MESA PROVING GROUNDS

DEVELOPMENT UNIT MASTER TRANSPORTATION PLAN FOR DU 7

Prepared For:

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Project No. 60224454

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1.0 Introduction

DMB Mesa Proving Grounds LLC (DMB) owns Mesa Proving Grounds located at the southeast corner of Elliot and Ellsworth Roads, which is anticipated to be an approximately 3,155-acre master planned community within the City of Mesa (City). The *Mesa Proving Grounds Master Transportation Plan (MTP)*, September 23, 2008, was prepared by AECOM (formerly DMJM Harris) as part of the Planned Community District (PCD) zoning request for the site and was approved by the City.

There are nine (9) Development Units (DU) that comprise the PCD. The approved land use budget for the site specifies the level of development and land use groups proposed for each DU. A mid-range level of density for each DU was used as the basis for estimating potential future land uses on the Site and projecting traffic volumes that may be generated.

DMB is preparing the Development Unit Plan (DUP) for DU 7 located at the northwest quadrant of Ray Road and Signal Butte Road. As shown in Figure 2.1 of the *MTP*, DU 7 extends from Ray Road north to Warner South Road and from Signal Butte Road to Spine West Road. Per the requirements of the *MTP,* this report addresses the transportation system associated with the proposed land uses and development densities on DU 7.

2.0 Proposed Development

2.1 Land Use

The planning framework for the site was outlined in the *MTP* which proposed a land use budget for each of the nine DU's. The minimum and maximum volumes for each DU present a range that will be balanced amongst the DU's as development, and ultimately, redevelopment occurs. The land use budget for DU 7 has a range of 1,270 - 4,060 dwelling units and a range of zero – 375,000 square feet of gross floor area of non-residential land. Within DU 7 several land use groups are defined which include estate, village, district, and general urban. The definitions to these land use groups are provided in Section 7 of the *Mesa Proving Grounds Community Plan*.

The DUP for DU 7 includes approximately 2,100 dwelling units and 81,000 square feet of gross floor area of non-residential land uses. The land use groups remain the same as the ones defined in the Community Plan. Land uses east of Spine East Road include single family and multi-family residential and a church. The Great Park is located between Spine West Road and Spine East Road. In addition to general open park area, additional associated land uses are proposed to include a community center including a restaurant and outdoor amphitheater/gathering area. Land uses near Warner South Road in the area are also anticipated to include a second church site and an elementary school with ball parks. The comparison of the DUP to the budgeted development levels confirms the proposed development is within the approved land use budget stated in the *MTP*.

The land use budget for the remaining DU's remains the same as presented in the *MTP* in Table 2.1. Total build-out for Mesa Proving Grounds will not exceed 15,000 dwelling units and 20 million square feet of commercial. Future DUP's for the remaining eight DU's will provide the opportunity to address potential changes in the balance of land uses and resulting shifts in trip distribution.

2.2 Street Circulation Plan

The roadway network and circulation plan will follow the same requirements and characteristics as was documented in the *MTP*. Appendix A illustrates the cross sections for each roadway classification and Section 10 of the *Mesa Proving Grounds Community Plan* provides additional details to include parking and/or bike lanes on a particular roadway.

Signal Butte Road and Ray Road are classified as six-lane arterial streets which border DU 7 on the east and south edges. Spine East Road and Spine West Road run north-south through DU 7 and are classified as four-lane District streets. Both streets run adjacent to the Great Park and will include parallel parking on each side of the roadway. Warner South Road borders to the north and is classified as a four-lane District street. A north-south roadway located between Signal Butte Road and Spine East Road connecting Warner South Road to Ray Road is classified as a Neighborhood street and will include bike lanes in each direction. Neighborhood streets comprise most of the roadway network within DU 7 and provide connections from the perimeter roadways to the individual parcels.

As identified in Section 2.3 of the *MTP, r*oadway cross section transition will be needed at the Crismon Road/Spine West Road and Ray Road intersection. The ultimate 6-lane cross section for Crismon Road will need to transition to a 4-lane cross section on the Spine West Road leg of the intersection. A typical intersection configuration and arterial roadway transition is presented in Appendix B.

An alignment shift of Crismon Road (Spine West Road) approximately 300 feet east of the section line at its intersection with Ray Road is proposed to accommodate future access to other developments south of Ray Road. The spacing between the proposed roadway intersections and the proposed access points for DU 7 is illustrated in Figure 2.1. Proposed locations for secondary site access at unsignalized intersection locations are also shown on Figure 2.1.

Ultimate build-out of Ray Road will include a raised median. Access points which may be signalized are allowed at a spacing less than 880 feet and greater than 660 feet from an arterial-to-arterial intersection. With the shift of Spine West Road, the intersection spacing between Spine West Road and Spine East Road is approximately 780 feet. The signal progression analysis presented in Section 4.0 herein shows acceptable progression with signalized intersections at both Spine West Road and Spine East Road. Full access median breaks are allowed a minimum of 880 feet from an arterial-to-arterial intersection. Allowable locations for median openings and full site access are shown in Figure 2.1.

Roadways segments which are anticipated to be constructed in the future with funds from other developments or as part of the Maricopa Association of Governments (MAG) Regional Transportation Plan include Crismon Road, Signal Butte Road, and Ray Road east of Signal Butte Road. SR 24 is planned for construction from SR 202L to Ellsworth Road by the end of year 2013. It is anticipated the remaining segments of SR 24 will not be constructed before year 2020. The future roadway network is illustrated in Figure 2.1.

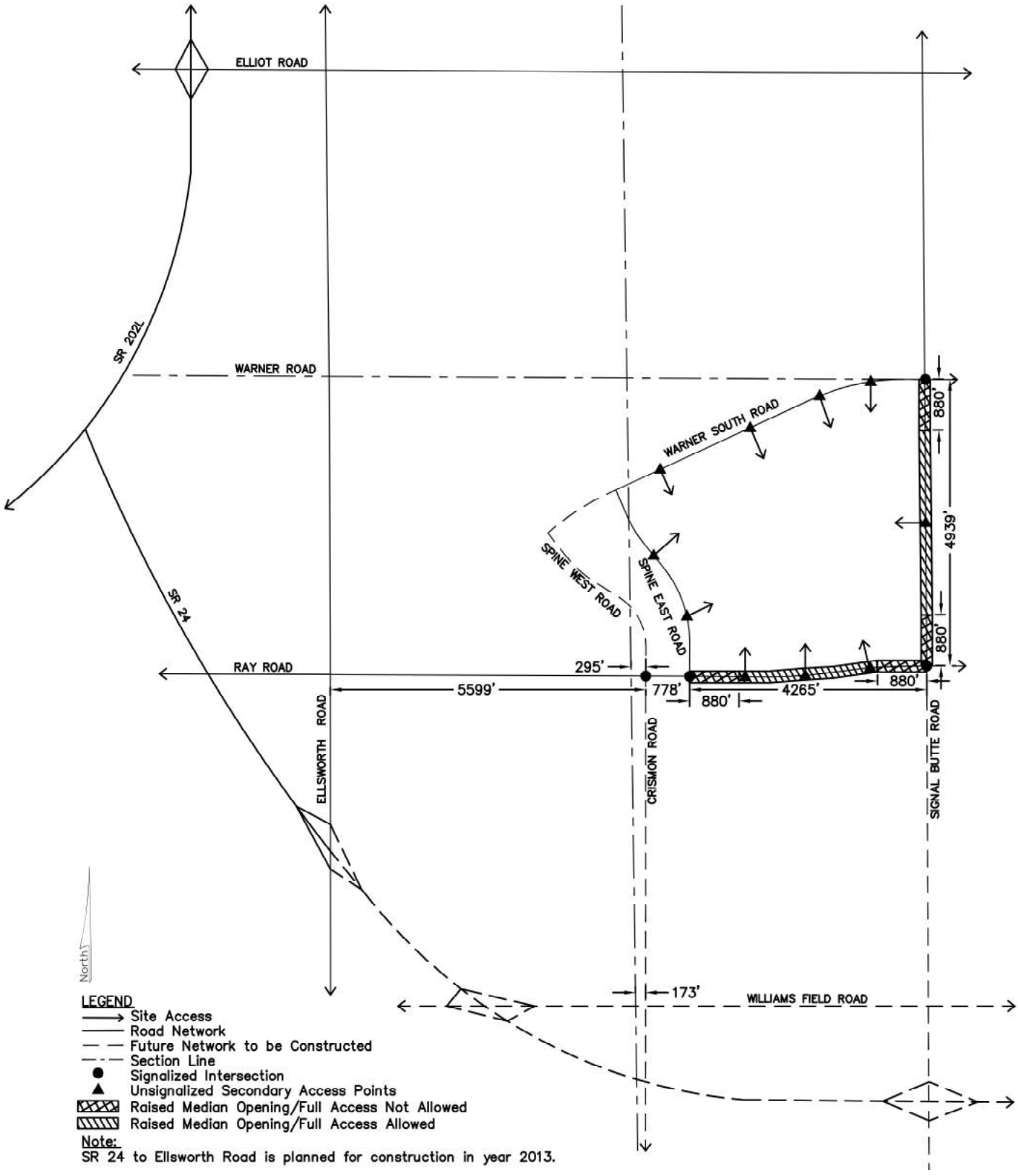


Figure 2.1 Roadway Spacing and Access to DU 7

2.3 Bicycle and Urban Trail Circulation Plan

The roadway network within Mesa Proving Grounds is designed to encourage multi-modal transportation, including, but not limited to, transit, bicycles, pedestrians, multiple electric vehicle options (MEVOs), including neighborhood electric vehicles (NEVs), electric scooters, and other plug-in electrically powered vehicles.

Bicycle and pedestrian accommodations are provided through the roadway network in DU 7. Sidewalks will be located on both sides of the neighborhood streets. East-west connections between neighborhoods will provide connectivity between the residences and the Great Park. The north-south road connecting Ray Road and Warner South Road through the residential part of DU 7 will have a striped bike lane in each direction.

3.0 Projected Site Traffic

The projected build-out daily weekday traffic volumes for the site-generated traffic in the *MTP* were estimated based on preliminary land use concepts that are within the Land Use Budget. Updated land use densities for DU 7 are proposed and a calculation using the same methodology as the *MTP* is used to compare the assumed land uses to the proposed land uses.

A generally accepted method of estimating the number of trips to be generated by new developments is to use the regression equations and/or average trip rates developed by the Institute of Transportation Engineers (ITE). These trip generation equations and rates were developed through a compilation of extensive field studies and traffic counts at existing developments throughout the United States. *Trip Generation, Eighth Edition*, published by ITE, is the result of these studies and provides these trip generation rates for various developments.

Table 3.1 and Table 3.2 show the approximate volume of site traffic in DU 7 for the previously assumed and DUP proposed land uses, respectively.

