thence South 89 degrees 46 minutes 22 seconds West along said South line a distance of 557.81 feet to the POINT OF BEGINNING.

EXHIBIT A TO ORDINANCE NO. 99-17

RECOMMENDATIONS: (PADA99-74)

Subject request is consistent with the proposed Surprise Comprehensive Development Guide. Furthermore, approval of this request would allow for efficient and orderly development. The Planning and Zoning Commission recommends that the City Council approve the request for a Planned Area Development Amendment for the Roseview P.A.D. to add 10 acres to the overall site (PADA99-74), as modified herein:

SPECIAL STIPULATIONS:

a) The applicant shall contact the Utilities Department regarding the water supply in order to convert existing water rights to other types of useable water rights, prior to the issuance of a grading permit;

b) The applicant shall include in the Public Report statement language which describes the proximity to the 65 DNL line, as well as the proximity to the railroad tracks;

STANDARD STIPULATIONS:

c) The applicant shall submit a Written Response to Stipulations, two (2) copies of the proposed amendment two (2) copies of the Narrative Report revised as necessary to comply with these approved stipulations. Said submission must be under one (1) transmittal package; and

d) No lot platted on this property shall have a width of less than 50 feet, to be reviewed during platting process.

REPORT TO THE PLANNING AND ZONING COMMISSION AND THE CITY COUNCIL

PREPARED BY THE COMMUNITY DEVELOPMENT DEPARTMENT

CASE NO.: PADA99-74 (Planned Area Development Amendment for the Roseview P.A.D.)

Planning & Zoning Commission Hearing Date: July 20, 1999
City Council Hearing Date: Sept. 23, 1999

REQUEST: Coe and Van Loo Consulting, representing the property owners Woodside Homes, is requesting approval of an application to amend the Roseview Planned Area Development plan to add 10 acres at the southwest corner of the half section.

SITE LOCATION: Generally located at the northeast corner of Waddell Road and the midsection line, the subject site is located within a portion of the east half of Section 10, Township 3 North, Range 1 West, Gila and Salt River Base and Meridian, Maricopa County, Arizona.

SITE SIZE: 10 gross acres

CONFORMANCE TO ADOPTED LAND USE PLANS:

GENERAL PLAN: If approved, this request would comply with the Surprise Comprehensive Development Guide and the corresponding General Plan Land Use Map.

DEVELOPMENT PLAN: If approved, this request would comply with the Roseview Planned Area Development guidelines and the corresponding land use map.

COMMENTING JURISDICTIONS:

Town of Buckeye:	No comments were received.
City of El Mirage:	No comments were received.
City of Peoria:	No comments were received.
Maricopa County:	Comments received (Attachment 1).
Dysart Unified School District:	No comments were received.
Maricopa Water District:	Comments received (Attachment 1).
Luke Air Force Base:	No comments were received.

DEPARTMENTAL REVIEW:

The **Engineering Department** has reviewed this application and has no additional comments.

The **Fire Department** has reviewed this application and has no additional comments.

The **Public Works Department** has reviewed this application and has no additional comments.

The **Utilities Department** has reviewed this application and has no additional comments.

STAFF RECOMMENDATION:

The Planning and Zoning Commission recommends that the City Council approve the proposed Planned Area Development Amendment to rezone and add 10 acres to the southwest corner of the Roseview P.A.D.,(PADA99-74), subject to the stipulations listed under "Recommendations."

EXISTING AND SURROUNDING ZONING:

1.	ON-SITE:	R1-43
	NORTH:	PAD (Roseview P.A.D. - designated R1-5)
	SOUTH:	R-43 (County Jurisdiction)
	EAST:	PAD(Roseview P.A.D. – designated R1-5)
	WEST:	R1-43

EXISTING AND SURROUNDING LAND USE

2.	ON-SITE:	Agricultural Use, Single Family Dwelling
	NORTH:	Vacant Land
	SOUTH:	Vacant Land
	EAST:	Vacant Land/Agricultural Use
	WEST:	Vacant Land/Agricultural Use

ADJACENT ROAD STATUS

3.	**GREENWAY ROAD**	Currently exists as a dirt road west of Reems Road, but is planned as a minor arterial in the Comprehensive Development Guide. Half street improvements will consists of 32.5 feet of asphalt and an 8 foot meandering sidewalk
4.	**DYSART ROAD**	Currently exists as a two lane road with approximately 24 feet of pavement, but is planned as a major arterial.

