Town of Oro Valley
Subdivision Street Standards and Policies Manual

TOWN OF ORO VALLEY

SUBDIVISION STREET STANDARDS

AND POLICIES MANUAL

AUTHORIZATION

This second edition of the Town of Oro Valley Subdivision Street Standards and Policies Manual is approved for the use in performing engineering design work and construction for local subdivision streets within the Town of Oro Valley. These Standards and Policies supercede the initial edition adopted by the Town of Oro Valley in May, 1992.

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William A. Jansen, P.E Date
Director of Public Works / Town Engineer

May 2004
Second Edition

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1.0 INTRODUCTION

1.1 Acknowledgments

The Subdivision Street Standards portion of this Manual were originally written by the Pima County Department of Transportation and Flood Control District (dated October, 1989), and have been modified for the Town of Oro Valley Department of Public Works by DMA Engineering. The contract was under the direction of Mr. William A. Jansen, P.E., Director of Public Works/Town Engineer and managed by Mr. Paul Nzomo, P.E. The Project Manager for DMA Engineering was Mr. David M. Atler, P.E.

DMA Engineering would like to extend its appreciation to Mr. Nzomo, Mr. Craig Civalier, P.E., Mr. Steven Faaborg and Ms. Lynn Garcia for their significant efforts and contributions during the preparation of these Standards and Policies. Special acknowledgement is given to Ms. Kathleen Atler for her assistance with this document and for her efforts on the cover design, and to Ms. Cinda Gaynor for her computer expertise and perseverence.

1.2 Introduction

These Standards are to be used by development consultants in the preparation of subdivision plats, master planning documents (Planned Area Developments, Specific Plans, etc.), development plans and improvement plans. Only local roadways are discussed herein, however, cross-sectional requirements for higher classification streets are included in Appendix A for reference and planning purposes, and supercede those cross-sections identified within the references listed in Chapter 2 herein. These Standards apply equally to both public and private local roadways within all land development roadway construction and reconstruction within the Town of Oro Valley, and are intended to be consistent with national standards and local Ordinances, policies, and procedures. They are guidelines which will be enforced as written. It is, however, recognized that there are situations under which these Standards may not apply. In such cases, and in cases of conflict or contradiction, sound engineering judgement consistent with accepted standards of practice and approved in writing by the Town Engineer, may be used. The most conservative approach shall prevail in cases of conflict or contradiction. Throughout these Standards "Town Engineer" is intended to signify the individual bearing said title or the Public Works Director/Town Engineer, or their duly appointed representative.

Appeals to specific sections of these Standards and for specific rulings made for these Standards shall be to the Town Engineer, whose decision shall be final.

Those portions of these Standards prepared by PCDOT & FCD ("Subdivision Street Standards", Oct. 1989) have been reproduced herein under permission by Pima County.

All documents and publications referenced herein and as updated from time to time are adopted in their entirety as part of these Standards.

1.3 Purpose

These Standards were adopted to increase service and protection of the travelling public on local streets, and to reduce maintenance costs borne by the residents of Oro Valley. They are intended to provide for the public safety, operational comfort, and convenience of the motorist, bicyclist and pedestrian while keeping operating costs on public facilities at a reasonable level.

These minimum Standards for local streets, if not met or exceeded, would create deficiencies resulting in a threat to public health, safety and comfort, as well as higher user costs and public losses.

In order to be responsive to the needs of roadway, sidewalk and multi-functional path users within future residential, commercial and industrial neighborhoods, these local street development Standards have been established to:

- Provide for streets of suitable location, width and improvement to safely accomodate vehicular, bicycle and pedestrian traffic;
- Afford adequate access for emergency services, sanitation, school bus, street maintenance and utility vehicles and equipment;
- Coordinate both public and private street improvements so as to compose a convenient circulation system and avoid undue hardships to adjoining properties;
- Establish safe, effective, efficient, sustainable and attractive bicycle and pedestrian-friendly transportation systems which provide for interconnectivity of developments; and
- Ecourage traffic management plans by private developers.

1.4 Responsibility for Improvements

It is the responsibility of the developer or subdivider to finance the planning, design and construction of all streets and appurtenant items including, but not limited to pavement, curbs, sidewalks, pavement markings and street signage, drainage facilities, and all other public and semi-public improvements required by the Oro Valley Town Council, these Standards and the Arizona Revised Statutes as they apply to standards established herein.

1.5 Improvement Plans Required

The developer or subdivider shall be responsible for having an Arizona registered professional civil engineer prepare a complete set of improvement plans when required, and satisfactory to the Town Engineer, for construction of required improvements. Such plans shall be based on the approved preliminary plat or development plan and shall be prepared, to a minimum, according to the "Improvement Plan Checklist" attached hereto as Appendix B.

2.0 APPLICATION

These standards apply to all subdivision and land development related roadway construction or reconstruction located within the Town of Oro Valley which is subject to zoning and/or subdivision regulations. These standards shall apply equally to both public and private roadways.

2.1 Roadway and Development Types

There are four (4) broad functional classifications of streets as defined by the American Association of State Highway and Transportation Officials (AASHTO): local, collector, arterial, and freeway (limited access). This document is limited in concern to the design characteristics of local streets associated with subdivisions and developments with particular attention to residential land development.

It is recognized that there are specialized types of developments such as retail, office, industrial, mobile home parks, recreational and cluster housing which vary widely in operational requirements. Design of these projects has been provided for as much as possible within this document.

2.2 Incorporated Regulations

This manual establishes general engineering design practices for local roadway construction associated with land development in Oro Valley. For design requirements not provided herein, such as collector and arterial roadway designs, the engineer shall design in accordance with the latest editions of the following references, or as otherwise directed by the Town Engineer:

1. "A Policy on Geometric Design of Highways and Streets", American Association of State Highway and Transportation Officials (AASHTO).

2. "Roadside Design Guide", AASHTO.

3. “Guidelines for Geometric Design of Very Low-Volume Local Roads (ADT ≤ 400)”, AASHTO.

4. “Guide For Design of Pavement Structures”, AASHTO.

5. “Manual on Uniform Traffic Control Devices”, U.S. Department of Transportation, Federal Highways Administration (FHWA).

6. “Highway Capacity Manual”, Transportation Research Board (TRB).

7. “Access Management Manual”, TRB.

8. “Trip Generation”, ITE.

9. “Trip Generation Handbook”, ITE.

10. "Traffic Impact Analysis for Proposed Developments", Arizona Department of Transportation (ADOT).

11. "Traffic Engineering Manual of Approved Signs", ADOT.

12. "Materials-Preliminary Engineering and Design Manual", ADOT.

13. "Bridge Design and Detailing Manual", ADOT.

14. "Construction Standards-Construction, Bridge, Signing and Marking", ADOT.

15. "Construction Standard Drawings", ADOT.

16. "Signing and Marking Standard Drawings", ADOT.

17. "Pima County Roadway Design Manual", and applicable references therein, Pima County Department of Transportation & Flood Control District (PCDOT & FCD).

18. "Standard Specifications for Public Improvements", Pima County/City of Tucson (PC/COT).

19. "Standard Details for Public Improvements", PC/COT.

20. "Pavement Marking Design Manual", PC/COT.

21. "Drainage and Channel Design Standards for Local Drainage for Floodplain Management within Pima County, Arizona", PCDOT & FCD.

22. "Stormdrain Design Guidelines and Standard Plans", PCDOT & FCD.

23. ADOT and PCDOT traffic signal design guidelines (general).

24. "Manual of Engineering Standards and Procedures", Pima County Wastewater Management Department (PCWMD).

25. "Standard Specifications and Details", City of Tucson Water Department, (COTWD).

26. "Oro Valley Drainage Criteria Manual".

27. Town of Oro Valley Department of Public Works Traffic Calming Policy.

28. Oro Valley Bicycle and Pedestrian Standards.

The following adopted standards, ordinances, or policies are also applicable and should be referred to by the design engineer as appropriate:

1. Town of Oro Valley Floodplain Ordinance.

2. Oro Valley Zoning Code Revised.

3. The Town of Oro Valley General Plan and any adopted area, Community, neighborhood and specific plans.

4. Conditions of zoning and rezoning.

5. Oro Valley Town Code.

6. Uniform Building Code (or International Building Code), Electric Code, Fire Code, Plumbing Code, etc. all as currently adopted and modified by the Town of Oro Valley.

In the event a conflict arises between two or more references listed above, the Town Engineer shall determine the reference to be applied.

3.0 TRAFFIC STUDIES

A Traffic Impact Analysis for developments shall be required and prepared in accordance with the Arizona Department of Transportation's (ADOT) "Traffic Impact Analysis for Proposed Development".

3.1 Traffic Calming

Please refer to Appendix H for Oro Valley's traffic calming policy.

3.2 Traffic Signal Design

When a developer is required to design and install a traffic signal, ADOT and Pima County traffic signal standards shall be used. Video detection system and cameras shall be used in lieu of presence loop detection. The cabinet and traffic controller shall meet Town of Oro Valley standards as directed by the Town Engineer. The street signs at signalized intersection shall be internally illuminated, and the traffic signal and pedestrian heads shall be LED. The design consultant must meet with the Town Engineer prior to commencing with design.

4.0 STREET LAYOUT AND GEOMETRIC DESIGN

All subdivision and development-related local street design shall conform to this document. Where not provided for herein, the design engineer shall refer to those supplementary standards referenced in Chapter 2.2., and all new streets shall be designed to the urban standards therein discussed.

4.1 Street Layout

1. All rights-of-way and street sections shall be designed and constructed to the full dimensions as shown in Appendix A (refer also to Chapter 5, "RIGHT-OF-WAY").

2. Where partial streets exist adjacent to the tract being developed the remaining right-of-way must be dedicated and improvements must be made to the street as required by the Town Engineer.

3. Proposed developments shall provide for the continuation of existing arterial and collector street rights-of-way where appropriate.

4. The local street system shall be arranged to discourage cut-through traffic and control speed within the proposed development.

5. When lots must front on a major street, proposed commercial and industrial developments will be required to provide sufficient right-of-way for local service or access streets (frontage roads) along major streets and routes. Residential lots shall not front on collectors or arterials. Frontage roads shall be discouraged, however, if they must be used, they shall be designed such that improper intersections with streets do not occur. They shall also provide adequate turn-around for the design vehicle at roadway termini, and they shall not intersect with new or existing streets at intervening distances less than allowed by Town Ordinances.

6. The proposed development shall provide streets in conformance with all existing neighborhood or area plans that are approved and adopted by the Town Council.

7. As determined by area plans or the Oro Valley General Plan, stub streets may be required to be designed as collector streets for a minimum ADT of 1,000 vehicles and shall provide temporary turnaround areas at the stub end. See Figure A-13, Appendix A.

8. Entrances to gated, private streets shall include a turn-around area constructed entirely between the ultimate public right-of-way and the proposed gate. The turn-around area shall be designed in accordance with Chapter 4.2 herein.

4.2 Cul-de-Sacs

Permanent dead-end streets shall be designed with an adequate turnaround area at the dead-end. This turnaround area may not be required on dead-end streets less than 150-feet in length if municipal services such as fire, refuse, school buses, delivery and repair vehicles, and postal service, can be provided without the use of the street, and the street is not to be maintained by the Town. Turnarounds may be designed as cul-de-sac configurations as shown in Figures A-9, A-10, and A-11 of Appendix A.

1. The cul-de-sac is preferred at all times for local street turnarounds because of its overall efficiency and maintainability.

   Residential

   a) The paved turnaround radius shall be a minimum of 42-feet measured to the edge of pavement.

   b) The turnaround right-of -way radius shall be a minimum of 50-feet.

   Commercial/Industrial

   a) The paved tunaround radius shall be a minimum of 53-feet measured to the face of the vertical curb or to the back of the wedge curb, whichever is provided.

   b) The turnaround right-of -way radius shall be a minimum of 65-feet.