Table 3.1. DU 7 Assumed Land Use Trip Generation Presented in *Master Transportation Plan*

Land Use	Land Use Code (LUC)	LUC Units	Intensity	Trip Gen Rate, Avg Weekday	Internal Trip Capture	Pass-by %	Resultant Total ADT, Weekday
Residential							
High Density	222	DU	932	5.81	Varies	0%	4,900
Medium Density	230	DU	1,818	7.38	Varies	0%	12,100
Low Density	210	DU	0	7.38	Varies	0%	0
Retail	82	1,000 SF	200	38.7	Varies	35%	3,700
School	520	1,000 SF	60	10.72	Varies	0%	500
Total							**21,200**

Table 3.2. DU 7 Proposed Land Use Trip Generation for DUP

Land Use	Land Use Code (LUC)	LUC Units	Intensity	Trip Gen Rate, Avg Weekday	Internal Trip Capture	Pass-by %	Resultant Total ADT, Weekday
Residential							
High Density	222	DU	360	5.81	0%	0%	2,100
Medium Density	230	DU	1,110	7.38	0%	0%	8,200
Low Density	210	DU	610	7.38	0%	0%	4,500
Retail	82	1,000 SF	0	38.7	0%	0%	0
School	520	1,000 SF	22	10.72	0%	0%	200
Park	411	Acre	30	1.59	0%	0%	100
Church	560	1,000 SF	57	9.11	0%	0%	600
Community Center	495	1,000 SF	2	22.88	0%	0%	100
Total							**15,800**

Overall the dwelling unit, non-retail, and retail densities in the DUP are less than the densities assumed in the *MTP*. The proposed dwelling unit density is approximately 2,100 units which is roughly 670 units less than assumptions used in the *MTP*. Similarly, the proposed retail land uses and school land uses are 200,000 and 38,000 square feet, respectively, less than assumed in the *MTP*.

The trip generation calculation for the DUP land uses did not include internal capture or pass-by trip reductions. The internal trip capture factors for each District within the development vary as a result of the ratio between the different land uses. Internal capture was not applied as a reduction for DU 7 because the primary land use type is single family residential. Pass-by trip reduction was not used because the reduction applies to retail development and DU 7 does not propose a significant level of retail development.

Site trip distribution for DU 7 uses the assumptions presented in Section 4.2, Site Trip Distribution, of the *MTP*. Assuming 15 percent of the development trips remain internal and are distributed on the roadway network within the ultimate development, the remaining 85 percent is assumed to leave the development and be distributed to the external roadway network. Development trips leaving the study area remain consistent with the *MTP* distributions, such that approximately 15 percent travel north, 25 percent travel south, 20 percent travel east, and 25 percent travel west. Of the 20 percent traveling east, 15 percent are anticipated to travel north on Signal Butte Road and then travel east on Baseline Road or US 60 since Ray Road does not continue east of Signal Butte Road.

The resultant trip distributions are presented in Figure 3.1, on the following page.

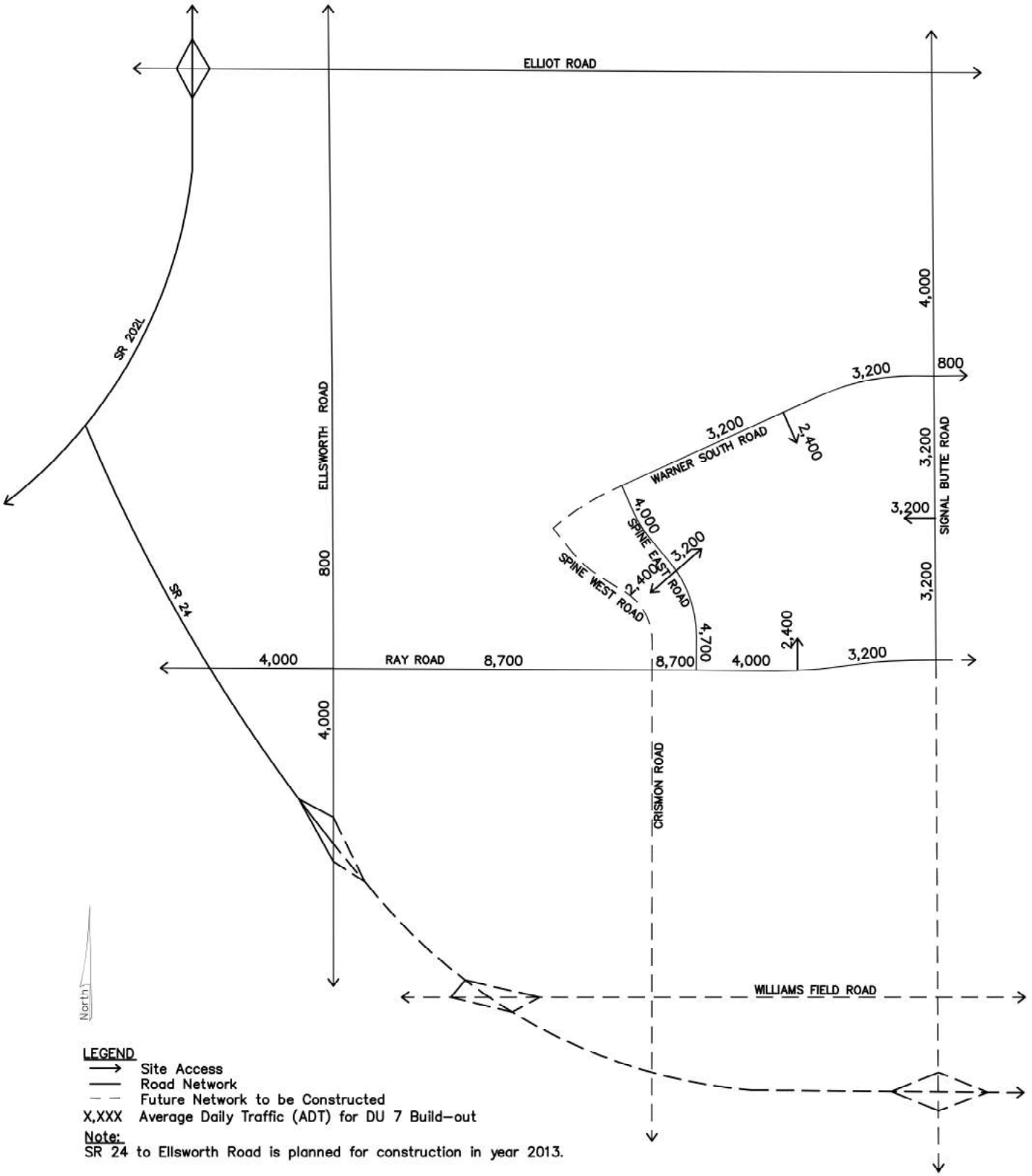


Figure 3.1 Average Weekday Site Traffic Volumes for DU 7

3.1 Year 2013 Total Traffic

The site opening for DU 7 is anticipated for year 2013. Background traffic adjacent to the site is projected for the same year. The assumed growth rate used to project the existing 2009 and 2010 ADT is three percent. The existing volume data is obtained from the 2011 traffic volume map located in the City of Mesa's website. It is anticipated the first phase of the First Solar development will be open and the development's site traffic is included in the 2013 background traffic. The site traffic is obtained from the *First Solar Phase 1 Traffic Impact Statement,* dated March 25, 2011 by CivTech, which projects 3,260 vpd and is included in the background traffic for DU 7. Roadways which currently do not exist and are not anticipated to be constructed prior to DU 7 opening will not have background traffic. This includes Ray Road, Crismon Road, and Signal Butte Road south of Ray Road. The projected year 2013 background traffic volumes are presented in Figure 3.2.

Figure 3.3 presents the resultant total traffic for DU 7. This is a result of adding the background traffic to the total site traffic volumes.