		Half street improvements will consist of 32 feet of pavement and an 8 foot meandering sidewalk.
5.	**WADDELL ROAD**	Currently exists as a two lane road with approximately 24 feet of pavement, but is planned as a minor arterial roadway. Half street improvements will consist of 32 feet of pavement and an 8 foot meandering sidewalk.

EXISTING UTILITIES AND SERVICES STATUS:

6.	**WATER**	City of Surprise
7.	**SEWER**	City of Surprise
8.	**FIRE PROTECTION**	The Surprise Fire Department currently has a fire station located at 15616 North Hollyhock Street. The second fire station is in operation at 18600 Reems Road near the intersection of Reems and Mountain View Boulevard.
9.	**POLICE PROTECTION**	The Surprise Police Department currently has a station located at 12425 W. Bell Road, and a substation located at 18600 Reems Road.

100 YEAR ASSURED WATER SUPPLY CERTIFICATION:

10. The Roseview Planned Area Development is within the City of Surprise Water Service area, which is designated as having a 100 Year Assured Water Supply.

FINANCIAL ASSURANCE FOR COMPLETION OF INFRASTRUCTURE:

11. To be addressed during platting process.

STREET LIGHT IMPROVEMENT DISTRICT:

12. To be addressed during platting process.

PLAN ANALYSIS:

13. On August 26, 1999, the City Council tabled this application and gave specific direction to the applicant regarding the lot layout, lot sizes, and the types of amenities within this 10 acre section. The applicant has revised the application and increased lot sizes throughout the 10 acre parcel. At this time, there are 41 lots proposed, which is less than the previously proposed total of 45. Additionally, the applicant has opened up the subdivision by increasing the open space along the road, and changing the street design to provide for additional creativity in the layout.

The smallest lot generally provided within this subdivision is 54 feet in width by 110 feet in depth.

PROPOSAL

14. This request is for an amendment to the Roseview Planned Area Development. The purpose of this amendment is to add the 10 acre exception at the southwest corner of the half-section to the overall Roseview development. The lot was purchased by Woodside Homes, therefore, they would like to add it to the Master Planned Community.

15. If approved, the 10 acres will be added to the Roseview P.A.D., and the standards as set forth in the P.A.D. would then apply to that land, including all development standards, design standards and all other requirements.

LOT SIZES/SUBDIVISION LAYOUT

16. The minimum lot size permitted within the Roseview P.A.D. is 45 feet in width by 105 feet in depth, which can comprise, per the P.A.D., up to 25 percent of the total lot build-out. The applicant has indicated that, if approved, the 10-acre parcel will not include any lot generally smaller than 53 feet in width.

AMENITIES

17. The proposed amendment also includes in excess of 1.5 acres of open space, which will be integrated into the previously approved open space area adjacent to the amendment site.

18. The trail system, which is incorporated throughout the Roseview P.A.D., provides access to all open space areas along the collector roads. This trail system consists of an 8 foot wide meandering sidewalk which is surrounded on both sides by landscaping areas in order to provide a buffer from the street and a pleasant way for pedestrian travel throughout this development. The total trail and bikeway easement is 15 feet in width, with an additional 8 feet between the easement and the roadway for a total of approximately 23 feet of width for the trail system.

CIRCULATION/INFRASTRUCTURE

19. The 10 acre amendment will have access through the adjacent subdivisions along local roadways. The addition will share all infrastructure with the previously proposed and approved subdivisions.

20. The addition of 41 lots to the Roseview Master Planned Community is not anticipated to create a significant traffic increase on the circulation system. The previously approved roadways are of adequate size to service the area.

ARCHITECTURE

21. The P.A.D. contains specific language indicating that the "homebuilders shall try to de-emphasize garage fronts as the most prominent architectural feature of the dwelling-front by incorporating front window popouts, covered entries or front porches, L-shaped floor plans, etc., into their product mix."

NOISE:

22. The Woodside Homes at Roseview Unit VI Final Plat is not within the lines of the adopted 1995 Air Installation Compatibility Use Zone (AICUZ), however, these homes will be subject to flyovers from aircraft based at Luke Air Force Base.