2. Improvements to existing dead-end streets on abutting properties may be required during rezoning or subdivision platting. The purpose of these improvements shall be to allow proper through connection of streets. Through connection may require that the developer remove abandoned cul-de-sac pavement on the abutting property (see Figure A-13, Appendix A) and that the full pavement section be carried to property line.

3. Where temporary turnarounds or cul-de-sacs are designed for future extension to abutting properties, a note shall appear on the final plat listing the street name and indicating the temporary nature of the cul-de-sac condition.

4. Cul-de-sacs may contain landscaping within the center area provided:

   a) vertical curb is used around the entire center landscaped area;

   b) the cul-de-sac is large enough to allow passage of the design vehicle without wheel paths of the design vehicle encountering the curb (see Figure A-12);

   c) the cul-de-sac is not proposed to be a future through street;

   d) the landscaping does not impinge on sight visibility;

e) improvement plans for landscaped cul-de-sacs are to provide details for both the landscaped and un-landscaped conditions as alternates;

f) landscaping irrigation runoff shall not be permitted to drain onto the roadway surface;

g) the Town shall not be responsible for maintaining cul-de-sac landscaping and a note to this effect shall be on the final plat; and

h) a license agreement for new landscaping within the public right-of-way shall be required in accordance with Town of Oro Valley Department of Public Works policies. The Town's License Agreement is attaced as Appendix G.

5. No cul-de-sac street shall be longer than 600-feet in length (refer to § 4-608B of the Oro Valley Zoning Code). Dead-end streets exceeding this length shall not be permitted unless a secondary access is provided. This requirement may be waived by the Town Engineer if a written release is obtained from emergency services and the local school district, or if other mitigating circumstances exist. Another cul-de-sac is not considered to provide a secondary access.

6. A cul-de-sac providing access to a residential development shall have a maximum ADT of 250. A cul-de-sac providing access to a commercial or industrial development shall not exceed 500 ADT.

4.3 Design Speed

The minimum design speed for local residential streets having ADT's less than one thousand (1,000) is 25 MPH. The Town Engineer may require local roadways with ADT's between one thousand (1,000) and twenty-five hundred (2,500) to be 35 MPH. The minimum design speed for commercial/industrial local roadways is 30 MPH. Higher speeds may be warranted (and required) for certain roadways, and lower design speeds may be used for mountainous roadways per Chapter 4.12.

4.4 Design Vehicle

All local streets shall be designed for a SU-30 vehicle as defined by AASHTO. Non-residential subdivision streets and Parking Area Access Lanes (PAALs) shall be designed for the largest vehicles (including service and delivery vehicles) anticipated to use the facilities, following consultation with the Town Engineer. Delivery and service routes are to be clearly shown on the preliminary plat or development plan, as applicable. A general note shall also be provided designating the design vehicle(s).

4.5 Horizontal Alignment

Minimum horizontal curve design criteria for residential streets are shown in Table 1.

TABLE 1: Horizontal Curve Design Criteria

Criteria	ADT < 1,000	1,000 < ADT
Design Speed (MPH)	25	35
Minimum Center Line Radius (ft) (Assumes 2% Normal Crown)	181	480
Minimum Horizontal Stopping Site Distance (ft)	150	250

Driver expectations and coordinated horizontal and vertical geometry shall be considered in subdivision roadway design.

When two local road tangents are connected by a curve of less than the minimum radius, a "knuckle" or "eyebrow" must be constructed in accordance with Figure A-11 of Appendix A.

Compound and reverse curves are discouraged for local roads, however, when designing a roadway with multiple curved sections, it is required that tangents be placed between the curves (refer to AASHTO for guidelines). Tangents increase driver comfort, expectancy and safety. A minimum tangent length of one hundred (100)-feet is required for all superelevated reverse curves.

4.6 Vertical Alignment

Vertical alignment shall generally conform to the natural topography within the following limits:

TABLE 2: Vertical Curve Design Criteria

Criteria	Slope
Maximum Gradient – Local Driveways	14% (in R/W)
Maximum Gradient – Local Streets < 600-ft in Length	15%
Maximum Gradient – Local Streets > 600-ft in Length	12%
Maximum Gradient – Non-Residential Streets	8%
Minimum Gradient	0.5% *

* Minimum slope within 100-feet of an intersection shall be 1% for all approaches.

1. In mountainous terrain (see Chapter 4.12), local street gradients may be up to 15% and collector gradients may be up to 12% upon approval by the Town Engineer.

2. Normal roadway crown slope shall be 2% (1% minimum, 3% maximum).

3. Cross slope for drainage design may be 4%, at drainageway crossings only.

4. Maximum cul-de-sac cross slope shall be 8%.

5. Inverted crown streets are not acceptable for local streets. Inverted crowns may be used in Parking Area Access Lanes (PAAL's) .

6. Minimum vertical stopping sight distance shall be per AASHTO "A Policy on Geometric Design of Highways and Streets", or 150-feet (assuming level ground), whichever is more restrictive. For other design speeds and grade conditions refer to AASHTO "A Policy on the Geometric Design of Highways and Streets".

7. Landing areas are required for all stopped conditions. The maximum allowable grade for this landing area (on approaches to unsignalized intersections) is 3% (6% in mountainous terrain, see Chapter 4.12), and this grade must extend at least 20 feet in each direction from the outside edge of the traveled way of the intersecting street.

8. Vertical curves shall be required on local streets where the algebraic difference in grade exceeds 1.0%. The minimum lengths of vertical curves shall be determined by multiplying the algebraic difference in grades by the appropriate 'K' factor from Table 3 below, or as specified in the Table (whichever is greater):

TABLE 3: K Factors

Design Speed	K Factor Crest Vertical Curve	K Factor Sag Vertical Curve	Minimum Length Curve
25	20	30	100
30	30	40	100
35	50	50	105

All vertical curves shall be symmetrical parabolic curves.

When grades are greater than ten (10) percent, vertical curves shall be lengthened in accordance with AASHTO "A Policy on Geometric Design of Highways and Streets" to account for increased stopping distance requirements.

4.7 Intersection Alignments

1. The centerlines of intersecting local residential to local residential, and local residential to collector streets shall have an angle of intersection of as close to ninety (90) degrees as is practical. In no case will the angle of intersection be less than 75 degrees (see Figure A-8).

2. Right-of-way lines at the corners of street intersections shall be rounded with a curve radius of 25 feet, or greater, as provided for by the zoning code and as conditions

warrant. The radii must be adjusted at skew intersections to provide sufficient curvature. In all cases, adequate sight distance shall be maintained.

3. Intersections shall have a minimum curb radius designed to accommodate the turning movements of the design vehicle without encroachment into the oncoming lane. In no case shall the curbed radius be less than twenty-five (25) feet.

4. Uncurbed intersections shall only occur where a new street intersects an existing uncurbed roadway in an interim state of development. These interim intersections shall have a minimum curve radius of forty (40) feet, except when auxiliary lanes are required. In cases where auxiliary lanes are provided, the curve radius may be reduced to twenty-five (25) feet. Larger radii shall not be permitted, however, as the travelway width may increase to unsafe dimensions. Uncurbed intersections shall have minimum six (6) inch wide by twelve (12) inch deep concrete headers installed to protect the pavement edge. A transition to full height curb shall occur at the point of tangency of the curb return.

5. Street jogs with centerline offsets of less than 150 feet shall be prohibited, unless otherwise approved by the Town Engineer (see Figure A-7).

6. Street intersections with more than four legs and "Y" type intersections where legs meet at acute angles are prohibited.

4.8 Intersection Sight Distance

Clear line of sight shall be maintained along all streets and driveways (including PAAL's) to provide for the safety of motorists, pedestrians, and bicyclists. Sight distance triangles shall be constructed as shown in Figures A-14, A-15, and A-16 of Appendix A, based on the design speed of the through street (or PAAL) and the near side and far side distance requirements from the following table:

TABLE 4: Intersection Sight Distance

Design Speed of Through Street (MPH)	Near Side Requirement (ft)	Far Side Requirement (ft)
20	180	140
25	240	190
30	300	240
35	380	300
40	480	370
45	600	470
50	740	580
55	890	690

On streets with two-way traffic separated by raised median islands (i.e. no opening) only the near side sight distance triangle is required; however, a pedestrian sight distance triangle shall be maintained in place of the far side triangle as shown in Figure A-14.

For new streets proposed to intersect existing roadways at a landscaped raised median, the far-side sight lines are to be extended across and perpendicular to the travel lanes, incorporating the raised median (Figure A-14). If the proposed street is to be at an equal or greater elevation than the area defined by the sight visibility triangle, the sight line area shall extend above the proposed street (30" to 72" vertical sight area applies). If the proposed street will be at a lower elevation than the area defined by the sight visibility triangel, the sight line area (encompassing the median) shall extend above the raised median elevation (0" to 72"). Upon determination by the Town Engineer, existing landscape materials within the sight line area shall be either trimmed or removed as a permit condition for the proposed development. A landscape plan depicting existing materials to be trimmed or removed, and landscape materials intended to replace removed materials, shall be submitted for approval to the Town Engineer and the Town Planning Director. The cost of the landscape plan, trimming, and removal/replacement shall be borne entirely by the developer.

Where streets intersect in a cross configuration, each street is considered the intersecting street with the other street considered the through street for purposes of determining sight lines (see Figure A-15).

The near side and far side distance requirements of sight triangles along a horizontal curve are to be measured along a chord as opposed to along the arc (see Figure A-16).

The sight line of the sight triangles shall supersede standard building setback lines where the sight line requires a greater setback distance.

Sight distance triangles shall be depicted to scale on all preliminary plats, and to scale and in a surveyable manner on all final plats, development plans, plot plans and landscape plans. The area within the sight distance triangle must be entirely enclosed by the right-of-way, easement, or common area.

Restrictive notes pertinent to sight distance triangles shall be required on plats, development plans, plot plans and landscape plans. No improvements between thirty (30) and seventy-two (72) inches in height relative to the adjacent roadways which might interfere with the purpose and intent of the sight distance triangle shall be permitted, placed or maintained within the sight triangle. No improvements between thirty (30) and seventy-two (72) inches in height relative to the adjacent PAAL which might interfere with the purpose and intent of the sight distance triangle shall be permitted, placed or maintained within fifteen (15) feet of a PAAL-to-PAAL intersection.

4.9 Parking Area Access Lanes (PAAL's), and Commercial Drive Entrances

Driveway entrances present a potential hazard to the motorist, bicyclists and pedestrians. As such they should be configured to allow rapid and definite recognition by the traveling public.

1. On streets with vertical curbs, depressed curb (curb cuts) and aprons shall be used for driveways unless otherwise permitted by the Town Engineer. Driveway aprons shall be of Portland cement concrete constructed to Town standards with a minimum length running from curb location to back of sidewalk location. Standard curb returns may be used for service entrances provided these entrances are clearly depicted as "service entrance" on plats and development plans. Curb returns may be used in place of standard curb cuts only when one (1) or more of the following conditions occur:

   a) The two-way peak hour volume of the proposed driveway exceeds one hundred (100);

   b) The points of access to the property are limited for traffic control purposes and other reasons deemed acceptable to the Town Engineer; or

   c) Local conditions are present which involve speed, the volume of truck traffic, or the type of development and which, in the Town Engineer's opinion, require curb returns.

2. On streets with wedge curb, driveways shall butt to back of curb, shall not have curb radii, and may be constructed of Portland cement concrete or asphalt.

3. Dimensions and configurations of driveways may need to be adjusted to account for higher approach speeds (greater than forty (40) MPH), traffic, roadway classification, design vehicle, bicyclists and pedestrians. Measures may include widening, turn lanes, etc. The Town Engineer must approve non-standard driveway widths and/or configurations.

4. Driveways are not to be located where conflicts will be created with drainage facilities, intersections, or other improvements.