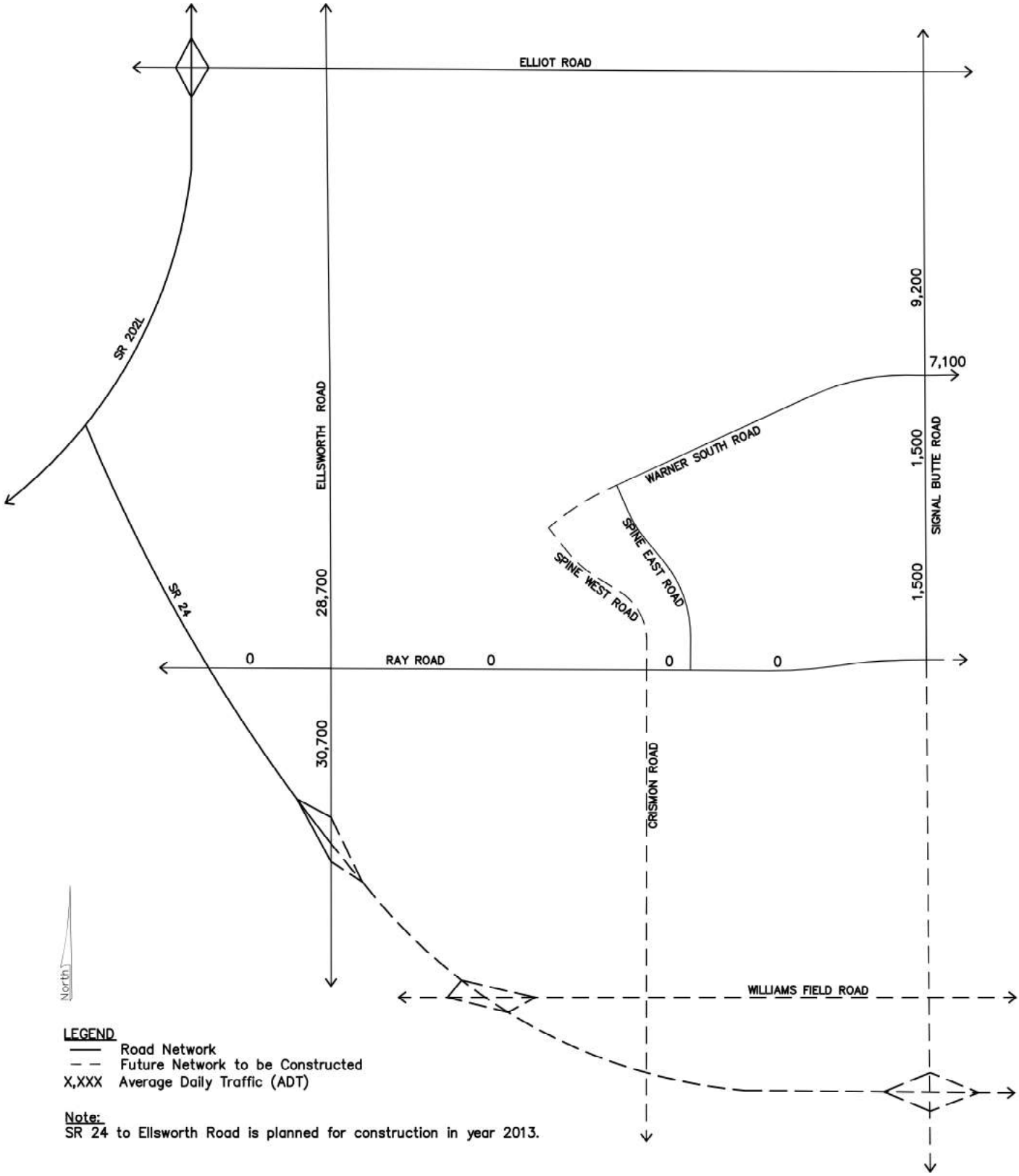


Figure 3.2 Year 2013 Background Traffic Volumes for DU 7

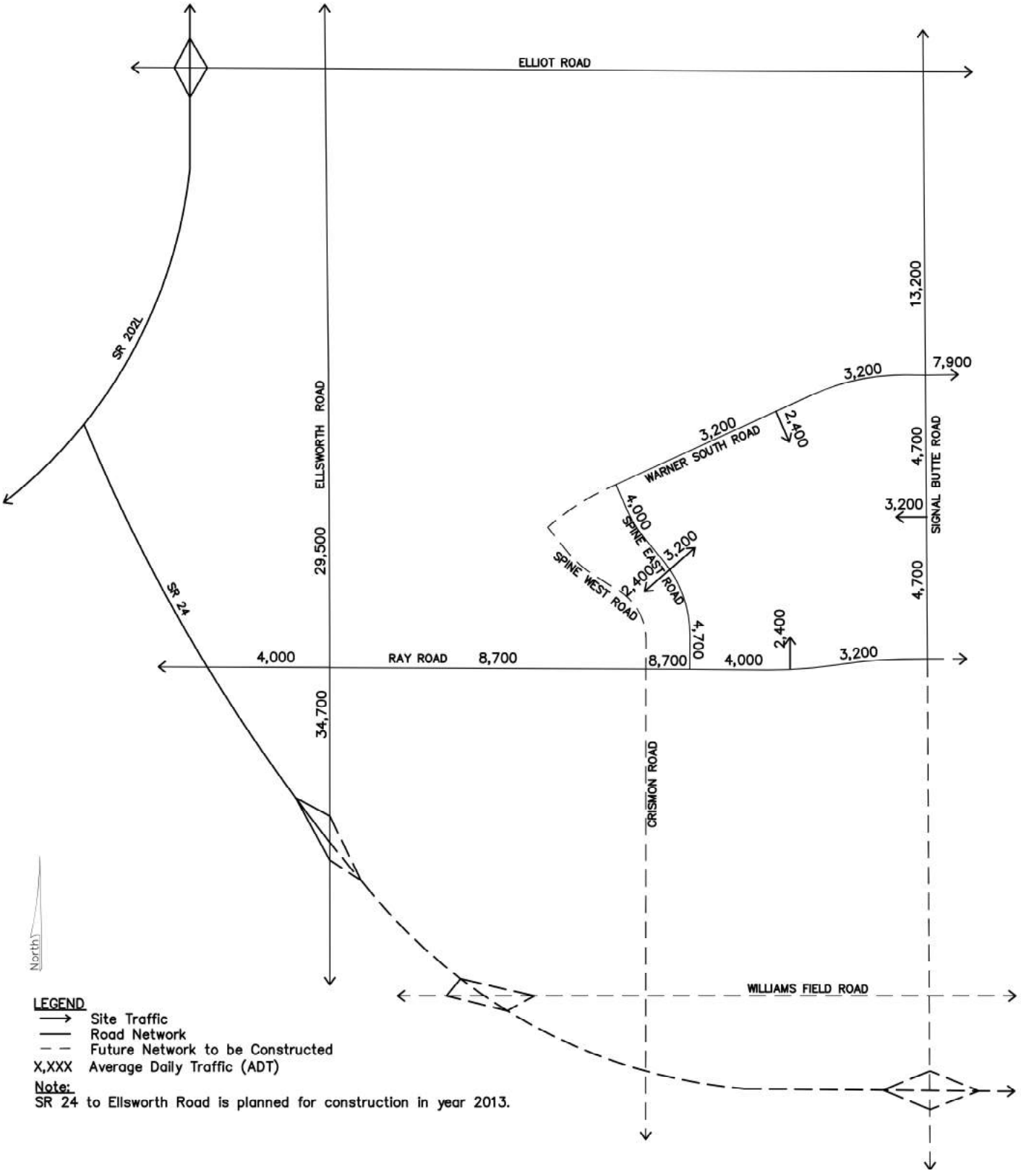


Figure 3.3 Year 2013 Total Traffic Volumes for DU 7

3.2 Year 2030 Total Traffic

Total build-out of Mesa Proving Grounds may take 35 to 40 years; however, MAG's capacity constrained traffic model for year 2030 was used to estimate the background traffic adjacent to Mesa Proving Grounds in the *MTP*. As a result of the reduction in trips generated by DU 7, the total trips on the roads adjacent to DU 7 are reduced. Site trip distribution for DU 7 in year 2030 uses the assumptions presented in Section 4.2, Site Trip Distribution, of the *MTP*. Figure 3.4 presents the year 2030 total traffic volumes for Mesa Proving Grounds which reflects the reduction of trips generated in DU 7.

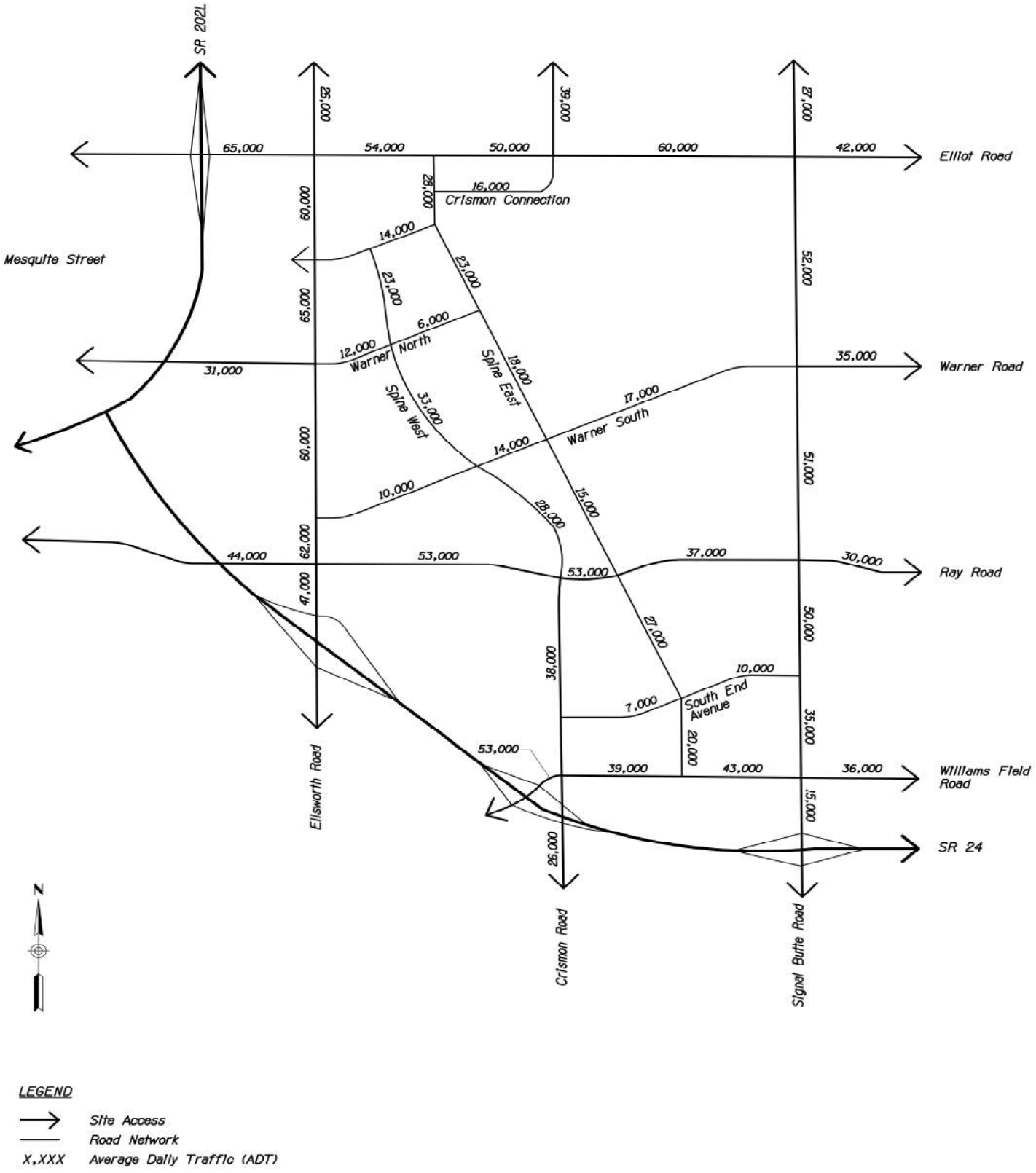


Figure 3.4 Year 2030 Total Traffic Volumes for Mesa Proving Grounds

4.0 Arterial Street Progression

Progression analysis on Ray Road was completed using the software program Synchro 7, which utilizes the methodologies set forth by the *Highway Capacity Manual*. The cross roads that were included in the analysis are Crismon Road/Spine West Road, Spine East Road, Signal Butte Road, and Meridian Road. Ellsworth Road is not included as its intersection and alignment with Ray Road may be uncertain.

The arterial roadway network developed in Synchro 7 is based on the DUP proposed roadway alignments. The distance between Crismon Road and Signal Butte Road is approximately 5,040 feet, and the distance between Signal Butte Road and Meridian Road is approximately 5,280 feet. Intersection spacing between Ellsworth Road and Signal Butte Road is shown in Figure 2.1. The speed on Ray Road was set to 38 miles per hour per the City's typical signal progression design speed.

The signal timing at the arterial to arterial intersections uses a cycle length of 94 seconds and an effective green time of 30 seconds for the through movements; this includes Crismon Road/Spine West Road, Signal Butte Road, and Meridian Road. The intersection of Ray Road and Spine East Road has a cycle length of 94 seconds with an effective green time on Ray Road of 60 seconds. An offset of zero was used at the arterial to arterial intersections. An offset of 14 seconds was used at the intersection of Spine East Road.

The analysis was performed for both AM and PM peak hours using the full site build-out volumes in the *MTP*. Appendix C includes the time-space diagram output from Synchro. Table 4.1 illustrates the results for the AM and PM peak hours.

Table 4.1. Ray Road Progression Bandwidth

	Eastbound	**Westbound**
AM Peak Hour	28 seconds	28 seconds
PM Peak Hour	30 seconds	30 seconds

The bandwidth on Ray Road for both directions during the AM peak hour and PM peak hour is approximately 30 seconds. This will provide continuous flow of traffic along this corridor from Crismon Road/Spine West Road to the east.

5.0 Development Phasing

Construction of DU 7 will occur in two phases in which the south half of the development unit will be constructed first and the north half will be constructed last. Half street section improvements will be completed with the development phasing and will include roadway, utility, and landscaping work.

Phase 1 will build the half street section of Ray Road from Ellsworth Road to Signal Butte Road; Signal Butte Road from Ray Road to the midpoint of DU 7; and Spine East Road from

Ray Road to the midpoint of DU 7. Phase 2 will construct the half street sections of Signal Butte Road from the midpoint of DU 7 to Warner Road, and Spine East Road from the midpoint of DU 7 to Warner South Road. In addition, the half street section of Warner South Road will be constructed from Spine East Road to Signal Butte Road. Spine West Road is anticipated to be constructed with Development Unit 3.