CONCLUSIONS:

23. Staff has determined that this proposal will not adversely affect the public health, safety or welfare and complies with the Comprehensive Development Guide of the City of Surprise and the Development Plan as set forth in the Roseview Planned Area Development document.

Attachments:
1. Applicant's Project Narrative

ATTACHMENT 1

A MAJOR AMENDMENT
TO THE
ROSEVIEW P.A.D.

June 10, 1999
Revised Sept. 1, 1999

OVERVIEW:

The Roseview Planned Area Development (P.A.D.), was approved by the Surprise City Council on May 28, 1998 (Ordinance 98-09). The Roseview P.A.D. (P.A.D. 97-69) is located within the City of Surprise at the northwest corner of Waddell Road (Thunderbird) and Dysart Road. The original P.A.D. encompassed 307 acres and excluded the existing 10 acre farm operations center located at the southwest corner of the property (See Figure A-1). Woodside Homes of Arizona, Inc., who is developing a portion of the Roseview P.A.D. (along with Lennar Communities Development, Inc.) is purchasing this 10 acre parcel, and seeks to amend the Roseview P.A.D. to include the parcel.

Amendments to an existing P.A.D. are allowed under Section 17.36.60.G of the Surprise Municipal Code. City of Surprise Staff have determined that the changes proposed in this request constitute a major amendment and shall meet the requirements of Section 17.36.40.C and D (Site Plan Approval).

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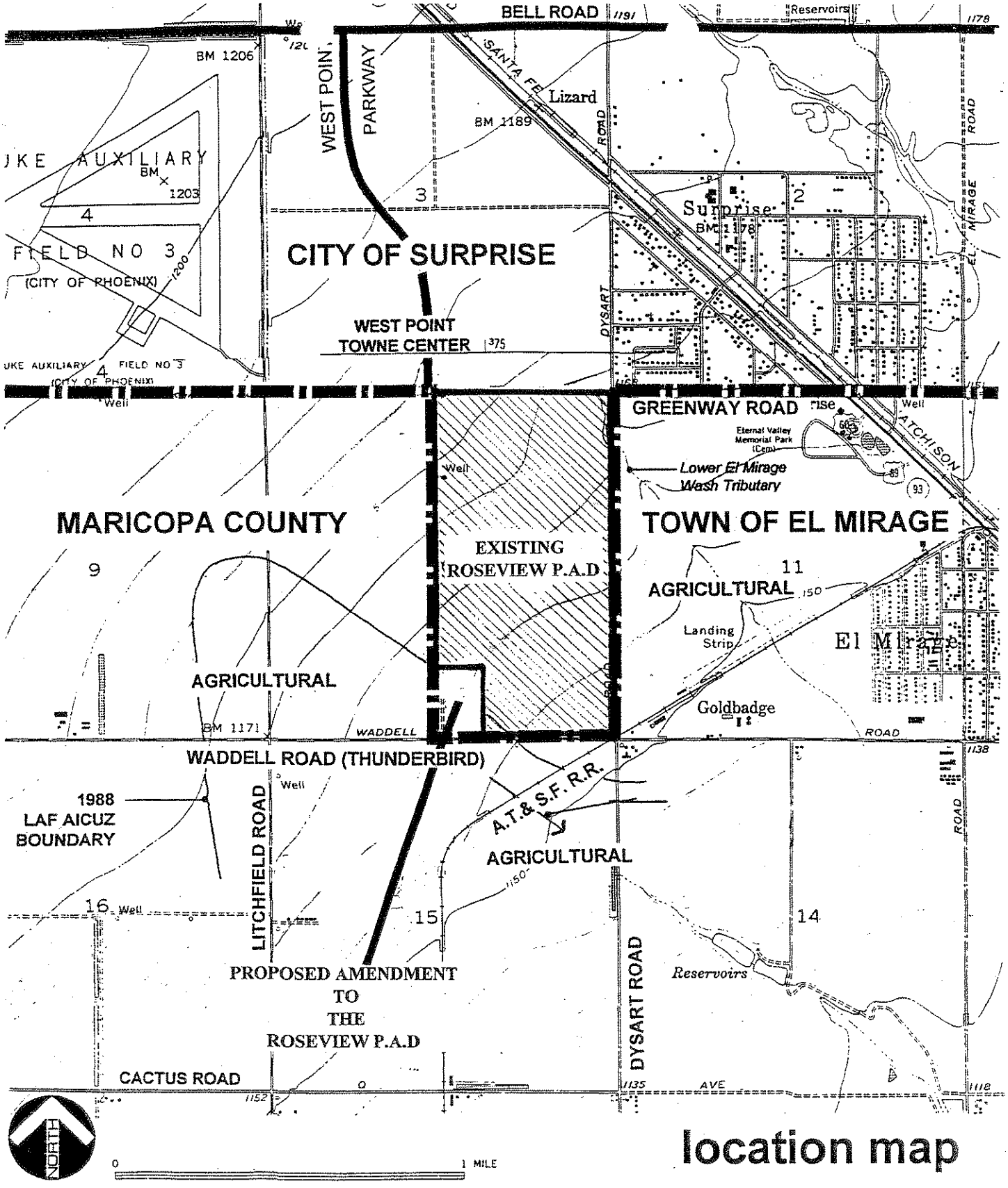