5. PAALs intersecting uncurbed streets shall follow those guidelines listed in Chapter 4.7.4 herein.

6. Shared-use driveways will be required whenever practicable. New developments which abut existing, undeveloped property shall provide one of the following driveway configurations:

   a) Working with the adjoining property owner(s), the developer shall construct a driveway of sufficient width (in no case more than thirty-six feet in width) to serve both properties, centered on the intervening property line. The future development will be required to be served by the shared driveway; or

   b) If the adjoining property owner does not grant the developer access to provide the driveway described above, the developer shall construct a driveway acceptable to the Town Engineer and based upon requirements indicated in the Transportation

Research Board's "Access Management Manual". The adjoining future development will be required to complete the shared driveway; or

c) If the foregoing options are unavailable and, in the opinion of the Town Engineer impractical, the developer shall construct the new driveway no less than the sum of the required driveway return radius and ten (10) feet. The future adjoining development will be required to meet the same criteria.

7. Location and separation of driveways accessing major collectors and arterials are to comply with those requirements specified in the Pima County "Roadway Design Manual" latest edition, and references therein.

   Note: No driveway shall be closer than 150 feet as measured from the nearest driveway edge to the center line of a major street intersection, and no median opening shall be closer than 660 feet from the center of a major street intersection.

4.10 Roadway Super-elevation

Superelevation is generally not necessary on streets designed for travel speeds of thirty-five (35) MPH or less. Maximum superelevation shall be 4% and runoff lengths shall be computed in accordance with "A Policy on Geometric Design of Highways and Streets", AASHTO.

4.11 Roadway Drainage Cross-Slope

Sloping of roadways for drainage purposes shall not exceed 4%, and comfortable speed as well as design speed must be maintained throughout the cross-slope. This maximum slope shall only be permitted at allowed "dip crossings". A minimum two (2) foot per second velocity shall be provided at drainage crossings to reduce potential material deposition within the roadway. Refer to the Oro Valley "Drainage Criteria Manual" for further information.

4.12 Mountainous Terrain

Mountainous terrain is that condition where longitudinal and transverse differentials in ground elevation with respect to the roadway are such that:

Excessive benching, side hill excavation, or other cuts and fills are needed;

1. Excessive rights-of-way for either cut and fill slopes (multiple cuts and/or fills exceeding fifteen (15) feet of vertical change) or for roadway alignment are required; or

2. Significantly lengthened roadway sections and increases in right-of-way are necessary in order to obtain acceptable horizontal and vertical alignment.

3. In any case, roadways to be constructed across terrain with an average cross slope of fifteen (15) percent or greater as determined by the Oro Valley Zoning Code Revised shall qualify for the mountainous terrain classification.

For local streets subject to this section, a twenty (20) MPH design speed may be used if the streets are to be privately held and maintained, and emergency services and school vehicles can safely traverse the roadway(s). With prior approval by the Town Engineer, the design engineer may utilize four-foot shoulder widths and steeper longitudinal slopes (private streets only). Roadside drainage provisions shall be incorporated to minimize cross-flows and material deposition within the travelway.

Particular attention to stopping sight distance and sight distance triangles is to be incorporated into the roadway and roadside grading design. Positive gradient slopes (those rising above the roadway) shall not be permitted within the sight distance triangle, unless they conform to Chapter 4.8 of these Standards.

4.13 Private Streets

1. Private streets will be permitted only where satisfactory means of providing for control and maintenance is demonstrated.

    a) The Town of Oro Valley will not be responsible for maintenance, liability, or enforcement of traffic control on private streets, except where specifically authorized by ordinance.

    b) Erection of traffic control measures and street name signs is the responsibility of the developer. Maintenance of the traffic control measures and street name signs is the responsibility of the property owners' association. All traffic control devices and signs shall meet MUTCD standards.

2. Private streets will be named according to current Pima County criteria and shall be approved by Pima County Addressing.

3. An application petitioning the Town of Oro Valley to accept the dedication of private streets to the public must satisfy the Town of Oro Valley that the streets meet Town standards for public streets, such as pavement structure, right-of-way, and all other public street provisions in place at the time said application is made, as defined in the Oro Valley Town Code, Chapter 7, Article 7-8, § 7-8-1.

4. Private streets must meet all the design and construction requirements of public streets, which carry similar types and volume of traffic, unless specific exceptions are noted in these Standards.

5. PAALs are not acceptable for dedication as public rights-of-way.

6. Mail boxes and Neighborhood Postal Box Units (NBUs) shall meet both AASHTO and U.S Postal Service design criteria. If a special mail box is to be constructed in the clear zone a professional structural/civil engineer licensed to practice in the state of Arizona shall design and seal the calculations to ensure the foundation has a breakaway base.

5.0 RIGHT-OF-WAY

1. Local street rights-of-way shall be in conformance with the cross-sections provided in Appendix A (Figure A-2). Rights-of-way must be large (wide) enough to encompass all publically maintained facilities including pavement, curb, signage, sidewalks, bicycle and shared-use paths, shoulders, clearzones, road-side ditches, cut and fill slopes, street lights, etc. and access to maintain said facilities.

2. Where not otherwise required by the zoning code, easements may be granted in lieu of rights-of-way for certain cross-section elements that are not to be maintained by the Town such as utilities, sidewalk/pedestrian/equestrian ways and slopes. Such easements must specifically grant right-of-entry to the Town of Oro Valley. Such right-of-entry shall be to provide auxiliary areas to allow maintenance of facilities within the right-of-way and to enable remedy from hazards to the public so as to assure the public safety.

3. Additional rights-of-way may be required by the Town at intersections identified on the Oro Valley General Plan, the Tangerine Road Corridor Study, or at intersections of other collectors and arterials where it is deemed necessary to provide sufficient width for turning lanes, clear zones, sight visibility, traffic interchanges and other design and safety considerations.

4. When it is determined by the Town Engineer that, in the public interest or for the health, welfare, or safety of same, vehicular access to or from a development or subdivision at a particular location should be prohibited, a one (1) foot wide no-vehicular-access easement shall be dedicated to the public. Physical barriers may also be required.

5. Supplemental right-of-way may be required at all intersections where standard rights-of-way widths are unable to completely enclose sight distance triangles in accordance with this document or the zoning code. If right-of-way is not dedicated for sight distance, an easement will be required restricting the use as per Chapter 4.8.

6. If parking is designed to be between the sidewalk/pedestrian way and the garage, it must be designed so as to not block the sidewalk.

6.0 ELEMENTS IN THE CROSS-SECTION

Roadways shall be designed based on a minimum twenty (20) year life expectancy. Typical cross-sections are shown in Appendix A. Selection of the appropriate cross-section is dependent upon the functional classification, ADT of the street, and the adjacent land use density. In all cases additional pavement width may be provided, upon approval or requirement of the Town Engineer.

6.1 Travel Lanes

Vehicular travel lanes are to be a minimum of fourteen (14) feet in width for two (2) lane local residential streets. If two-lane divided local roadways are to be constructed the minimum one-way pavement width shall be sixteen (16) feet with an inside shoulder of four (4) feet.

The minimum width of pavement shall be 28 feet for local residential streets and forty (40) feet for local commercial/industrial streets.

Specific applications of various lane width requirements are shown in the figures in Appendix A. The design engineer shall use these figures as the basis for design considerations.

Fifteen (15) foot travel lanes provide additional maneuvering space, increase driver confidence and expectancy, and provide for more easily maintained design speed in residential areas. Residential subdivisions with large numbers of lots may require certain through streets to be built with fifteen (15) foot travel lanes. This shall be determined as part of the Traffic Impact Analysis.

6.2 Curbing

1. Curbing shall be required on all streets as shown in the typical cross-sections supplied herein. The purpose of curbing shall be to adequately control drainage within the street, reduce moisture entering the subgrade, control access to abutting property, separate the roadway from pedestrian areas, delineate the traveled roadway, control dust, and provide adequate lateral support for the pavement structure.

2. Curbing shall be six (6) inch reveal vertical (PC/COT standard detail 209 Type 2) or six (6) inch reveal two (2) foot wedge as detailed in the Pima County/City of Tucson "Standard Specifications for Public Improvements", as well as the “Standard Details for Public Improvements”. Preference shall be given to two (2) foot wedge curb, however, the Town Engineer may permit mountable vertical curb.

3. At local street to local street intersections, the standard curb radius shall be twenty-five (25) feet to face of curb, or the minimum radius which will accommodate the turning movements of the design vehicle without encroachment into opposing lanes, whichever is greater. Proposed designs which indicate curb returns greater than twenty-five (25) feet in radius shall require Town Engineer approval.

4. Wheelchair ramps shall be provided at all curb returns and shall be in accordance with Pima County/City of Tucson "Standard Specifications for Public Improvements". A six (6) inch reveal curb shall be constructed along the back of the ramp per Pima County/City of Tucson "Standard Details for Public Improvements" standard detail 207. Wheelchair ramps shall be located so that anticipated parked vehicles cannot obstruct the ramp access. All ramps and landings shall be designed and constructed to avoid the collection of water.

6.3 Sidewalks and Pedestrian Circulation Paths

Sidewalks located within a street right-of-way, both parallel to the street and leading into a development project, shall be of Portland cement concrete constructed according to Pima County/City of Tucson "Standard Specifications for Public Improvements,'' and "Standard Details for Public Improvements". Other materials may be used for private pedestrian ways provided they meet the Americans with Disabilities Act (ADA). Textured concrete shall have a relief less than or equal to one-eight (1/8) inch. Additional sidewalk width shall be required for special pedestrian oriented areas such as schools, recreation sites and certain businesses. Wheelchair ramps, landings and applicable handrails shall all comply with ADA and Town requirements.

1. Sidewalks shall be required along both sides of paved streets with curbs, or along streets where future curb grades and locations are established, in accordance with the cross-sections in Appendix A.

2. Sidewalks are required as part of new development of all properties. All new residential subdivisions and applications for residential building permits shall provide four (4) foot wide sidewalks along the entire length of street frontage, whether public or private, of the property in question. Sidewalks shall be installed to avoid any obstruction which decreases the minimum required width. Commercial/industrial developments shall provide five (5) foot sidewalks along the entire length of street frontage. The sidewalk requirements also apply to expansions in floor area, site area, or vehicular use area of twenty-five (25) percent or more, except in the following circumstances:

   a) Any individually owned and developed single-family dwelling on property where no abutting parcel has a sidewalk and, prior to final inspection, for which parcel plans for development have not been submitted to the building official. Parcels adjacent to collector or arterial streets may be required to install sidewalk along their frontage.

   b) Areas included in improvement districts in design at the time the developer/builder makes application, and in which sidewalks are included that may be demolished during the construction of the improvement district project.

   c) Areas where the right-of-way is in question as to existence or location (for offsite improvements).

3. At locations where pedestrian traffic is extremely unlikely or expected to be heavily predominant along only one side of the street, sidewalk may be required on only one side at the discretion of the Town Engineer.

4. The area between the back of curb and the roadside edge of the pedestrian walkway is the curbway. Minimum width for the curbway is three (3) feet. Sidewalks shall not be permitted to abut curbs unless authorization by the Town Engineer has been obtained during the project planning phase.

5. A maintenance space between the sidewalk and the lot property line shall be provided and must be one foot or greater depending on grade differentials and available right-of-way. This maintenance space may be located within the required Public Utility and Maintenance Easement.

6. In pedestrian areas having sidewalks, abutting property owners may place ground cover, pea gravel, decomposed granite or brick-in-sand in the curbway and ground slope areas without first obtaining a permit.

7. Landscaping work in street right-of-way that involves irrigation systems, raised planters, vegetative ground cover, trees, shrubs, or curbing shall require the submittal and written approval of a plan from the Town Engineer. A license agreement shall be required (refer to Appendix G). No irrigation systems shall be permitted within the curbway. Vegetation planted within the clear zone shall not have trunks greater than four (4) inch caliper at maturity and must meet sight visibility requirements. It may not be placed in locations that may block line of sight to street signage.