Future traffic signals will be located at the intersections of Crismon Road/Spine West Road and Ray Road, Spine East Road and Ray Road, Signal Butte Road and Ray Road, and Signal Butte Road and Warner South Road. Conduit and pull boxes should be installed at the arterial-to-arterial intersections and at Spine East Road and Ray Road intersections during Phase 1 and Phase 2. The installation of a traffic signal at each location shall be constructed when traffic volumes meet traffic signal warrants and a traffic signal warrant analysis is performed.

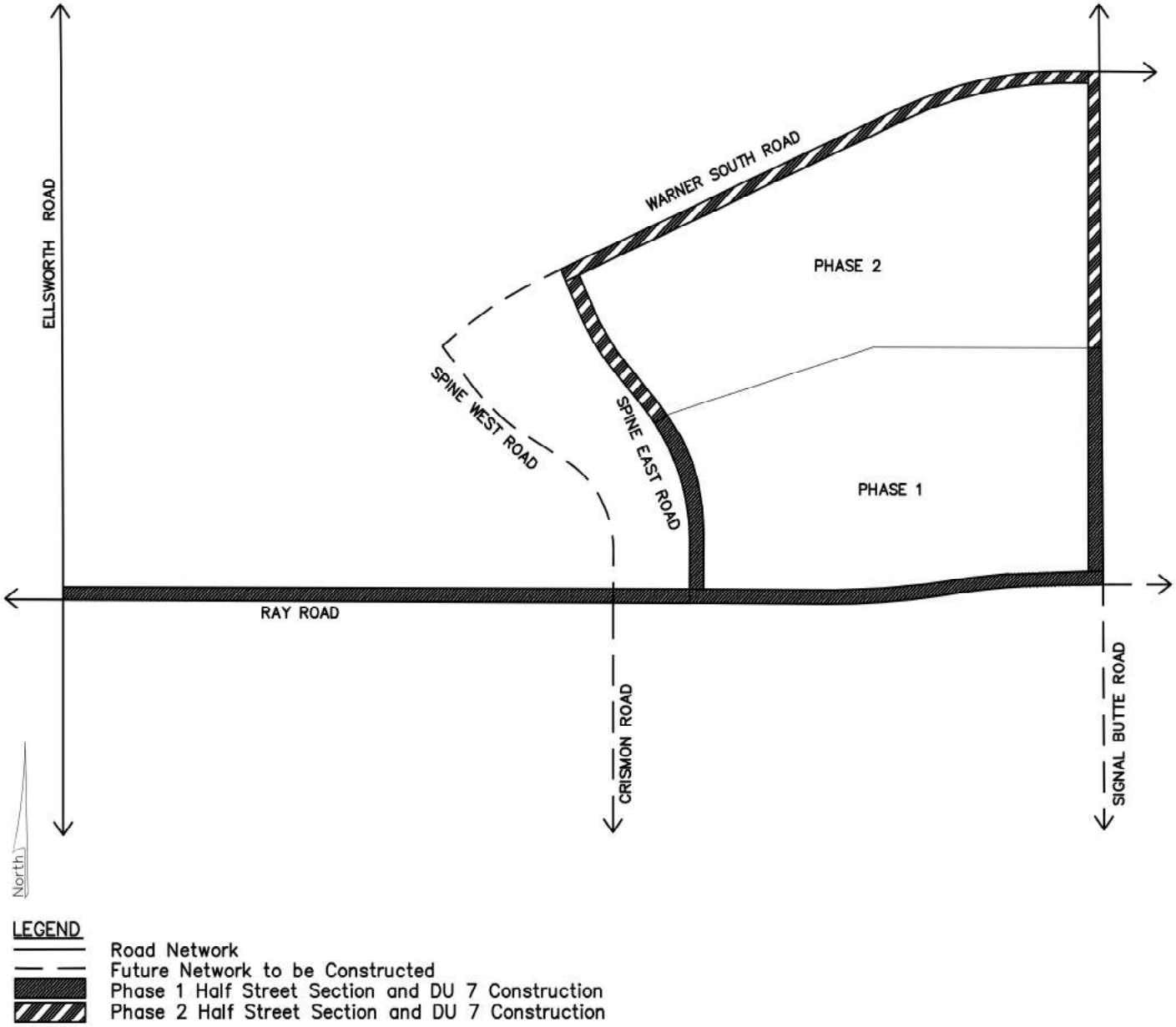


Figure 5.1 Development Phasing for DU 7

6.0 Conclusions

The proposed land use intensity for DU 7 is within the approved land use budget and less than the assumed intensity used to generate volumes in the *MTP*. The estimated trips generated is approximately 15,800 daily weekday trips, which is approximately 5,400 trips less than the assumed weekday trips calculated in the *MTP*. The roadway network and cross sections approved in the *MTP* are still appropriate for the proposed land uses within DU 7.

Total build-out for Mesa Proving Grounds will not exceed 15,000 dwelling units and 20 million square feet of commercial. Future DUP's for the remaining eight DU's will provide the opportunity to address potential changes in the balance of land uses and resulting shifts in trip distribution.

Half-street roadway sections to be constructed with DU 7 include Ray Road from Ellsworth Road to Signal Butte Road and Signal Butte Road from Ray Road to Warner Road. Internal District Streets to be constructed include half street improvements on Spine East Road and Warner South Road adjacent to DU 7. Conduit and pull boxes should be installed at the arterial-to-arterial intersections and at Spine East Road and Ray Road intersections for future traffic signals. Traffic signal warrant evaluations should be coordinated with City traffic engineering staff to determine the appropriate time for traffic signal installations.

Appendix A

Roadway Cross Sections
(From Section 10 of the Community Plan)

D. The following general notes apply to all of the Detailed Cross Sections that follow. Refer to ***Exhibits 10.7 – 10.13***

1. Trash collection is not permitted on arterial streets.

2. Trash barrels are not permitted in travel lanes.

3. Minimum vertical clearance requirement for trash collection under overhead structures is eighteen (18) feet for trash barrel collection and twenty-six (26) feet for trash bin collection.

4. Minimum vertical clearance requirement is fifteen (15) feet on fire lanes and fourteen (14) feet on all other streets, except arterial streets. Minimum vertical clearance on arterial streets is sixteen (16) feet.

5. Except for service lanes, sidewalks are to be provided on both sides of a street but may be separated from the curb by parking lane or other feature. Sidewalk conditions are set forth in Section 10.10.

6. All structures encroaching into City ROW require specific City approval.

7. Trash collection on one-way streets and service lanes, shall be on the right side only.

8. Trash collection on two-way service lanes, is preferred on one (1) side only.

9. Bicycle lanes may be added at the edge of travel lane, except on service lanes.

10. Parking options may be added at the edge of travel lane for all streets except arterial streets. Only parallel parking options may be used on four (4) lane district streets. Perpendicular parking is not permitted on district streets.

11. Typical utility locations are shown. Specific locations will be based on actual planned utilities within roadways that may include water, sewer, non-potable water, storm drain and dry utilities. Water mains will typically be located in frontage roads and not in service lanes.

12. When ribbon curb is used, no part of the curb shall be considered part of the drivable surface.

13. When rolled curb is used, the first nine (9) inches shall be considered part of the drivable surface.

14. When vertical curb is used, the entire surface up to the face-of-curb shall be considered part of the drivable surface. When travel lanes are less than eleven (11) feet wide and against a vertical curb, one (1) additional foot of width in the travel lane is required to allow the driver to shy away from the curb. The travel lane may continue straight through with the curb being set back one (1) foot to provide the extra lane width. Refer to ***Exhibit 10.15*** - Medians and Turn Lanes – Details for an example of this.

15. Easements along ROW shall be in a form acceptable to the City. Easements shall be able to accommodate the elements of Section 10, so long as the elements are appropriate to the setting.

Exhibit 10.7 - 6 Lane Perimeter Arterial/6 Lane Internal Arterial (Ray Road) – Detailed Cross Section