location map

FIGURE 1

The 10 acre parcel is legally described as follows:

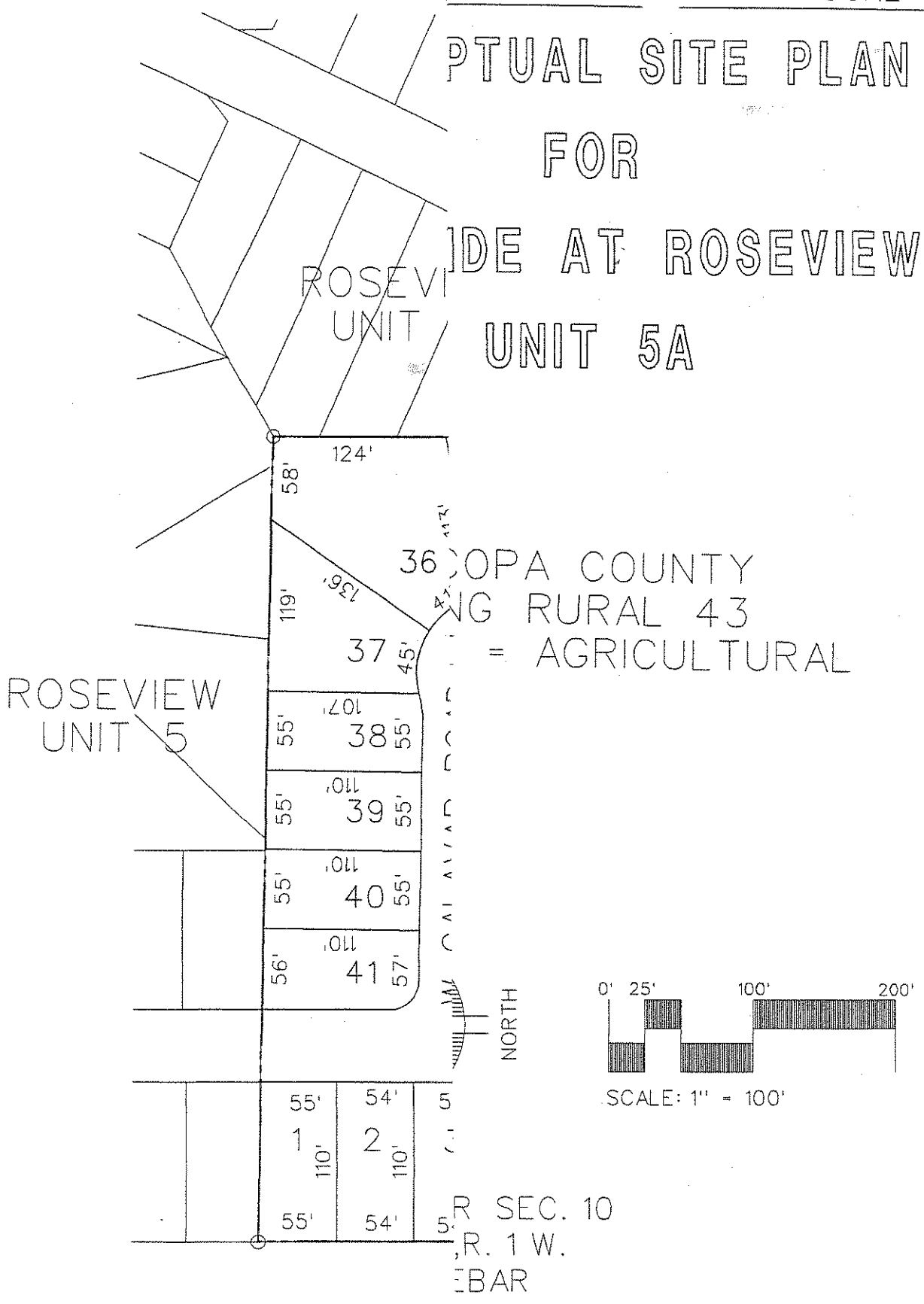
The southeast quarter of Section 10, Township 3 North, Range 1 West of the Gila and Salt River Base and Meridian, Maricopa County, Arizona.