8. NBU's shall be designed and located in such a manner as to not present a hazard to the motoring public or pedestrians. A minimum of four (4) feet of sidewalk clearance must be provided around the NBU.

9. Sidewalks may meander, if:

   a) The sidewalk is in the standard location at the extension of the property lines or matches the alignment of the abutting sidewalks; and

   b) On a public street, the sidewalk is located within the right-of-way or within an acceptable pedestrian easement; and

   c) The maximum lateral offset does not exceed seven and one-half (7-1/2) feet; and
   d) Lateral transitions in the sidewalk are no sharper than three (3) longitudinal to one (1) lateral; and

   e) Irrigation is not placed between the sidewalk and the curb.

10. Sidewalks must be physically separated from any vehicular travel lane by means of curbing, grade separation, barriers, railings, or other means, except at crosswalks.

11. All residential projects which have an adjacent existing sidewalk less than four (4) feet in width shall provide a sidewalk with a minimum width of four (4) feet by:

    a) Increasing the width of any narrower existing sidewalk to four (4) feet. Adding the necessary width adjacent to the existing sidewalk is not acceptable – new sidewalk meeting the standards herein referenced shall be required; and

    b) Removing all obstructions (such as poles, signs, benches, bus stops, etc.) from the sidewalk to provide a minimum width of four (4) feet; or

    c) Constructing additional sidewalk where obstructions cannot be moved, so that a minimum four (4) feet of sidewalk extends past the obstruction.

    Note: The same approaches as stated in items a. through c. shall apply to commercial/industrial projects as well. The applicant is to substitute five (5) foot widths in place of the four (4) foot widths noted.

12. All sidewalks shall have a minimum unobstructed vertical clearance of eight-four (84) inches.

13. The cross slope of the sidewalk shall not exceed two (2) percent. If existing public sidewalks which intersect driveway aprons have a cross slope which exceeds two (2) percent (where the apron slope is measured to the back of the sidewalk), one (1) of the following must occur (a public pedestrian easement may be required for installation of pedestrian facilities):

    a) The driveway apron shall be reconstructed so the sidewalk portion of the apron does not exceed two (2) percent cross slope; or

    b) For residential projects, an additional four (4) feet of sidewalk, with transitions, shall be installed behind the existing apron (five (5) feet for commercial/industrial projects); or

    c) Additional paving shall be installed to provide a level accessible route, with transitions, in the parking area behind the sidewalk; or

    d) Where excess right-of-way exists, the sidewalk is meandered behind the driveway apron to provide an accessible route.
    In all cases appropriate transitions meeting ADA and Town standards shall be utilized.

6.4 Roadside Clear Zone

A clear zone shall be provided for all streets. The minimum clear zone width for local streets having a design speed of 25 MPH shall be the distance between the edge of the travel lane and

the right-of-way limit, as depicted on the cross-sections in Appendix A. Refer to AASHTO for definition of clear zone and determination of clear zone requirements for higher street classifications. Sufficient right-of-way or easement in favor of Oro Valley shall be granted for all clear zones.

If infeasible to provide this clear zone, a suitable traffic barrier as defined in the AASHTO publications "Roadside Design Guide" shall be provided.

Mail boxes and NBUs shall meet both AASHTO and U.S Postal Service design criteria. If a special mail box is to be constructed in the clear zone a professional structural/civil engineer licensed to practice in the state of Arizona shall design and seal the calculations to ensure the foundation has a breakaway base.

6.5 Roadside Vehicle Barriers

Determination of warrants for the installation of roadside vehicle barriers (barriers) shall be in accordance with AASHTO's "Roadside Design Guide", with the exception that barriers shall be required for roadside slopes away from the roadway of three-to-one 3:1 or steeper and/or if the embankment height exceeds five (5) feet: within the rights-of-way shown in the cross-sections for 25 MPH streets (Appendix A). Barriers shall be installed in accordance with current ADOT Standard Specifications and Drawings. Guardrail end treatments shall be required. Obstructions may also require barriers to provide for motorist safety. Please refer to AASHTO "A Policy on Geometric Design of Highways and Streets" and "Roadside Design Guide," for definition of obstructions and applications of barriers.

6.6 Barricade Railing

Barricade railing shall be installed for protection of pedestrians whenever slopes are two-to-one (2:1) or steeper within three (3) feet of the sidewalk and the embankment height is three (3) feet or greater. The design engineer may determine that differences in elevation between the sidewalk and nearby terrain under other circumstances may also warrant the installation of barricade railing. Barricade railing shall be built in conformance with Standard Detail No. 105 of the Pima County/City of Tucson Standard Details.

6.7 Roadside Ditches

Roadside ditches shall not be constructed within the right-of-way. Ditches constructed within the clear-zone, when applicable, shall comply with the AASHTO "Roadside Design Guide", and AASHTO "A Policy on Geometric Design of Highways and Streets", in addition to applicable sections of these standards.

6.8 Cut and Fill Slopes

All cut and fill slopes shall be constructed in accordance with the Town Grading Ordinance, adopted Planned Area Development (PAD) standards and AASHTO "A Policy on Geometric Design of Highways and Streets", and shall be either revegetated or stabilized as stipulated in the

project's Soils Report. Alternative methods of stabilization shall be allowed if certified as stable by an Arizona registered geotechnical (soils) engineer, subject to approval by the Town Engineer.

Construction documents shall specify the area(s) requiring slope treatment and include all material specifications.

6.9 Continuity of Design

All streets shall be designed such that the roadway cross-section and constituent elements remain consistent throughout the length of the street or cul-de-sac.

6.10 Landscaping in the Public Right-of-Way

Landscaping may be permitted within Town rights-of-way subject to the following standards:

1. All structures, such as walls, private signs, and fences must be within private property lines. Earthen berms may be located within the public right-of-way upon approval of the Town Engineer and must be in conformance with this document and those applicable publications referenced herein;

2. The installation and perpetual maintenance of landscaping in the public right-of-way shall be accomplished by the developer, owner or private association, as covenanted to in the form of approved recorded covenants, conditions and restrictions. Assurances may be required by the Town Engineer. Insurance policies, in a form acceptable to the Town, shall be required for all landscaping constructed in the public right-of-way;

3. The Town Engineer is to be contacted by the designer prior to the design phase. The Town Engineer will review landscaping proposals taking into consideration project safety, future expansion of the roadway, drainage concerns, adjoining land uses, and other criteria on a case-by-case basis;

4. License agreements for new landscaping within the right-of-way shall be required in accordance with Town of Oro Valley policies;
5. The location and size of landscape elements shall be in conformance with standards available from the Town Engineer's office and are subject to the Town Engineer's approval; and

6. Turf lanscaping shall not be permitted within the right-of-way, nor shall it be permitted to drain onto pedestrian ways, bicycle paths, or pavement.

7.0 SUPPLEMENTAL ELEMENTS

7.1 On-Street Parking

Parking is allowed on both sides of local streets if sufficient pavement width is provided, and parking does not interfere with the through function of the street or hinder sight distance at street intersections or private driveways. Parking will not be permitted on streets with a pavement width of twenty-four (24) feet or less.

If additional parking width is not provided, "No Parking" labels shall be indicated on the preliminary and final plats, and development plans, as applicable.

7.2 Turning Lanes

Pavement widening to accomodate local street turning movements may be required by the Town Engineer at intersections with collector and arterial streets. Turning lanes shall be fourteen (14) feet in width. Turn lanes and pavement tapers required for any of the above improvements shall be designed in accordance with Pima County's "Roadway Design Manual".

8.0 DRAINAGE (RESERVED)

Please refer to Oro Valley "Drainage Criteria Manual" for drainage and floodplain requirements.

9.0 UTILITIES AND PAVEMENT CUTS

The main lines of electric, gas, water, telephone and communications, sanitary sewer, and drainage facilities shall be located as shown in Figure A-1. Alternate locations may be used with the written permission of the affected utility and the Town Engineer. Utility companies franchised to operate in Town right-of-way for electric, telephone, and communications may be permitted under terms of adopted franchise agreements. Utility easements are required, where applicable, and shall allow public access.

With the exception of minor service extensions to individual parcels, all longitudinal utility facilities between service points to individual parcels shall be located within street rights-of-way. Strip easements may be used along streets in lieu of right-of-way if for utility purposes and for other uses compatible with utility needs and roadside maintenance (subject to utility company approval). Access between the street and the private property shall not be denied, unless unsafe conditions may occur.

All sanitary sewer facilities shall be provided in accordance with the current Pima County Department of Wastewater Management "Manual of Engineering Standards and Procedures".

All services shall be provided or stubbed out to existing or planned parcels with all new street construction to avoid the need to remove and replace new pavement within the five (5) year pavement cut moratorium (refer to Chapter 9.1.1 of these Standards). All underground service line trenches, including minor service extensions (sewer,water, etc.) shall be backfilled and compacted (within the right-of-way) to at least 95 percent of the maximum density (Standard Proctor), for the full depth of the trench. Sewer connection stub-outs are to extend a minimum of ten (10) feet beyond the right-of-way, while other service connection stub-outs are to extend a minimum of five (5) feet beyond the right-of-way. In no instance shall the excavation of stub-outs extend into the right-of-way without the Town Engineer's approval. In such cases, the Town Engineer will require the developer/builder/homeowner to replace public infrastructure damaged during the excavation of and connection to the stub-out.

All utilities are to be installed in accordance with utility company standards, or the Pima County/City of Tucson "Standard Specifications for Public Improvements," latest edition, whichever is more restrictive.

Shading material for utility trenches shall be supplied from an approved commercial source and meet utility company or Pima County/ City of Tucson standard Specification, whichever is more restrictive.

9.1 Pavement Cut Criteria

Blue Stake law requires that utilities be marked for horizontal alignment within two (2) feet of the marks. Depth may need to be determined by pot-holing. Therefore, in many instances the Town may allow the digging of small pot-holes in the streets to determine the precise locations of underground utilities. Pot holes shall be repaired by the means described within this Chapter, unless otherwise approved by the Town Engineer.

The following Standard is intended to help provide for the continued high level of service of street pavements by establishing criteria for the cutting of pavement; pot-holing; trenching; trench backfilling; repairing of pavement cuts; and criteria for the limitation of pavement cuts after the installation of new pavement or overlay. The goal of this Standard is to reduce the number of pavement cuts in Town streets and to improve the quality of those pavement cuts which are determined to be necessary. This Standard applies to all roadway pavement located within the public rights-of-way of the Town of Oro Valley.

9.1.1 Pavement Cut Moratorium - General

1. The following moratorium shall generally apply to the cutting of asphaltic concrete pavement or overlays:

   a) Arterial and collector streets:
   The Town of Oro Valley has adopted a five (5) year moratorium on the cutting of asphaltic concrete pavements and overlays beginning from the date of acceptance of the last installation of asphaltic concrete pavements or overlays. Chip sealcoats are not considered overlays for moratoria purposes.

   The Town Engineer, or his designated representative, shall maintain a list of protected streets ("Protected List") on which pavement cuts shall not be allowed without the specific permission of the Town Engineer or his/her designated representative. Streets may be added to this Protected List from time to time (at least annually), and such lists shall be maintained and available for inspection in the office of the Town Engineer.

   Criteria for placing a newly paved or overlaid street on the above Protected List shall include, but not necessarily be limited to, the following:

   1) Residential collector streets.

   2) Streets with inverted cross-sections utilized for drainage.

   3) Streets in the Central Business District.

   In order to reduce the number of pavement cuts on streets not shown on the current list of arterial/collector, alternatives to pavement cuts shall be utilized for such streets whenever feasible (refer to Chapter 9.1.2).

b) Traffic Loops

Traffic loops may be installed in new pavement where required. Grooves to receive traffic loop detection wire shall be sawed to a depth sufficient to allow a sealant thickness over the loop wire of not less than one (1) inch. Sealant shall conform to the current ADOT specifications. (NOTE: The Town of Oro Valley utilizes video detection, rather than loop detection at Town maintained signalized intersections. The Town Engineer must be consulted prior to seeking an exception to this policy.)