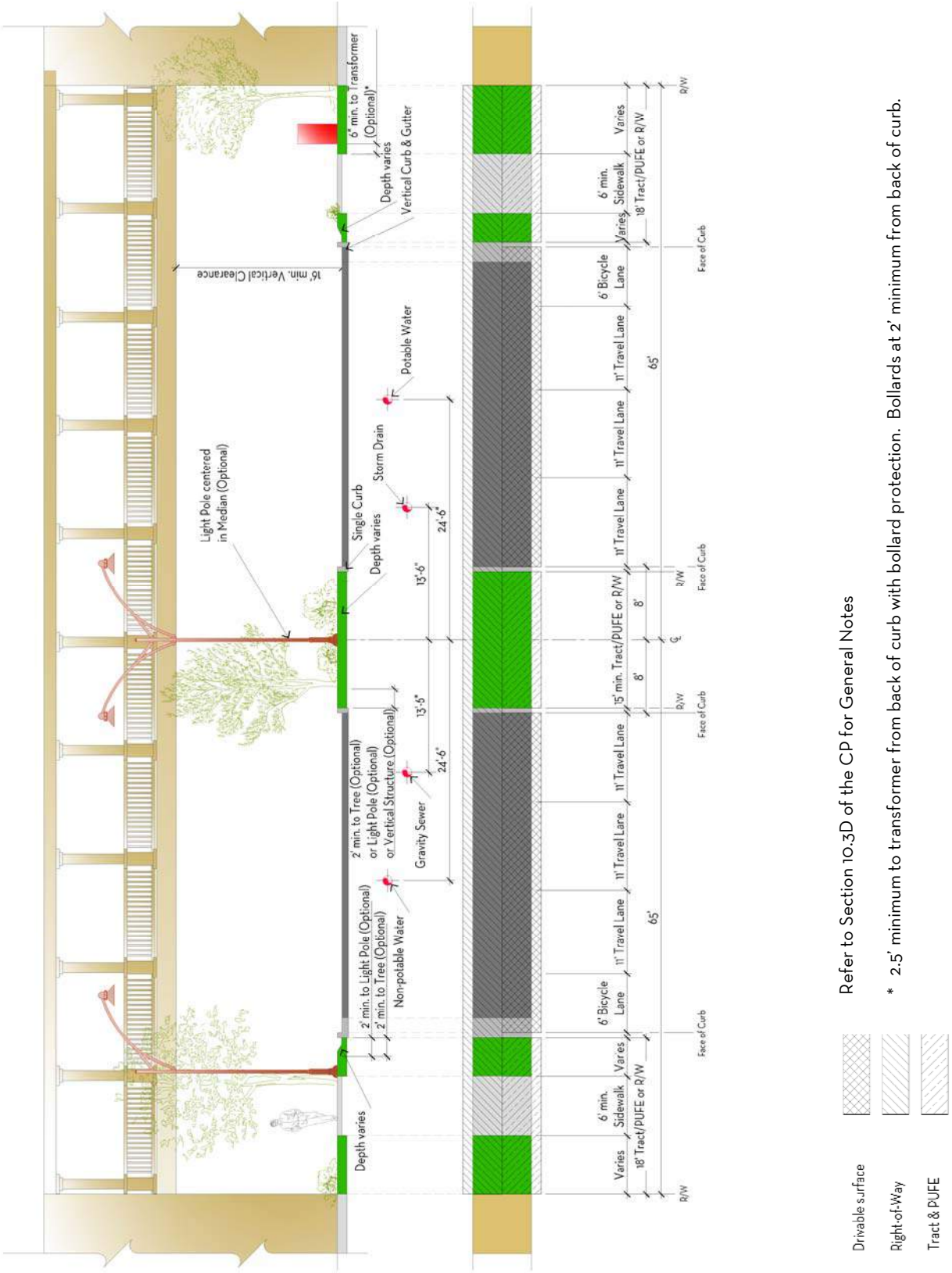


Exhibit 10.8 - Two-Way Four Lane District Street – Detailed Cross Section

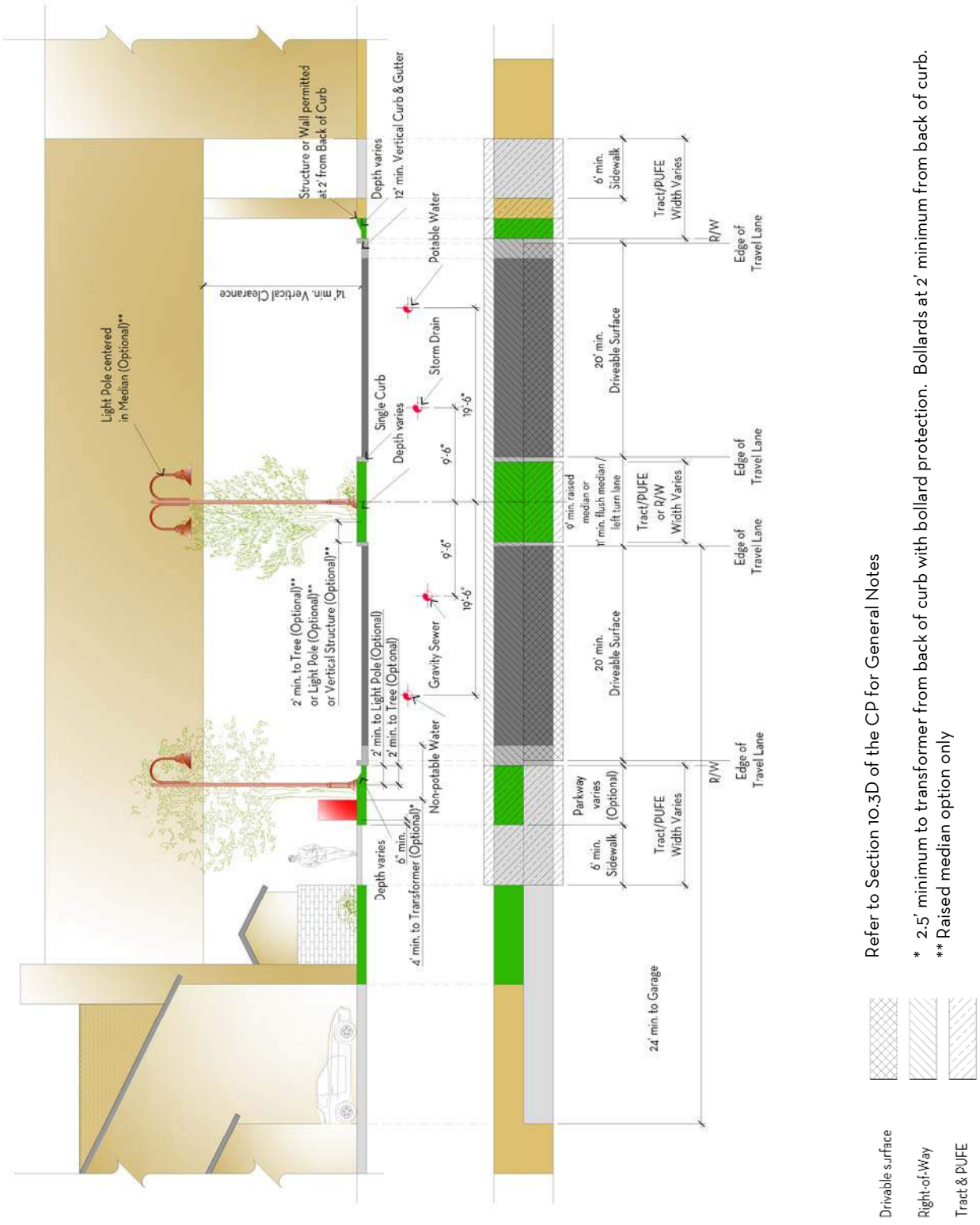


Exhibit 10.10 - Two-Way Neighborhood Street – Detailed Cross Section

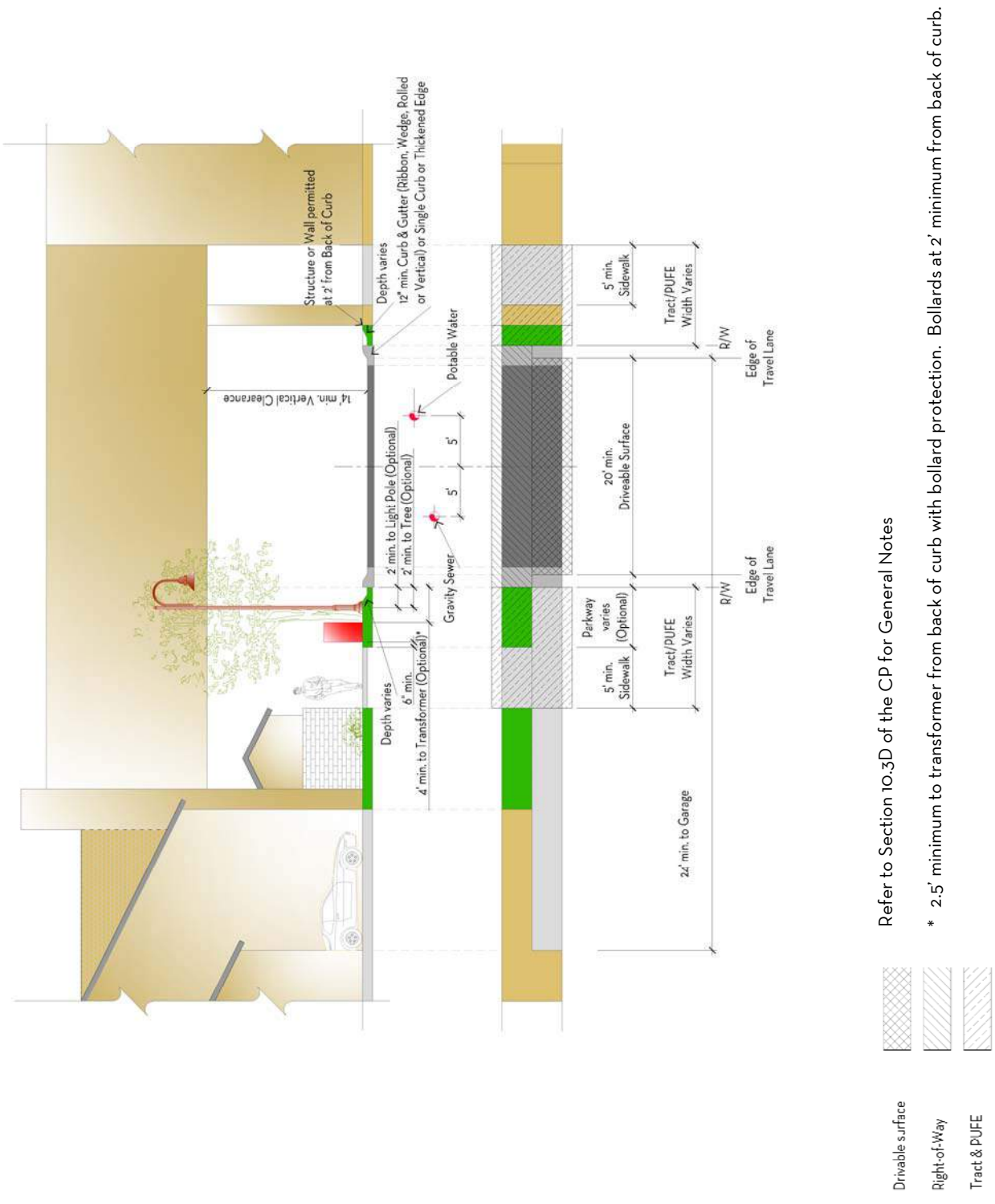
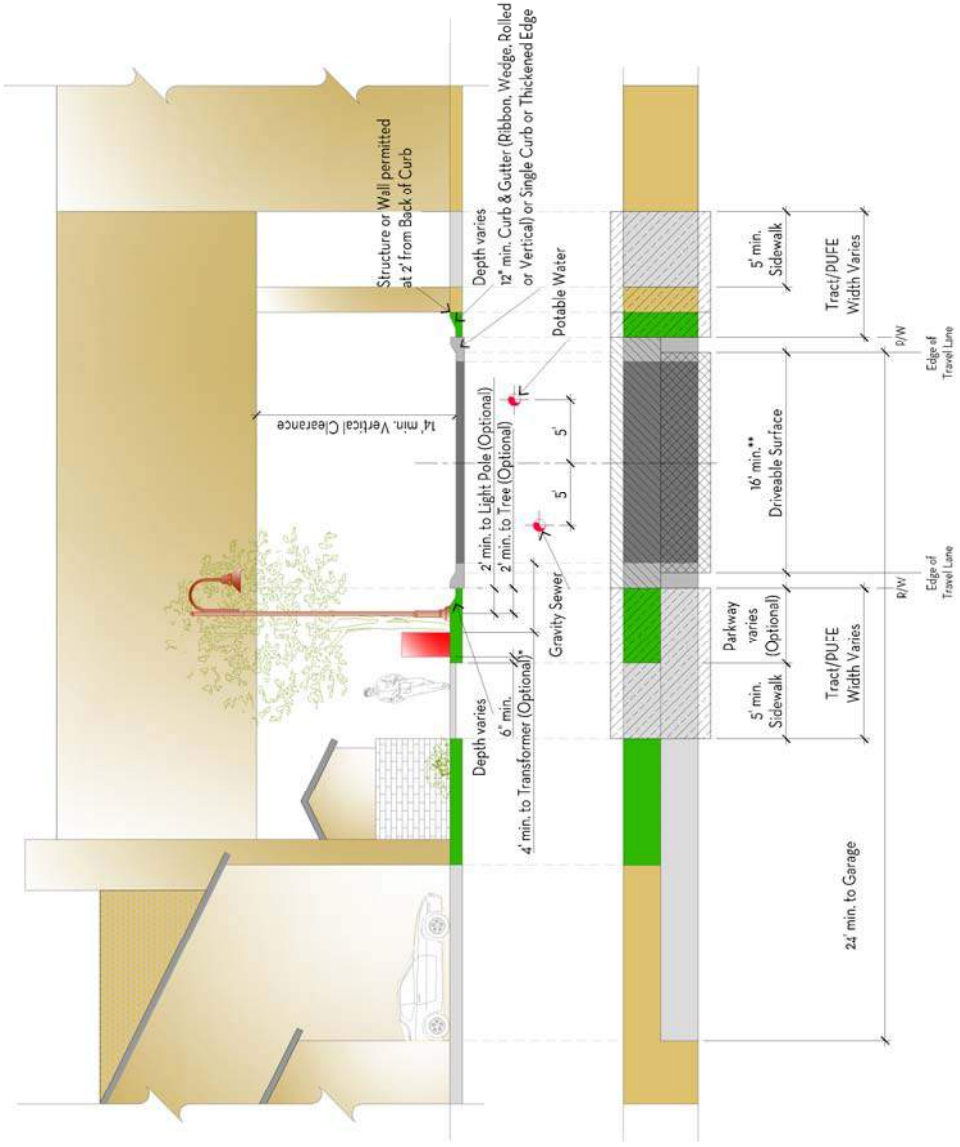


Exhibit 10.11 - One-Way Neighborhood Street – Detailed Cross Section



Refer to Section 10.3D of the CP for General Notes

* 2.5' minimum to transformer from back of curb with bollard protection. Bollards at 2' minimum from back of curb.