Beginning at the southwest corner of said southeast quarter; thence north 00°05'25" west along the west line of said southeast quarter a distance of 814.00 feet; thence south 89°16'19" east parallel with the south line of said southeast quarter a distance of 557.81 feet; thence south 00°05'25" east parallel with said west line a distance of 814.00 feet to the south line of said southeast quarter; thence north 89°16'19" west along said south line a distance of 557.81 feet to the point of beginning.

Woodside Homes of Arizona, Inc. proposes to subdivide the land into 41 lots with a minimum lot size of 50' x 110'. Most of the lots within this parcel will be larger than this minimum (see Figure A-2). The streets within this parcel will be integrated into the street system of the Roseview P.A.D. If approved, this parcel will become a part of the previously approved Phase 7 of the Roseview P.A.D. (see Figure A-3).

FIGURE A-2

PTUAL SITE PLAN FOR IDE AT ROSEVIEW UNIT 5A



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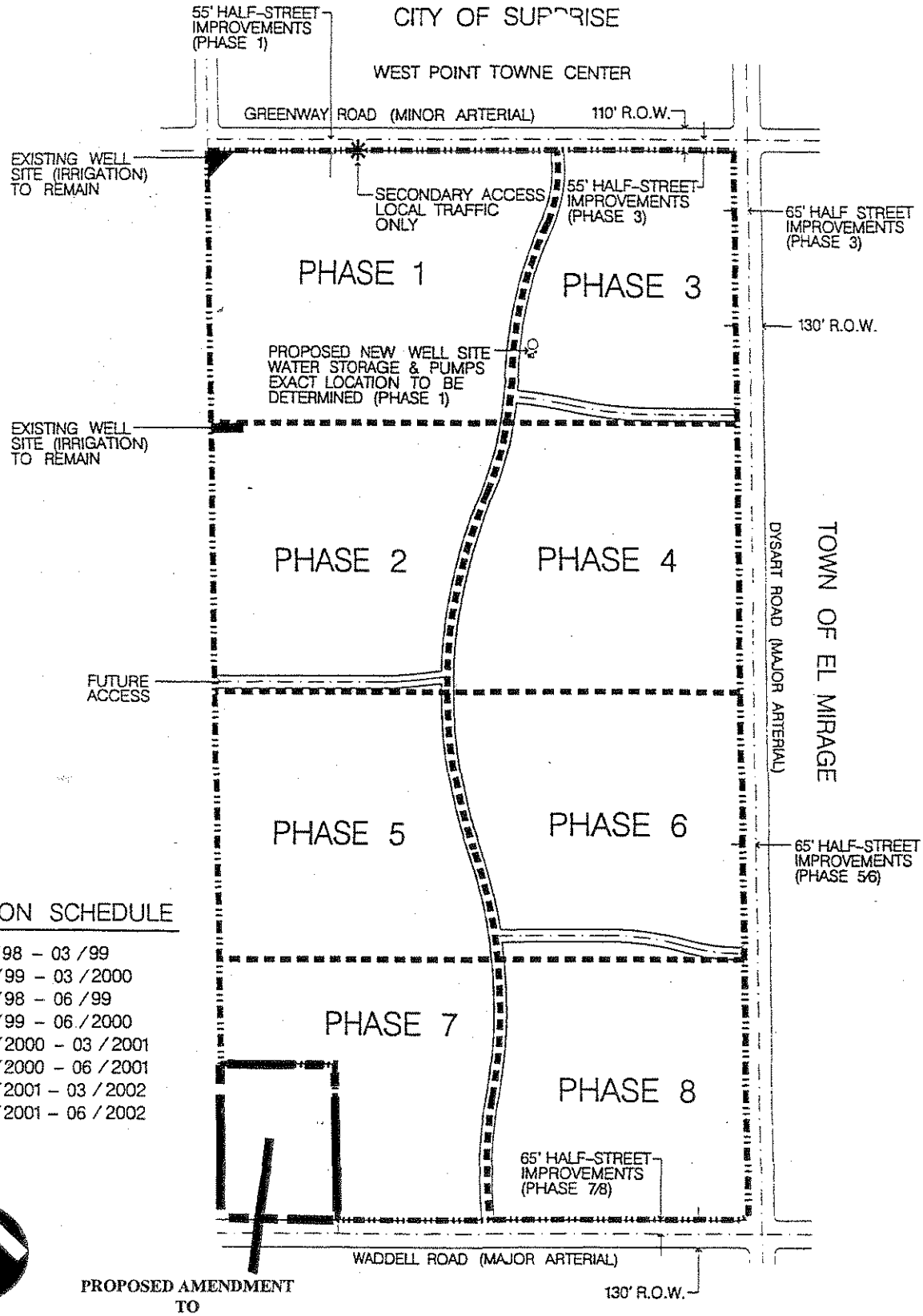
DATE: 8/18/99