2. Where the above moratorium is in effect, boring or jacking shall be used for pavement crossings.

3. Where jacking or boring is impossible due to subsurface soil conditions or other extenuating conditions, the Town Engineer may allow trenching subject to such conditions as the he/she may establish.

4. Where emergency (dangerous to health and safety) situations exist, the express written or verbal permission of the Town Engineer must be obtained prior to cutting of pavement within the above restrictions. Emergencies under pavement not subject to these restrictions shall be handled in accordance with the provisions in the right-of-way permit (Appendix I).

5. All final pavement cuts shall be sawed to the full depth of the asphalt prior to patching. Initial cuts for pavement removal may be made using pneumatic spades providing the spade penetrates the entire thickness of asphalt and the successive cuts form a connected straight line. Dimensions for pavement cuts shall be as called for in the PC/COT "Standard Specifications for Public Improvements" and the PC/COT "Standard Details for Public Improvements".

6. The Town Engineer shall maintain, in the Engineering Division, information concerning the date, by month and year, of the latest construction or overlay affecting streets covered by these restrictions.

9.1.2 Pavement Cut Moratorium - Guidelines

The guidelines outlined within this Chapter shall be used as a framework to analyze requests for making pavement cuts on streets which are protected by the moratorium. The guidelines will establish the requirements necessary to support a request to allow trenching.

All alternatives to pavement cutting shall be explored prior to the submission of an application for an excavation permit by those seeking to install/repair/connect to underground facilities located within Town of Oro Valley rights-of-way. Applicants for excavation permits shall demonstrate, to the satisfaction of the Town Engineer, evidence of investigation of alternatives to pavement cutting. Economics of installation shall not be the only or necessarily the overriding consideration in the selection of underground routing and location.

In all cases where a request is made to open trench a street within the moratorium period, a comprehensive report shall be submitted which will explore every feasible alternative to pavement cutting. The report shall unequivocally demonstrate the logical best means of providing infrastructure to the site. Detail shall be presented which gives evidence that real efforts have been made exploring alternatives through research of records and site visits to search for abandoned conduits, open drainageways, i.e., box culverts and alternate routes (alleyways or side streets not under moratorium).

Specifically, for the Town Engineer to consider a request to cut pavement for a crossing on a street protected by moratorium, the submittal shall include:

1. Maps depicting existing infrastructure for at least one-half mile in each direction for new developments, or a block in each direction for in-fill sites in developed areas.

2. Evidence of contact with abutting property owners for temporary easements giving access to side streets, or possible temporary sharing of service conduits until the moratorium period expires.

3. A feasibility report for redesigning the project to take advantage of existing utility stub-outs, or access to utilities within other streets which are not subject to moratorium periods (detailed cost analysis, phasing, utilization of long unused utility runs), etc.

4. A signed and sealed report from a geotechnical engineering firm concluding that jacking or boring is impossible or very impractical.

5. Documentation of insufficient room for jacking or boring pits inside Town rights-of-way and documentation of efforts to obtain construction easements from neighboring property owners.

The jacking/boring requirement will be waived only if the above criteria are met or exceeded. If a documented, detailed cost analysis clearly indicates that points (1-5 above) are cost-prohibitive to the project, the minimum cost differentials shall be as follows:

TABLE 5: Pavement Cut Moratoria

Remaining Moratorium	Cost Over Open Trenching
4 Years	10 Times
3 Years	8 Times
2 Years	6 Times
1 Year	4 Times
< 1 Year	2 Times

If open cutting is allowed, the following requirements will apply:

1. Controlled low strength material per ADOT Specification 501-3.02 (A)(3) shall be utilized to fill the trench from top of shading to the bottom of the concrete cap or first lift of asphaltic concrete (whichever applies). The ABC-slurry shall be composed of ABC material, one sack of Type II Portland cement per cubic yard, and an appropriate amount of water. The purpose of this material is to create a flowable fill rather than a hard concrete material which cannot be easily excavated. The material shall have an eight (8) inch slump and a compressive strength between forty (40) and one hundred (100) pounds per square inch (psi). When the one (1) sack ABC slurry is mixed and transported to the site the mixing shall comply with standard specification for public improvements . When the one (1) sack ABC slurry is mixed at the job site, the contractor shall submit for the engineer's approval the method, equipment, and procedure for proportioning and mixing of the ABC slurry fill.

2. Type-2 trench patches (Pima County/City of Tucson Standard Details), which are less than twenty-five (25) feet in width, shall be repaved with an extra 1-3/4 inch thickness of asphaltic concrete. All paving removal and replacement shall be at a ten (10) degree skew to the perpendicular, or normal traffic flow.

3. Where an entire section of street is replaced by repaving with self-propelled equipment the new paving thickness shall be at least the same as existing; and the transverse joints shall be at a ten (10) degree skew to the perpendicular.

For those trenches which run mostly parallel to street centerline, the entire lane(s) shall be replaced by paving equipment. All requirements and details of Pima County/City of Tucson Standard Details and the compaction requirements of the Standard Specifications shall apply. The final analysis should not preclude the use of engineering judgement.

If a street cut is allowed on streets subject to the moratorium, the applicant shall apply a 2- inch AR-AC (Asphalt Rubber-Asphaltic Concrete) overlay for the entire width of the roadway pavement. The length of the AR-AC overlay shall be determined by the Town Engineer (refer to Appendix I).

9.2 Trenching Within the Public Right-of-Way

1. Applicability. This Standard concerning trenching under present or future pavement, shading, trench backfilling, and patching in Town of Oro Valley rights-of-way shall apply to all public and private entities seeking to trench within the Town of Oro Valley rights-of-way. Builders, developers, utilities, etc., shall make every effort to utilize the "common trench" principle. Multiple cuts for services which can otherwise be combined into a common trench will not be approved.

2. Facilities. When facilities other than Town of Oro Valley Department of Public Works facilities (storm sewers, street lighting conduit and appurtenances, traffic light conduit and appurtenances) are installed in the Town of Oro Valley rights-of-way between curb lines, bedding and shading of the facility shall be in accordance with either the Town's or the parent organization's specifications and details for bedding, installation, and shading, whichever is more restrictive.

3. Permits. Prior to excavation within the rights-of-way of the Town of Oro Valley, a permit to excavate within the right-of-way shall be obtained. The Town Engineer may, with discretion, require the posting of a performance bond by any entity wishing to obtain an excavation permit for the purpose of trenching within the rights-of-way of the Town of Oro Valley. The Town Engineer may, with discretion, issue blanket/annual permits (franchise agreements) to utilities and other entities trenching in Town of Oro Valley rights-of-way for the purpose of installing or maintaining service connections, subject to compliance with these Standards. Failure to comply with these Standards shall be cause for revocation of blanket/annual permits (franchise agreements).

4. Traffic Control. Traffic control during trenching operations shall be in accordance with the current provisions of the Manual for Uniform Traffic Control Devices. In all cases concerning traffic control, the Town Engineer shall be the final authority with regard to barricading, channelization, hours of work, and compliance with other Town Codes. A traffic control plan shall be submitted forty-eight (48) hours prior to starting work. No work shall start until a traffic control plan is accepted by the Town Engineer and a Right-of-Way Use Permit has been issued.

9.2.1 Shading, Backfilling, Patching and Seal Coating

1. Shading

   Shading shall extend to one (1) foot above the top of the highest projection of the facility being installed and conform to the parent organization's specifications.

2. Backfilling

   Backfilling of trenches under existing or future pavement with native soil/aggregate base course/lean portland cement concrete shall be from the top of the shading to the appropriate elevation depending on the type of patch to be installed. Backfilling shall be in accordance with Pima County/City of Tucson "Standard Specifications for Public Improvements".

   When native soils (material excavated from the trench site) are used for backfill, evidence of compliance with compaction requirements in the form of test results by a recognized testing laboratory in accordance with the following schedule, may be required:

a) One (1) test per five hundred (500) feet of trench length or portion thereof, per three (3) feet of trench depth or portion thereof. The Town Engineer may require these tests anywhere within the backfill prism.

b) Aggregate Base Course used for backfill shall conform to PC/COT "Standard Specifications for Public Improvements".

c) Trench backfill shall consist of controlled low strength material per ADOT Specification 501-3.02 (A)(3).

3. Patching

a) Temporary Patches

1) Temporary patching shall be installed in accordance with the provisions of the Pima County/City of Tucson "Standard Specifications for Public Improvements".

2) Temporary patches shall be replaced with permanent patches within thirty (30) calendar days of the application of the temporary patch.

3) It shall be the responsibility of the organization installing/securing the permit for pavement cuts to maintain the temporary patch until replaced by a permanent patch.

4) The organization shall be responsible for permanent patches until the street is overlaid or reconstructed.

b) Permanent Patches

1) Permanent patches shall be in accordance with the PC/COT "Standard Details for Public Improvements". Type B patches shall be used for all arterial/collector streets. During trenching activities, care shall be taken to preserve the shoulder at the trench top.

2) For longitudinal trenches whose top widths exceed four (4) feet, the roadway shall be repaved with a combination of materials having the same structural strength and surface course as the existing pavement according to the following schedule:

Trench/Width	Repaving Width
4' - 12'	One-half pavement width or one (1) lane width depending on trench location.
Over 12'	Full pavement width

3) Patches for transverse trench shall be twice the trench width.

4) Permanent patches on temporary pavement shall consist of the standard pavement section for residential streets.

4. Seal Coating
   Seal coating shall be done in accordance with the PC/COT "Standard Specifications for Public Improvements", where applicable. The type of seal coat shall be determined by the Town Engineer.

5. Older Asphaltic Pavement Underlaid by Concrete Bases
   Type B patch shall be used and the underlying concrete base cut to a width shown for Type B patches.

9.3 Abatement

Abatement for violations of this Standard shall consist of paving or overlaying a substantial portion of the affected roadway. The extent of the paving or overlaying shall be determined by the Town Engineer.

9.4 Modifications and Appeals

1. Modifications: Emergency situations and other conditions not specifically addressed by Chapters 9.1 and 9.2 of this Standard shall be judged on a case-by-case basis by the Town Engineer without setting precedent.

2. Appeals: Appeals to rulings made under Chapters 9.1 and 9.2 of this Standard shall be to the Town Engineer in writing, whose decision shall be final.

10.0 PAVEMENT DESIGN

These pavement design standards apply to all local and collector street improvement projects designed as part of development which requires off-site improvements. Each development that involves street construction shall submit for approval a Pavement Design Report (PDR) containing the following information for each street: a tabulation of results of soil subgrade tests, projected ADT's, equivalent single axle loads (ESAL) used, structural numbers (SN), and pavement thickness for each street. A minimum twenty (20) year pavement design life is required. The PDR may be waived by the Town Engineer for parking lots in private developments. Refer to Pima County's "Roadway Design Manual" for the general organization and content of the PDR.

1. The following ESAL's, based on the twenty (20) year projected ADT will be accepted for pavement design:

TABLE 6: ESAL's

20 Year ADT	ESAL
<500	40,000
500-1,000	70,000
1,000-1,500	100,000
1,500-2,500	150,000

When the projected twenty (20) year ADT exceeds 2,500, or when the engineer desires to calculate his/her own ESAL's, complete calculations, including a breakdown of the traffic by vehicle type, shall be included in the PDR. The ESAL calculations shall be based on the twenty (20) year design period and the following ESAL factors:

TABLE 7: ESAL Factors

Vehicle Type	Symbol	ESAL Factor
Passenger Car	P	0.0008
Bus	BUS	0.25
Single Truck	LT	0.01
Single Truck (Dual Rear or 3 Axle)	MT	0.4
Tractor-Trailer	TS	0.6560
Truck-Tandem Trailer	TT	0.8646
Tractor-Tandem Trailer	TST	1.2604

Please refer to:

- "Materials – Preliminary Engineering and Design Manual", ADOT
- "Guide for Design of Pavement Structures", AASHTO

2. Subgrade sampling and testing for roadways shall be accomplished in accordance with standard ADOT procedures and the results tabulated in the PDR. Soil support values shall be calculated in accordance with the ADOT "Materials – Preliminary Engineering and Design Manual" and the selection of a design soil support value shall be fully documented in the PDR.