** Any fire lanes with less than a 20' clear drivable surface require a defensible position. Refer to ***Exhibit 10.16*** - Defensible Positions in Section 10 of CP.

Drivable surface

Right-of-Way

Tract & PUFE

E. On-street Parking

1. ***Exhibit 10.14*** - On-Street Parking and Bicycle Lane Options - Details provides a list of detailed options that can be used beyond the edge of the travel lane on various street cross sections.

2. Public On-street parking may be within the ROW.

3. Private On-street parking may adjacent to the ROW with a ribbon curb defining the edge of the ROW.

4. Parking is allowed only on paved parking surfaces. Pavement may be concrete, asphalt, or a porous material approved by the City Engineer. Where decomposed granite or similar porous pavement is used, it shall conform to ADA guidelines.

5. Public or private on-street parking spaces may be used to accommodate the required parking of adjacent properties.

6. A curb, wheel stop, vertical element (such as bollards, pots, or other street furniture) or bumper guard at least four (4) inches in height, shall be installed to delineate the parking areas from other adjacent uses such as landscape or pedestrian pathways. Parking may overhang landscape or hardscape by two (2) feet. Parking may likewise overhang required pathways by two (2) feet when the minimum required pathway width is maintained exclusive of the overhang. In either case, the length of a parking stall may be reduced by two (2) feet.

7. All parking spaces may be marked or denoted, and the paved area shall be properly drained or appropriately designed to handle stormwater retention. Changes in paving type, texture, color, curb design, tree placement, painted stripes or similar elements may be used to denote parking stalls. Parallel parking stalls along streets, service lanes or access ways do not require striping for individual parking stalls.

8. Private on-street parking spaces may be publicly or privately metered by a pay per use, lease, long term purchase or other similar agreement.

9. Public on-street parking spaces may be publicly metered by a pay per use or other similar agreement by the City or the Master Developer.

10. Availability of public on-street parking for reserved , loading or other such use may be designated at any time so long as such designation is not intended to reserve spaces for a specific or individual user. On public streets and service lanes, the designation shall be made and monitored by the Master Developer. The City shall not be responsible to make, monitor or maintain such designations.

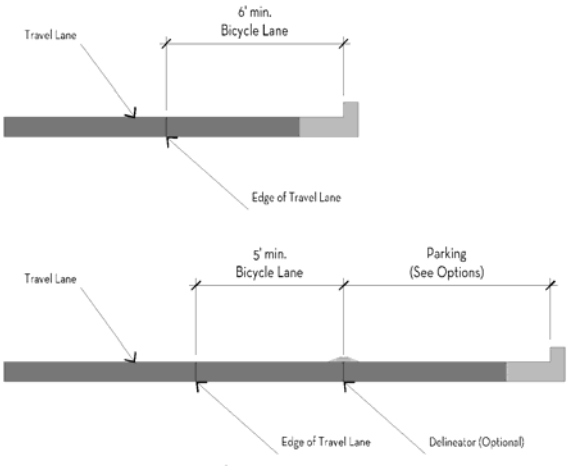
11. Availability of private on-street parking for reserved , guest , loading or other such use may be designated at any time. On public streets and service lanes, the designation shall be made and monitored by the Master Developer. The City shall not be responsible to make, monitor or maintain such designations.

12. Vehicle charging stations or other alternative energy solutions may be provided as part of the parking stall without additional space requirements so long as the largest typical alternative vehicle's size is accommodated.

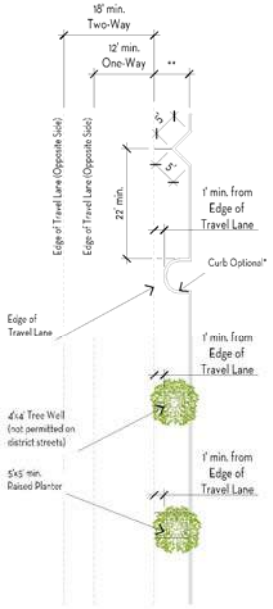
13. Small parking stalls may be provided for Neighborhood Electric Vehicles (NEVs) or other alternative transportation vehicles. Such parking stalls will count at a ratio of one-to-one (1:1) toward any parking requirements.

F. ***Exhibit 10.15*** - Medians and Turn Lanes - Details provides options that can be used for medians and turn lanes on all streets except the arterial streets. Other options may be approved by the City Traffic Engineer and Fire Chief.

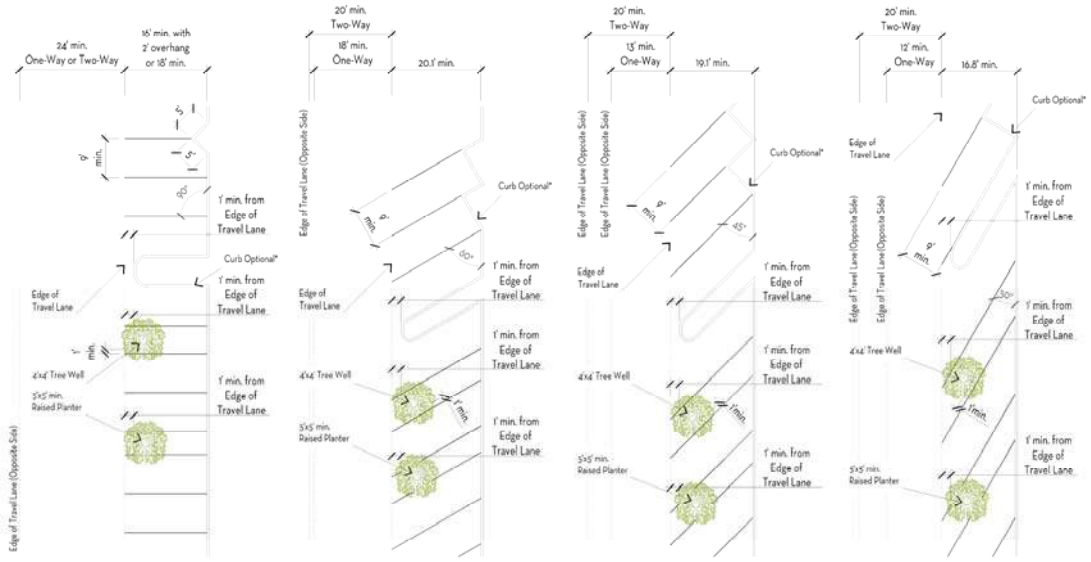
Exhibit 10.14 - On-Street Parking and Bicycle Lane Options – Details



Bicycle Lane Options



Parallel Parking (0°)



Perpendicular Parking (90°) Angular Parking (60°) Angular Parking (45°) Angular Parking (30°)

General Notes

1. Parallel Parking is only parking option allowed on Four Lane District Street
2. Perpendicular Parking is not permitted on District Streets
3. No parking allowed on 6 Lane Arterial Streets
4. Bicycle Lanes may be part of a fire lane, parking stall areas may not. Refer to ***Exhibit 10.16*** – Defensible Positions.

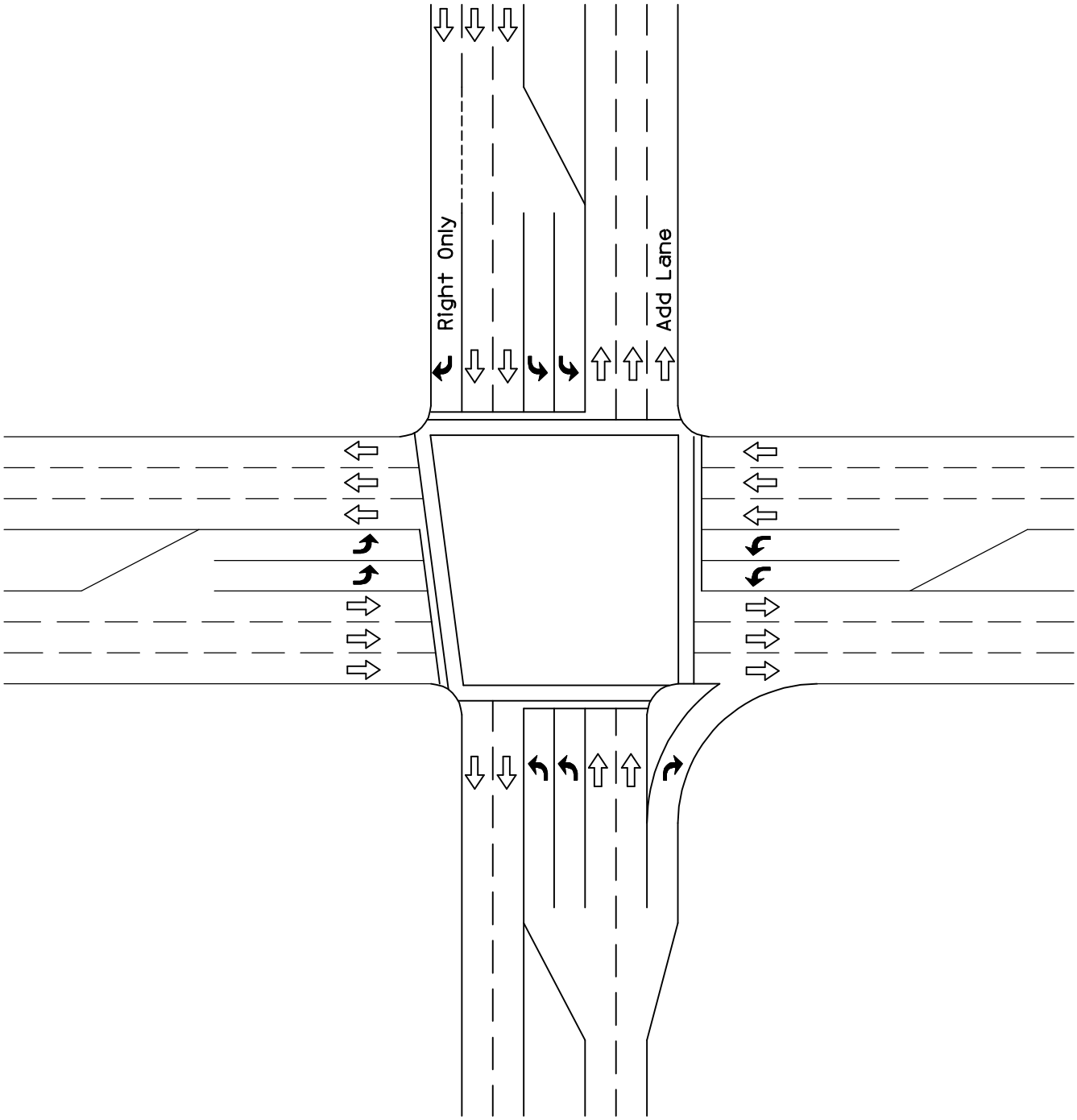
* Curb, Vertical Element, Wheel Stop or Bumper Guard