ESTIMATED CONSTRUCTION SCHEDULE

PHASE 1:	03 /98 – 03 /99
PHASE 2:	03 /99 – 03 /2000
PHASE 3:	06 /98 – 06 /99
PHASE 4:	06 /99 – 06 /2000
PHASE 5:	03 /2000 – 03 /2001
PHASE 6:	06 /2000 – 06 /2001
PHASE 7:	03 /2001 – 03 /2002
PHASE 8:	06 /2001 – 06 /2002

PROPOSED AMENDMENT TO THE ROSEVIEW P.A.D (PHASE 7)

conceptual phasing

PROJECT DESCRIPTION:

During the original rezoning of the Roseview P.A.D. the 10 acre farm operations center parcel was excluded. This parcel has now been purchased by Woodside Homes. The addition of the 10 acre parcel will not adversely impact development of the full Roseview project. The 10 acre parcel has identical existing characteristics to the full Roseview P.A.D., and the proposed improvements will seamlessly connect with the infrastructure and amenity elements of the Master P.A.D.

EXISTING CONDITIONS:

A. INFRASTRUCTURE

Domestic Water Services. The Roseview P.A.D. is served by a well and storage system that is to be developed on site and intertied with the City of Surprise water system. The City is the water provider. Services to the 10 acre parcel will be extended from the backbone system developed for the Roseview project. The system designed for Roseview has enough capacity to serve the 10 acre parcel. (Ref. P.A.D. Exhibit C)

Sanitary Sewer Services. The Roseview P.A.D. is served by the City of Surprise through an existing 24 inch trunk line in Dysart Road. This trunk line extends south to the wastewater treatment facility located south of Cactus Road and west of Dysart Road. There is sufficient capacity in the Dysart line and the wastewater treatment facility to accommodate the 10 acre parcel. Sanitary sewer lines in the 10 acre parcel will connect to the collection system designed for the Roseview P.A.D. (Ref. P.A.D. Exhibit D)

B. NATURAL RESOURCES

Topography. The Roseview site slopes very gently at approximately 0.5% from the northwest to the southeast. The topography of the 10 acre parcel is consistent with the topography of the Roseview project. (Ref. P.A.D. Figure 1).

Soils. There are no new soil associations found of the 10 acre parcel. The 10 acre parcel is in effect a sub-unit of the soil associations found on the Roseview property.

Hydrology and Drainage. As with the Roseview P.A.D., the 10 acre parcel's storm drainage system will conform to the Flood Control District of Maricopa County standards and requirements. On-site runoff will use the streets as conveyance corridors. If street capacity within the curbs is exceeded, a storm drain system will be utilized for the excess. Both the streets and the storm drain system will route flows to on-site retention basins. A retention basin is planned along the south edge of the parcel, adjacent to Waddell Road, to retain the 100-year frequency event.

Vegetation. The 10 acre parcel has been the farm operations center for agricultural activities on the Roseview property and acreage south and east of the project. No significant trees or shrubs exist on the 10 acre parcel.