3. Weighted structural numbers shall be calculated using the design soil support value, the appropriate ESAL, and a regional factor of 1.7. The minimum weighted structural number is to be 1.30. A minimum terminal serviceability index of 2.0 (ADOT) is acceptable for design of local streets.

4. Pavement thickness shall be calculated in accordance with the design equations in the ADOT manual ("Materials – Preliminary Engineering and Design Manual"). The layer coefficient for asphaltic concrete shall be obtained from the ADOT manual. The layer coefficient for aggregate base course is 0.12. Minimum thickness is to be as follows:

TABLE 8: Minimum Pavement Thickness

Traffic ESAL's	AC	ABC
< 150,000	3.0"	5.0"
≥ 150,000 and < 500,000	3.0"	6.0"
≥ 500,000	4.0"	6.0"

5. Subbase material should be of significantly better quality than native soil. Subbase may not be used as part of the pavement section when the subgrade soil has an R-value of thirty (30) or greater. In addition, when subbase material is used, the thickness of the subbase may not be more than one-and-a half (1.5) times the combined thickness of the asphalt and aggregate base courses. The layer coefficient for material which meets minimum Pima County/City of Tucson joint standards for subbase is 0.05. If better quality material is used, a larger layer coefficient may be used in accordance with the ADOT manual.

6. When existing streets are widened, the new pavement section shall either match the existing pavement section or meet minimum thickness as required in paragraph 4 above, or as determined within the PDR, whichever is greater. Upon completion of a pavement widening, a 2-inch thick AR-AC overlay shall be applied the entire roadway width from the beginning to the end station of the new pavement. A tack oil shall be applied prior to AR-AC overlay. Appropriate pavement markings and traffic control signage, the design of which shall be approved by the Town Engineer prior to construction, will be required to be installed all at the developer's expense.

7. When through streets are designed which may ultimately connect to future developments, pavement design shall accommodate future wheel loads, including construction traffic to account for use of the roadway as a haul-road.

10.1 Collector and Arterial Streets – Surface Course

Following applicant consultation with the Town Engineer with regard to design criteria, the final 2-inch pavement lift applied to collector and arterial streets shall consist of Asphalt Rubber-Asphaltic Concrete (AR-AC). The applicant shall submit a pavement mix design to the Town Engineer for approval.

11.0 TRAFFIC CONTROL SIGNAGE AND PAVEMENT MARKINGS

1. All traffic control signage and pavement markings within new subdivisions shall be posted and installed in accordance with the "Manual on Uniform Traffic Control Devices", latest edition, and the PC/COT Pavement Marking Design Manual or any subsequent editions.

2. All intersections shall be controlled. Tee intersections shall be posted with a stop on the noncontinuous leg. Four (4)-way intersections shall be controlled by traffic control devices which stop the traffic on the lesser volume street, unless specific written approval is given by the Town Engineer, or unless a four (4)-way stop is recommended within the approved Traffic Impact Analysis.

3. All temporary ends of road shall be posted with post barracades or end of road markers, five (5) feet on center, across the pavement projection. If grading has occurred in the alignment beyond the end of road, at least two (2) permanent Type 3 barricades as described within the MUTCD shall be added to the road end.

4. Upon review of traffic operational characteristics and within the one-year warranty, the Town Engineer may require additional signage or pavement markings by the developer. Said additions shall be provided at no cost to the Town.

5. All Stop Sign locations shall be supplemented with a stop bar on the pavement.

6. All street segments greater than six hundred (600) feet in length and subdivision streets intersecting collector streets shall be posted at twenty-five (25) MPH, unless ordinanced at a different speed.

7. All Streets having no outlet shall be posted as such (W14-2 or approved alternate).

8. Pavement markings shall be thermoplastic and meet "Standard Specifications for Public Improvements" (PC/COT) requirements. Seal coated streets with pavement markings are to comply with ADOT standards and have two (2) applications.

9. Street name signs shall be reflective, shall state the direction of the street, and shall have the primary name at least four (4) inches high. Prefixes, suffixes, and directions may be no less than two (2) inches high. The directional prefix shall be in the upper left corner of the sign.

10. All projects requiring signage and/or striping will require a signage/striping plan to be submitted for approval by the Town Engineer. This plan is to be integral to the project construction documents. All collectors and arterials shall be striped.

12.0 DEFINITIONS

AASHTO: The American Association of State Highway and Transportation Officials.

AVERAGE DAILY TRAFFIC (ADT): Unless physically determined, the total volume of traffic passing a point or segment of roadway in both directions, forcasted for specific land use(s) over a 24-hour period by applying either regression equations or trip generation rates as provided within ITE's "Trip Generation".

BEDDING: That material between the bottom of the excavated trench and the springline of the pipe or underground facility to be installed.

BUILDING SETBACK: The right-angle distance from a point on or within street right-of-way to the closest point of any building structure.

CC & R's: An acronym for Covenants, Conditions and Restrictions.

COLLECTOR STREET: A street designed to distribute traffic between local streets and arterial streets. See PCDOT's "Roadway Design Manual" for further discussion and design requirements.

CROWN: A cross-slope of difference in elevation between the high point of a street and the gutter line, adjacent to the pavement edge, for any given cross-section. Crown is normally expressed as a percentage.

CURB CUT: A depressed segment of a vertical roadway curb.

CURB RETURN: A curved segment of a curb used at each end of an opening in the roadway curb.

CURBWAY: The area between the back of curb and the roadway edge of the sidewalk.

DESIGN YEAR: The year during which the roadway improvements shall reach life expectancy with normal maintenance, generally twenty (20) years.

DEVELOPER: The private party in whose interest engineering documents, plats and plans are submitted for the purposes of review and regulation of private land development in the Town of Oro Valley.

DRIVEWAY: A point of vehicular access between a street and an abutting property.

ENGINEER: The design engineer or engineer of record. The engineer must be a civil engineer licensed to practice in the state of Arizona, unless otherwise stated within these Standards.

FINAL PAVEMENT CUT: The sawing of pavement edge through its entire depth along a line one (1) foot beyond the widest portion of the trench width after trench backfilling for the purpose of establishing a trench shoulder at the time of permanent patching.

FRONTAGE ROAD: A local street or auxiliary road, located on the side and generally parallel to a collector or arterial street which provides service to abutting property and adjacent areas while controlling access.

FUNCTIONAL CLASSIFICATION: A way of distinguishing between street types by the purpose each serves, such as freeway (limited access), arterial, collector, and local streets.

HOMEOWNERS' ASSOCIATION (HOA): A legal entity established for the purpose of owning and maintaining commonly held private real property.

INITIAL PAVEMENT CUT: The penetration of the asphaltic pavement through its entire depth by use of an approved device for the purpose of removing sections of permanent asphalt and/or concrete paving.

INTERIM PAVING: Placed to designed grades and can be expanded to a permanent improvement at a future time.

INVERT: The difference in elevation between the low point of a street and a chord line connecting the outer edges of pavement or gutter lines.

LEVEL OF SERVICE (LOS): A general term describing the operating conditions a driver will experience while traveling on a particular roadway facility. Where roadway conditions are fixed, Level Of Service varies primarily with volume.

LOCAL STREET: A street that primarily serves as access to residences or other abutting properties.

MASTER TRANSPORTATION PLAN: The most recent version of the Plan, as adopted by the Mayor and Council.

MINIMUM: The least quantity or amount allowable for a singular design condition, and may not be an acceptable state in consideration of other aspects of project design.

NO-ACCESS EASEMENT: A strip of land across which vehicular traffic is prohibited, except emergency and utility vehicles.

OFF-STREET PARKING: Any space provided for vehicular parking not within the street right-of-way.

ON-STREET PARKING: The parking lane adjacent to travel lanes in a travelled roadway.

ONE-WAY STREET: A street that has only one legal direction of travel.

PAVEMENT CUT MORATORIUM: That time period after the acceptance of newly installed pavement or overlay during which the pavement surface shall not normally be cut for trenching or other purposes.

PAVEMENT TRENCHING: Includes the cutting of pavement and the excavation of material to a depth below the lowest elevation of the underlying base course within Town rights-of-way. Typically, trenches are deeper than they are wide and longer than they are deep; however, for purposes of this Standard, any excavation within the Town rights-of-way will be referred to as trenching without regard to the geometric shape of the excavation. Trenching may occur in other locations outside pavement areas.

PERMANENT PATCH: The native material/aggregate base course/concrete base and hot mix asphaltic concrete/portland cement concrete used to repair the upper level of pavement cut and to provide a permanent wearing surface. The following types apply:

1. Type A consists of emulsified asphalt and chip sealcoat, hot mix asphaltic concrete, and aggregate base course above the trench backfill material.

2. Type B consists of matching the existing surface course of hot mix asphaltic concrete and 3000 psi high early strength portland cement concrete above the trench backfill material.

3. Permanent Patches for portland cement concrete surfaces not overlaid with other materials shall consist of matching the existing structural pavement section. The finished surface shall match the original concrete finish. The trench shoulder and portland cement concrete shall be the same as "Type B" patch above.

These patches shall be in accordance with the PC/COT Standard Specifications and Details.

SHADING: The trench backfill above the bedding material of the underground facility, in accordance with either the Town's or parent organization's specifications and details, whichever is more restrictive, to a height of one (1) foot above the parent organization's facility, unless otherwise specified by the Town or parent organization.

STANDARD SPECIFICATIONS, DETAILS AND MANUALS (Standard Specifications, Standards, Standard): The specifications and details published by Pima County/City of Tucson. These specifications, details, and other regulations/policies of the Town of Oro Valley may be amended or changed as to nomenclature or content, and the nomenclature changed in this Standard without necessity for review or reapproval of this Standard. Such specifications, details, and other regulations/policies shall be reviewed/amended in accordance with the applicable procedures for the review/amendment of the respective specification, detail, regulation, or policy.

TEMPORARY PATCH: A cold mix asphaltic concrete applied to the surface of a trench backfill to provide a temporary wearing surface and moisture barrier until a permanent patch can be installed.

TEMPORARY PAVING: Sometimes called strip paving, an asphaltic surface treatment applied to graded and compacted earth.

TRENCH BACKFILL: The filling of the excavated void from a point one (1) foot above the facility installed (top of shading) to a point sufficiently below the existing original asphaltic concrete or portland cement concrete surface to allow the installation of the appropriate pavement patch.

TOWN: The Town of Oro Valley, a political subdivision of the State of Arizona.