** 8' minimum on District Streets and 7' minimum on all other streets

Appendix B

Arterial Roadway Cross Section Transition

6–Lane Transition to 4–Lane



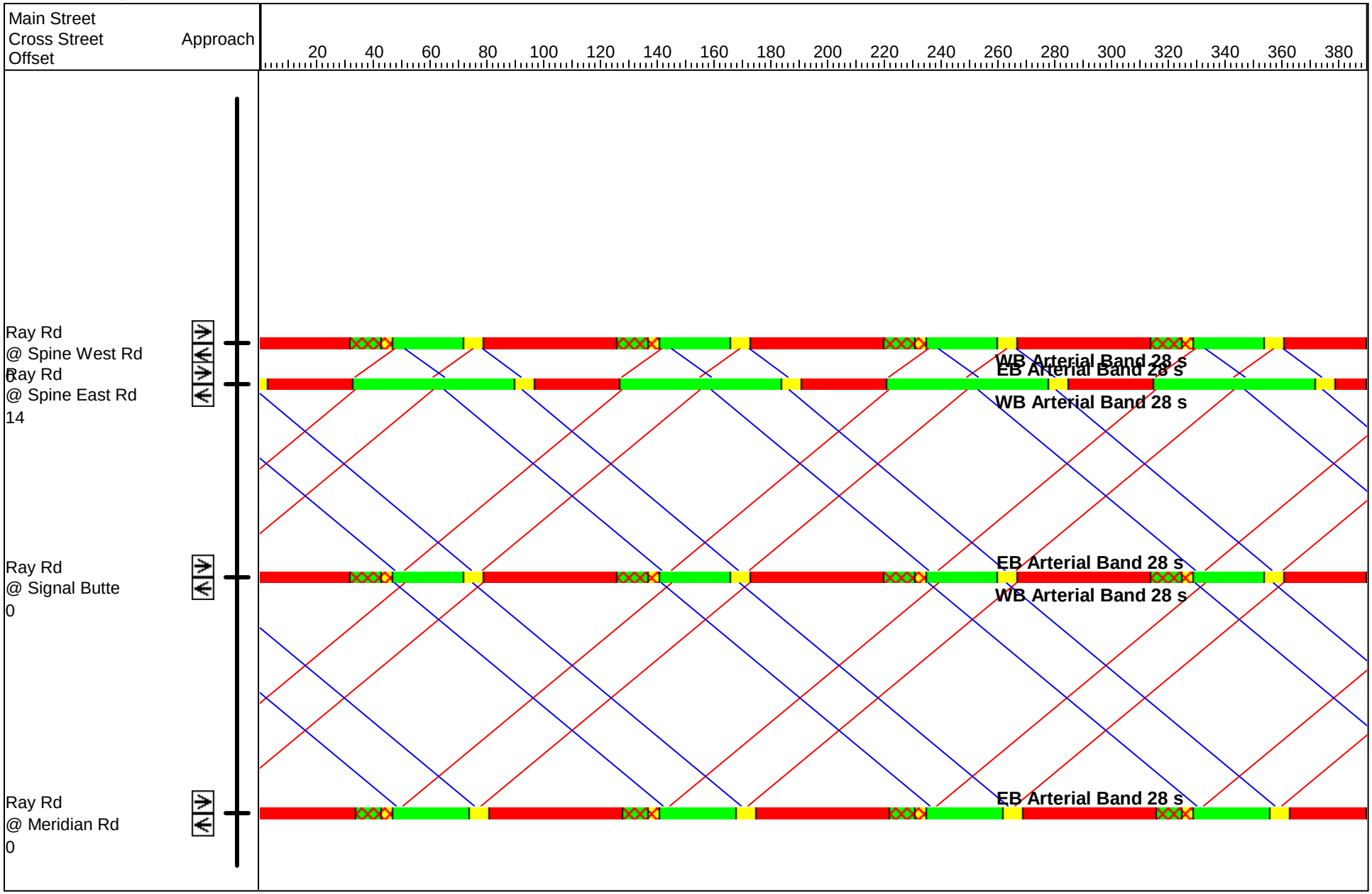
DMJM HARRIS | AECOM 2777 E. CAMELBACK RD SUITE 200 PHOENIX, AZ. 85016-4302 (602) 337-2777		
MPG 6-Lane Transition to 4-Lane		
DATE: July 15, 2008	SCALE: N/A	SHEET: – OF –

Appendix C

Synchro Progression Analysis for Ray Road

Time-Space Diagram - Ray Rd - AM Peak Hour at Build-out
Arterial Bandwidths, 50th Percentile Green Times

10/20/2011



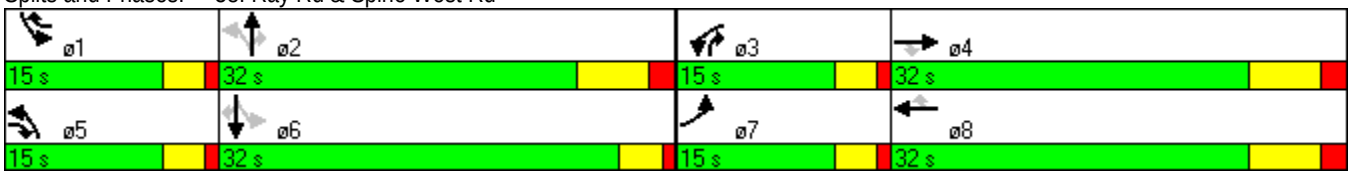
MPG Ray Rd Build Out 2030 AM Pk Hr
Randy Dunsey

N:\60224454\Design\Synchro\Crismon shift_MPG Networksyn AM rev 1.syn

Phase Number	1	2	3	4	5	6	7	8
Movement	SBL	NBTL	WBL	EBT	NBL	SBTL	EBL	WBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	15	32	15	32	15	32	15	32
Maximum Split (%)	16.0%	34.0%	16.0%	34.0%	16.0%	34.0%	16.0%	34.0%
Minimum Split (s)	11	23	11	23	11	23	11	23
Yellow Time (s)	3	5	3	5	3	3	3	5
All-Red Time (s)	1	2	1	2	1	1	1	2
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		5		5		5		5
Flash Dont Walk (s)		11		11		11		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	79	0	32	47	79	0	32	47
End Time (s)	0	32	47	79	0	32	47	79
Yield/Force Off (s)	90	25	43	72	90	28	43	72
Yield/Force Off 170(s)	90	14	43	61	90	17	43	61
Local Start Time (s)	79	0	32	47	79	0	32	47
Local Yield (s)	90	25	43	72	90	28	43	72
Local Yield 170(s)	90	14	43	61	90	17	43	61

Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	80
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 38: Ray Rd & Spine West Rd



Phase Number	1	2	4	5	6	8
Movement	SBL	NBT	EBTL	NBL	SBT	WBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	11	19	64	11	19	64
Maximum Split (%)	11.7%	20.2%	68.1%	11.7%	20.2%	68.1%
Minimum Split (s)	11	23	23	11	23	23
Yellow Time (s)	5	5	5	5	5	5
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		5	5		5	5
Flash Dont Walk (s)		11	11		11	11
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	3	14	33	3	14	33
End Time (s)	14	33	3	14	33	3
Yield/Force Off (s)	7	26	90	7	26	90
Yield/Force Off 170(s)	7	15	79	7	15	79
Local Start Time (s)	83	0	19	83	0	19
Local Yield (s)	87	12	76	87	12	76
Local Yield 170(s)	87	1	65	87	1	65

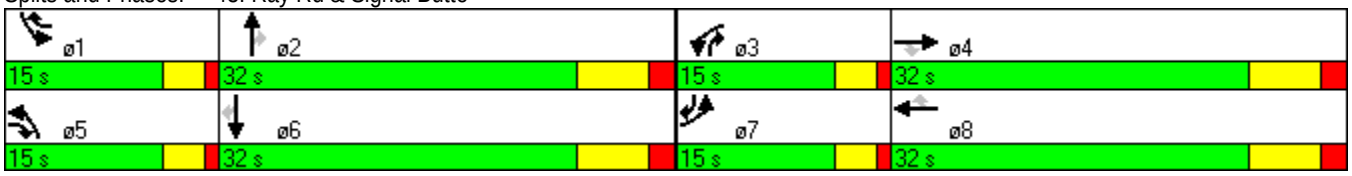
Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	75
Offset: 14 (15%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 44: Ray Rd & Spine East Rd

Phase Number	1	2	3	4	5	6	7	8
Movement	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	15	32	15	32	15	32	15	32
Maximum Split (%)	16.0%	34.0%	16.0%	34.0%	16.0%	34.0%	16.0%	34.0%
Minimum Split (s)	11	23	11	23	11	23	11	23
Yellow Time (s)	3	5	3	5	3	5	3	5
All-Red Time (s)	1	2	1	2	1	2	1	2
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		5		5		5		5
Flash Dont Walk (s)		11		11		11		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	79	0	32	47	79	0	32	47
End Time (s)	0	32	47	79	0	32	47	79
Yield/Force Off (s)	90	25	43	72	90	25	43	72
Yield/Force Off 170(s)	90	14	43	61	90	14	43	61
Local Start Time (s)	79	0	32	47	79	0	32	47
Local Yield (s)	90	25	43	72	90	25	43	72
Local Yield 170(s)	90	14	43	61	90	14	43	61

Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

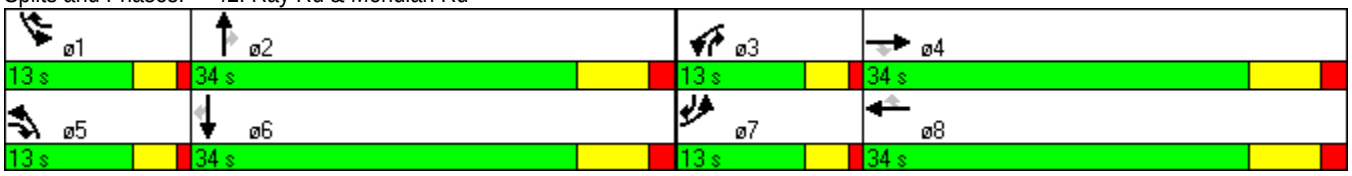
Splits and Phases: 43: Ray Rd & Signal Butte



Phase Number	1	2	3	4	5	6	7	8
Movement	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	13	34	13	34	13	34	13	34
Maximum Split (%)	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%
Minimum Split (s)	11	23	11	23	11	23	11	23
Yellow Time (s)	3	5	3	5	3	5	3	5
All-Red Time (s)	1	2	1	2	1	2	1	2
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		5		5		5		5
Flash Dont Walk (s)		11		11		11		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	81	0	34	47	81	0	34	47
End Time (s)	0	34	47	81	0	34	47	81
Yield/Force Off (s)	90	27	43	74	90	27	43	74
Yield/Force Off 170(s)	90	16	43	63	90	16	43	63
Local Start Time (s)	81	0	34	47	81	0	34	47
Local Yield (s)	90	27	43	74	90	27	43	74
Local Yield 170(s)	90	16	43	63	90	16	43	63