A Phase I Environmental Site Assessment performed by Speedie and Associates in May of 1996 indicated that soils tested conformed with allowable limits of pesticides and herbicide residues commonly associated with raising agricultural crops. Another Phase I Environmental Site Assessment

was completed by Speedie and Associates for the 10 acre parcel and is included as a supplemental document dated April 22, 1999. The results of the assessment indicated that the soils tested conformed with an agricultural use and are within allowable limits likely not to pose a significant threat to human health or the environment.

Noise. The A.T. & S.F. (Santa Fe) railroad right-of-way cuts the southeast corner of the Roseview P.A.D. from a point 125.71-feet north along the east section line of Section 10, 209.84 feet west along the south section line of Section 10, and connected by diagonal line located in the extreme southeast corner of the parcel.

At the time of approval of the Roseview P.A.D., the southwest corner of the P.A.D., including the 10 acre parcel was within the Luke Air Force Base (LAFB) Air Installation Compatibility Use Zone (AICUZ) 65 DNL noise contour derived from the 1988 Maricopa Association of Governments Westside Joint Land Use Study. Luke Air Force Base revised the contours in 1995, and the new contours removed the Roseview P.A.D. and the 10 acre parcel from the 65 DNL noise contour. Since the approval of the Roseview P.A.D. (August, 1998), the City of Surprise has officially recognized the 1995 contour revisions (as revised in 1997).

RELATIONSHIP TO SURROUNDING PROPERTIES:

The 10 acre parcel surrounded on the east and north by the Roseview P.A.D. Land to the west of the parcel is proposed for residential development. Land to the south of the parcel is undeveloped agricultural land that is designated for industrial uses under the current City Comprehensive Plan.

LOCATION AND ACCESSIBILITY:

The 10 acre parcel is located at the southwest corner of the Roseview P.A.D. The parcel and the P.A.D. are within the City of Surprise. Regional access is via US Highway 60 (Grand Avenue) to the north, Loop 303 (Estrella Parkway) to the west, and Interstate 10 to the south. The Roseview P.A.D. is bordered by arterial roadways which will be improved to meet City standards: Dysart Road, Waddell (Thunderbird Road), and Greenway Road.

CIRCULATION SYSTEM:

The Roseview P.A.D. is served by an internal collector street (133rd Avenue) which will provide convenient access to all lots within the subdivision including the proposed 10 acre parcel. The addition of the 10 acre parcel will be insignificant in terms of established traffic impact projections for the Roseview P.A.D.

COMMUNITY FACILITIES AND SERVICES:

The open space buffer proposed along Waddell Road for the Roseview P.A.D. will be extended across the southern portion of the 10 acre parcel. The addition of this open space will increase the overall total private open space for the Roseview P.A.D. from 25.68 acres to approximately 27 acres. All open space areas will be dedicated to, and maintained by a Homeowners Association. Residents of the 10 acre parcel will be members of the Roseview Homeowners Association and shall have access to all Roseview parks, trails and amenities.

The City of Surprise is the domestic water provider for the Roseview P.A.D. and shall be the provider for the 10 acre parcel. The City of Surprise is the sanitary sewer provider for the Roseview P.A.D. and shall be the provider for the 10 acre parcel. Arizona Public Service (APS) is the electric power provider for the Roseview P.A.D. and shall be the provider for the 10 acre parcel. US West is the telephone service provider for the Roseview P.A.D. and shall be the provider for the 10 acre parcel. Cox Communications is the cable television provider for the Roseview P.A.D. and shall be the provider for the 10 acre parcel. Police and Fire services shall be provided by the City of Surprise. The 10 acre parcel is located within the Dysart School District. Street lights for the Roseview P.A.D. will be installed and maintained by a Street Light Improvement District. The 10 acre parcel will participate in the Street Light Improvement District.

DEVELOPMENT SCHEDULE:

Development of the Roseview P.A.D. has begun with improvements on Greenway, Dysart, Waddell and the collector roads with the first units of development commencing with Unit 1 and proceeding through Unit 6. The anticipated completion date is approximately 2000. The 10 acre parcel will become a portion of the Phase 7 improvements described in the Roseview P.A.D.

DESIGN STANDARDS:

All site development, architectural, and landscape design standards governing the Roseview P.A.D. and including the *Surprise Municipal Code, Title 16 Subdivision* Section 16.20.040, regarding sidewalks for local streets (4 feet) shall apply to the 10 acre parcel.