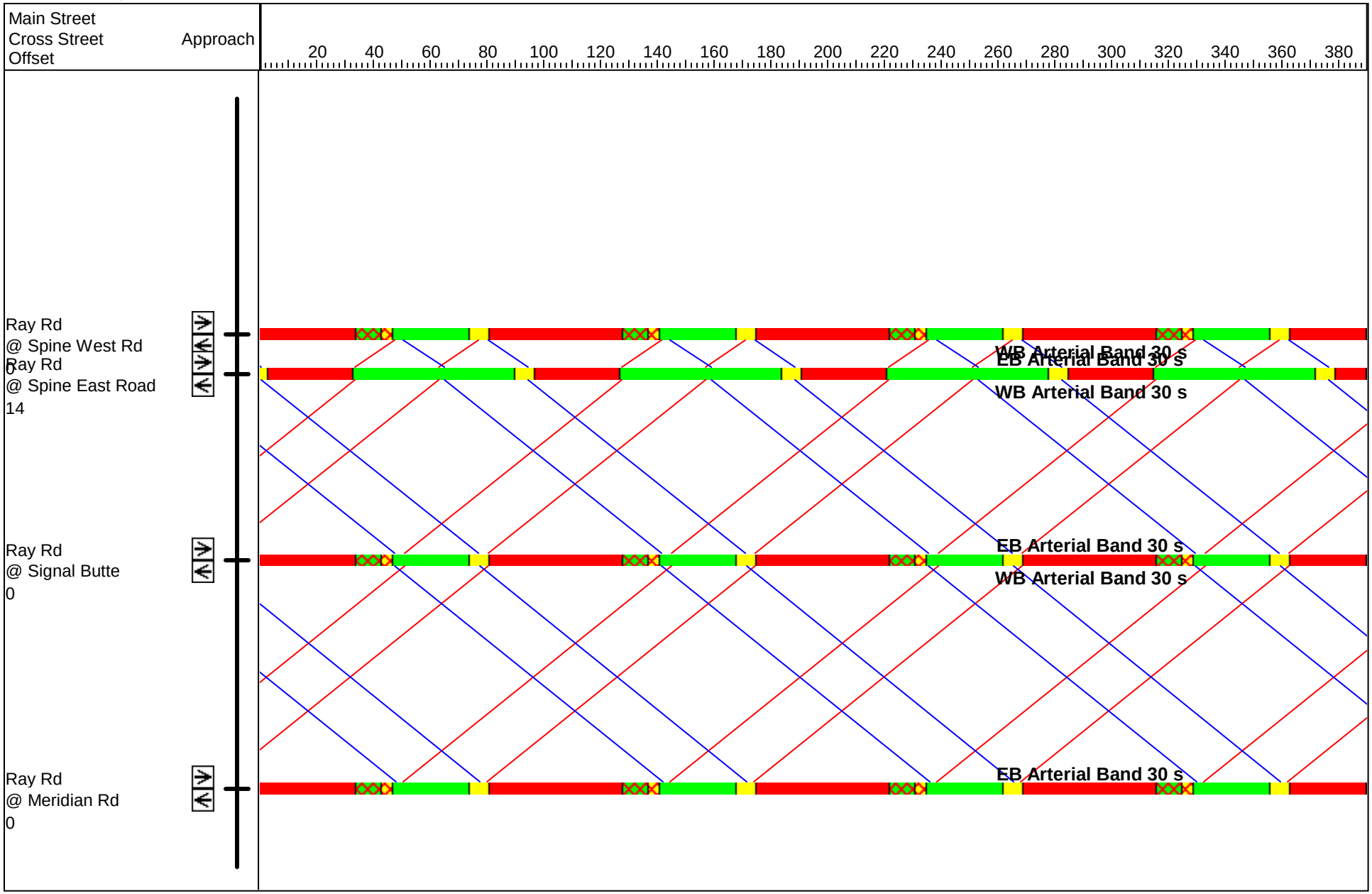
Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 42: Ray Rd & Meridian Rd



Time-Space Diagram - Ray Rd - PM Peak Hour at Build-out
Arterial Bandwidths, 50th Percentile Green Times

10/20/2011



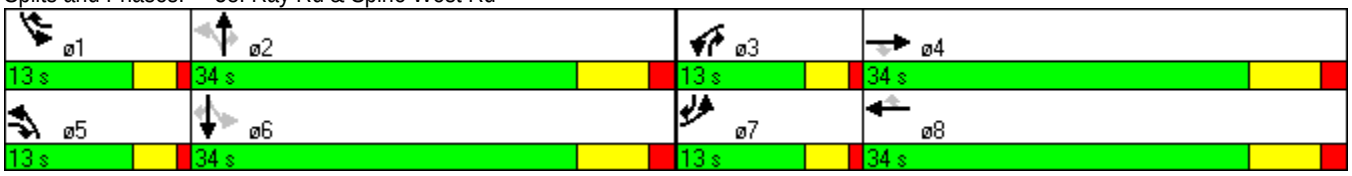
MPG Ray Rd Build Out 2030 PM Pk Hr
Randy Dunsey

N:\60224454\Design\Synchro\Crismon shift_MPG Networksyn PM rev 1.syn

Phase Number	1	2	3	4	5	6	7	8
Movement	SBL	NBTL	WBL	EBT	NBL	SBTL	EBL	WBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	13	34	13	34	13	34	13	34
Maximum Split (%)	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%
Minimum Split (s)	11	23	11	23	11	23	11	23
Yellow Time (s)	3	5	3	5	3	5	3	5
All-Red Time (s)	1	2	1	2	1	2	1	2
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		5		5		5		5
Flash Dont Walk (s)		11		11		11		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	81	0	34	47	81	0	34	47
End Time (s)	0	34	47	81	0	34	47	81
Yield/Force Off (s)	90	27	43	74	90	27	43	74
Yield/Force Off 170(s)	90	16	43	63	90	16	43	63
Local Start Time (s)	81	0	34	47	81	0	34	47
Local Yield (s)	90	27	43	74	90	27	43	74
Local Yield 170(s)	90	16	43	63	90	16	43	63

Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	130
Offset: 0 (0%), Referenced to phase 2:NBTL and 6:SBTL, Start of Green	

Splits and Phases: 38: Ray Rd & Spine West Rd



Phase Number	1	2	4	5	6	8
Movement	SBL	NBT	EBTL	NBL	SBT	WBTL
Lead/Lag	Lead	Lag		Lead	Lag	
Lead-Lag Optimize						
Recall Mode	Max	Max	Max	Max	Max	Max
Maximum Split (s)	11	19	64	11	19	64
Maximum Split (%)	11.7%	20.2%	68.1%	11.7%	20.2%	68.1%
Minimum Split (s)	11	23	23	11	23	23
Yellow Time (s)	5	5	5	5	5	5
All-Red Time (s)	2	2	2	2	2	2
Minimum Initial (s)	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0
Walk Time (s)		5	5		5	5
Flash Dont Walk (s)		11	11		11	11
Dual Entry	No	Yes	Yes	No	Yes	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	3	14	33	3	14	33
End Time (s)	14	33	3	14	33	3
Yield/Force Off (s)	7	26	90	7	26	90
Yield/Force Off 170(s)	7	15	79	7	15	79
Local Start Time (s)	83	0	19	83	0	19
Local Yield (s)	87	12	76	87	12	76
Local Yield 170(s)	87	1	65	87	1	65

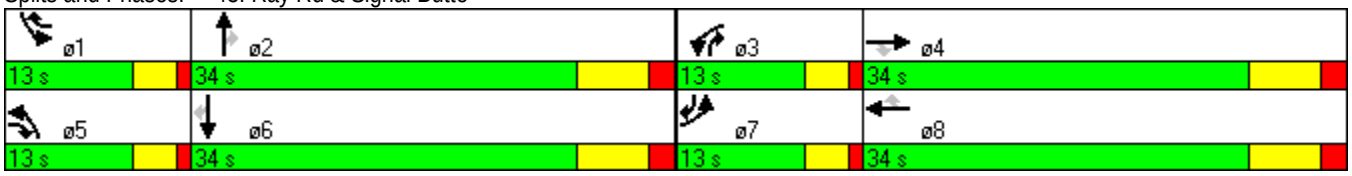
Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	150
Offset: 14 (15%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 44: Ray Rd & Spine East Road

Phase Number	1	2	3	4	5	6	7	8
Movement	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	13	34	13	34	13	34	13	34
Maximum Split (%)	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%
Minimum Split (s)	11	23	11	23	11	23	11	23
Yellow Time (s)	3	5	3	5	3	5	3	5
All-Red Time (s)	1	2	1	2	1	2	1	2
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		5		5		5		5
Flash Dont Walk (s)		11		11		11		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	81	0	34	47	81	0	34	47
End Time (s)	0	34	47	81	0	34	47	81
Yield/Force Off (s)	90	27	43	74	90	27	43	74
Yield/Force Off 170(s)	90	16	43	63	90	16	43	63
Local Start Time (s)	81	0	34	47	81	0	34	47
Local Yield (s)	90	27	43	74	90	27	43	74
Local Yield 170(s)	90	16	43	63	90	16	43	63

Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 43: Ray Rd & Signal Butte



Phase Number	1	2	3	4	5	6	7	8
Movement	SBL	NBT	WBL	EBT	NBL	SBT	EBL	WBT
Lead/Lag	Lead	Lag	Lead	Lag	Lead	Lag	Lead	Lag
Lead-Lag Optimize								
Recall Mode	Max	Max	Max	Max	Max	Max	Max	Max
Maximum Split (s)	13	34	13	34	13	34	13	34
Maximum Split (%)	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%	13.8%	36.2%
Minimum Split (s)	11	23	11	23	11	23	11	23
Yellow Time (s)	3	5	3	5	3	5	3	5
All-Red Time (s)	1	2	1	2	1	2	1	2
Minimum Initial (s)	4	4	4	4	4	4	4	4
Vehicle Extension (s)	3	3	3	3	3	3	3	3
Minimum Gap (s)	3	3	3	3	3	3	3	3
Time Before Reduce (s)	0	0	0	0	0	0	0	0
Time To Reduce (s)	0	0	0	0	0	0	0	0
Walk Time (s)		5		5		5		5
Flash Dont Walk (s)		11		11		11		11
Dual Entry	No	Yes	No	Yes	No	Yes	No	Yes
Inhibit Max	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Start Time (s)	81	0	34	47	81	0	34	47
End Time (s)	0	34	47	81	0	34	47	81
Yield/Force Off (s)	90	27	43	74	90	27	43	74
Yield/Force Off 170(s)	90	16	43	63	90	16	43	63
Local Start Time (s)	81	0	34	47	81	0	34	47
Local Yield (s)	90	27	43	74	90	27	43	74
Local Yield 170(s)	90	16	43	63	90	16	43	63

Intersection Summary	
Cycle Length	94
Control Type	Pretimed
Natural Cycle	120
Offset: 0 (0%), Referenced to phase 2:NBT and 6:SBT, Start of Green	

Splits and Phases: 42: Ray Rd & Meridian Rd