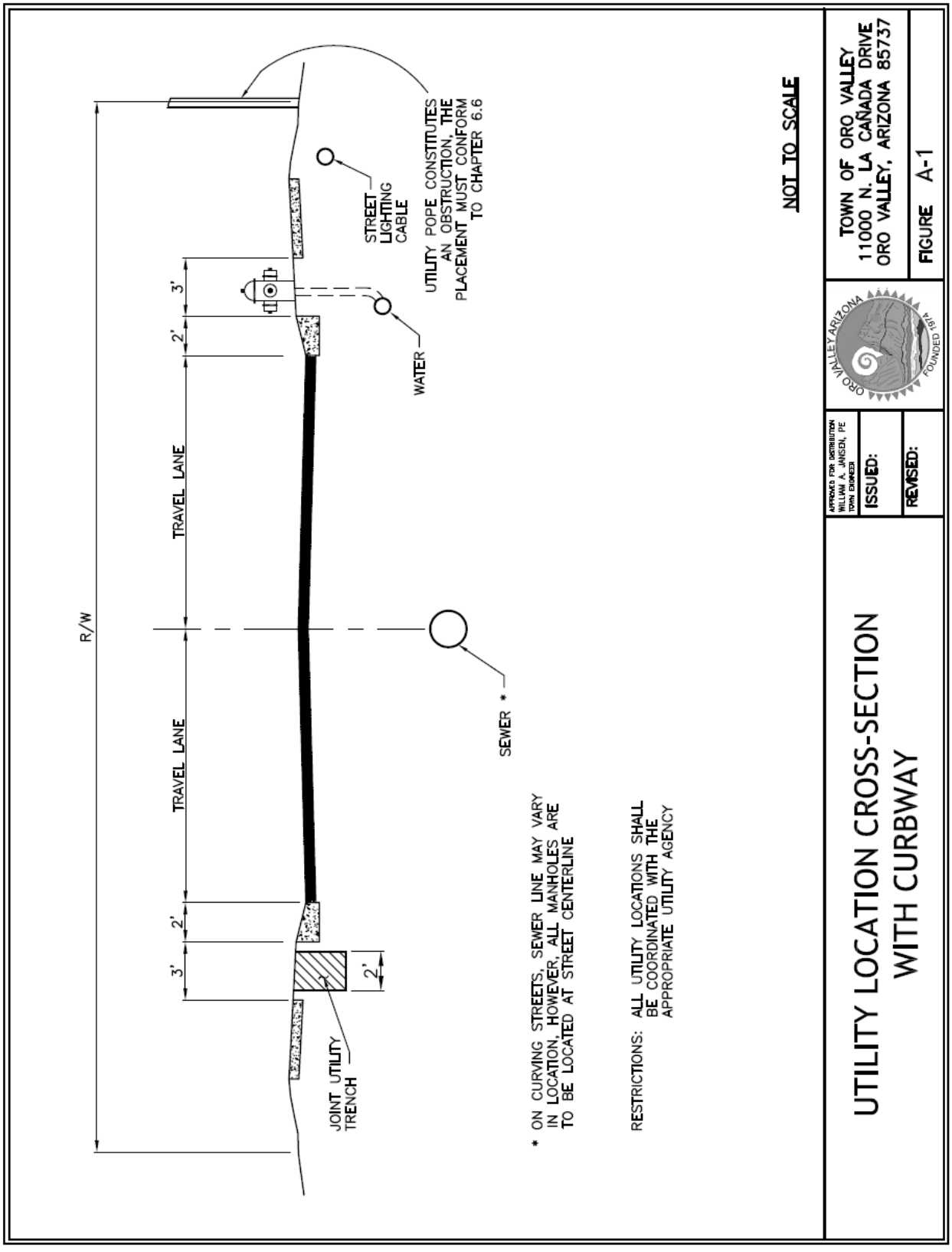
TOWN ENGINEER: The Director, Department of Public Works, or as otherwise specified in the Oro Valley Town Code, or his/her designated representative, in accordance with Arizona Revised Statutes.

UNDERGROUND FACILITY: Any item or appurtenance to be installed below the surface in the right-of-way of a Town street such as water pipes, storm or sanitary sewer pipes, gas lines, electrical conduit and ducts, telephone appurtenances, etc., including individual service connections.

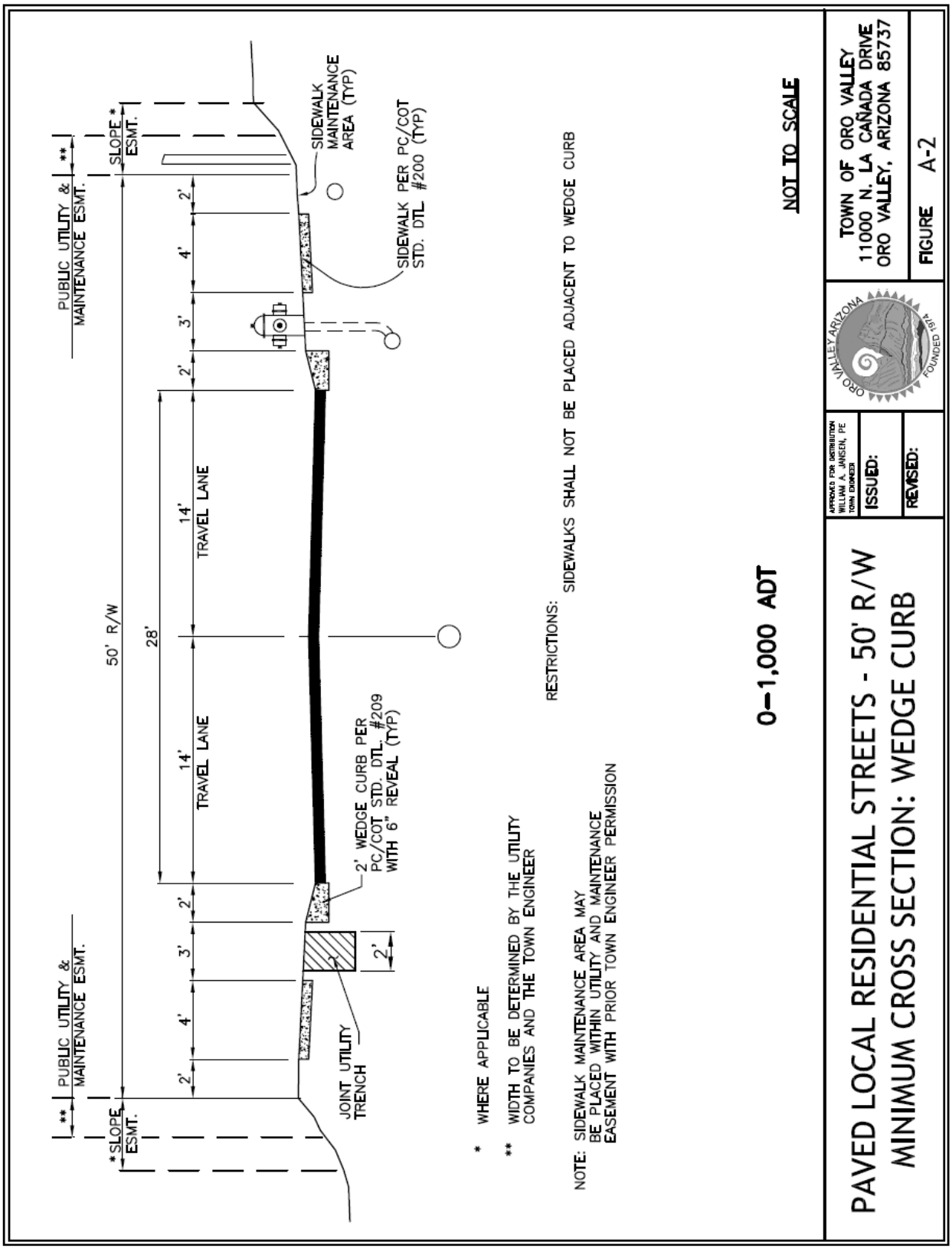
APPENDICES:

APPENDIX A: STANDARD FIGURES

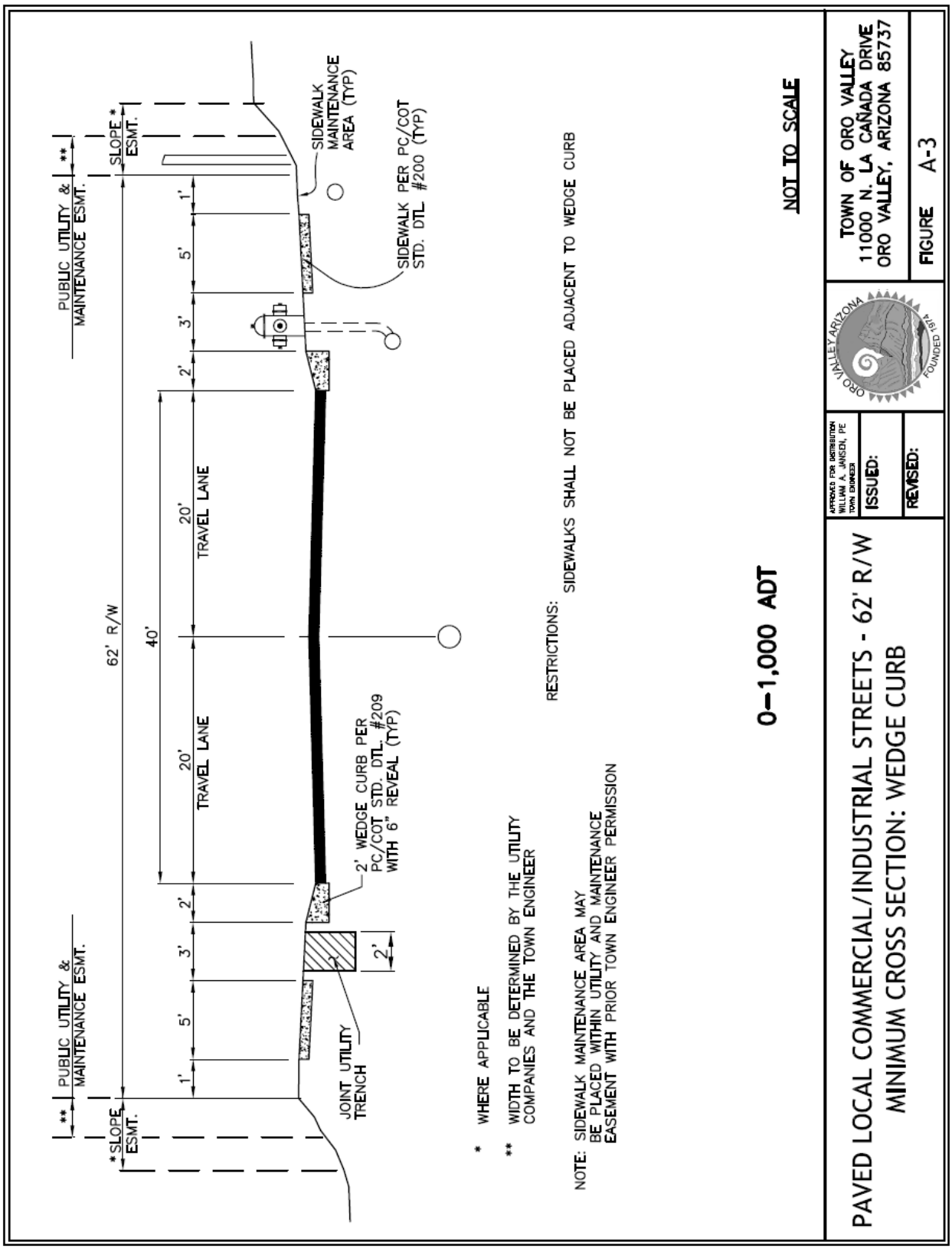
A-1 Utility Location Cross-Section



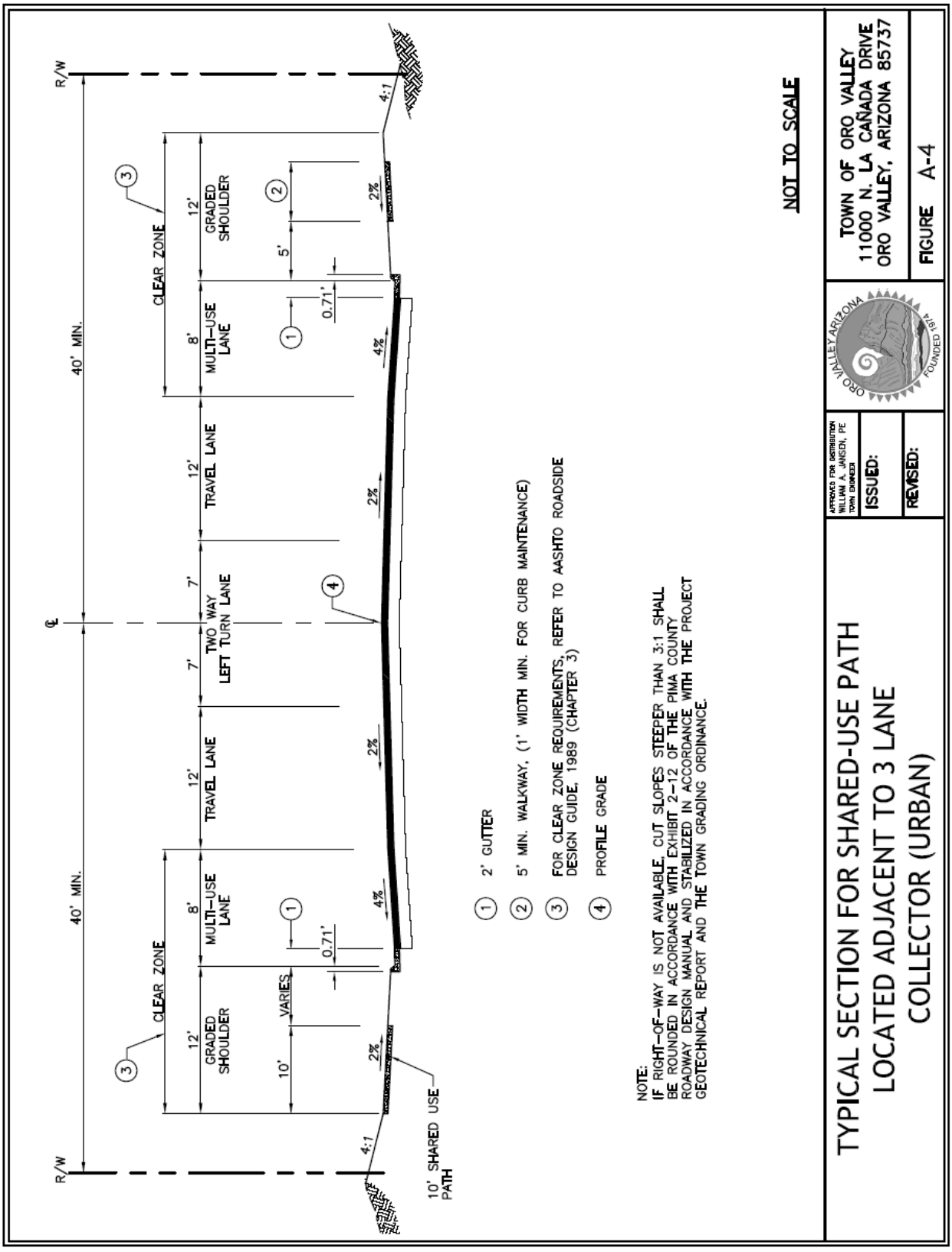
A-2 Local Residential Street – 50-R/W



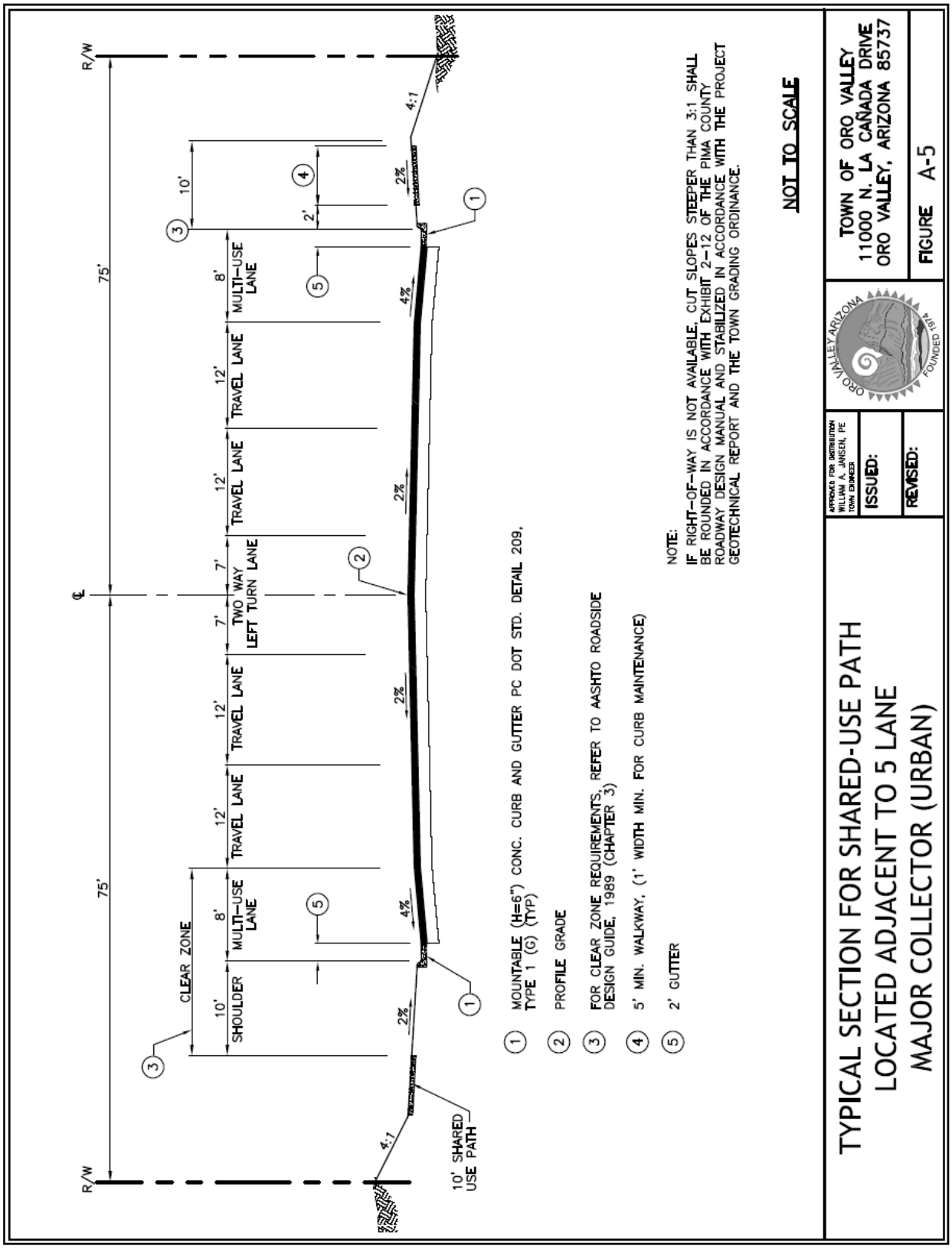
A-3 Local Commercial/Industrial Street – 62-R/W



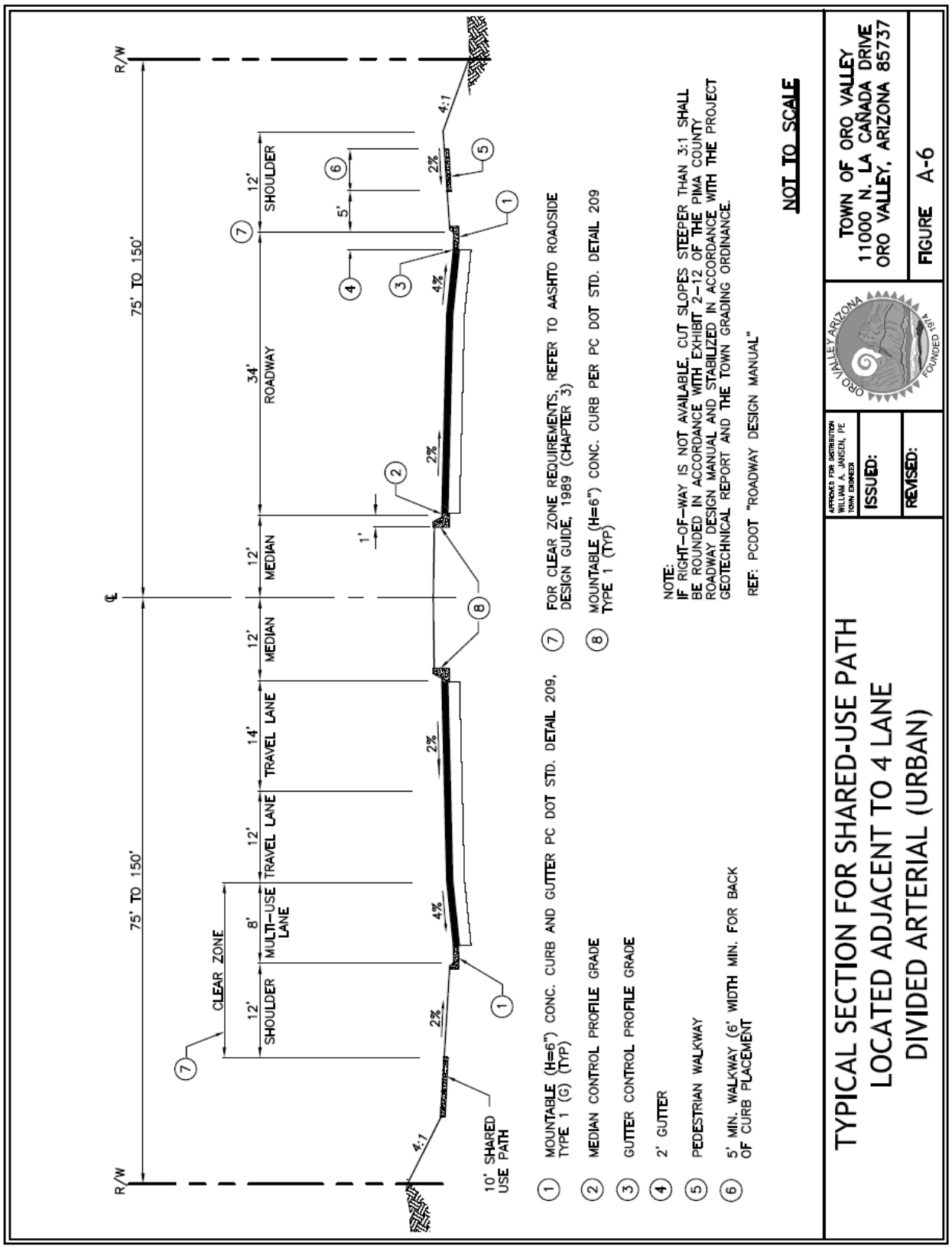
A-4 Typ. Section for Shared-Use Path Location – 3-Lane Collector



A-5 Typ. Section for Shared-Use Path Location – 5-Lane Collector



A-6 Typ. Section for Shared-Use Path Location – 4-Lane Div. Arterial



1. MOUNTABLE (H=6") CONC. CURB AND GUTTER PC DOT STD. DETAIL 209, TYPE 1 (G) (TYP)
2. MEDIAN CONTROL PROFILE GRADE
3. GUTTER CONTROL PROFILE GRADE
4. 2' GUTTER
5. PEDESTRIAN WALKWAY
6. 5' MIN. WALKWAY (6' WIDTH MIN. FOR BACK OF CURB PLACEMENT
7. FOR CLEAR ZONE REQUIREMENTS, REFER TO AASHTO ROADSIDE DESIGN GUIDE, 1989 (CHAPTER 3)
8. MOUNTABLE (H=6") CONC. CURB PER PC DOT STD. DETAIL 209 TYPE 1 (TYP)

NOTE:
IF RIGHT-OF-WAY IS NOT AVAILABLE, CUT SLOPES STEEPER THAN 3:1 SHALL BE ROUNDED IN ACCORDANCE WITH EXHIBIT 2-12 OF THE PIMA COUNTY ROADWAY DESIGN MANUAL AND STABILIZED IN ACCORDANCE WITH THE PROJECT GEOTECHNICAL REPORT AND THE TOWN GRADING ORDINANCE.

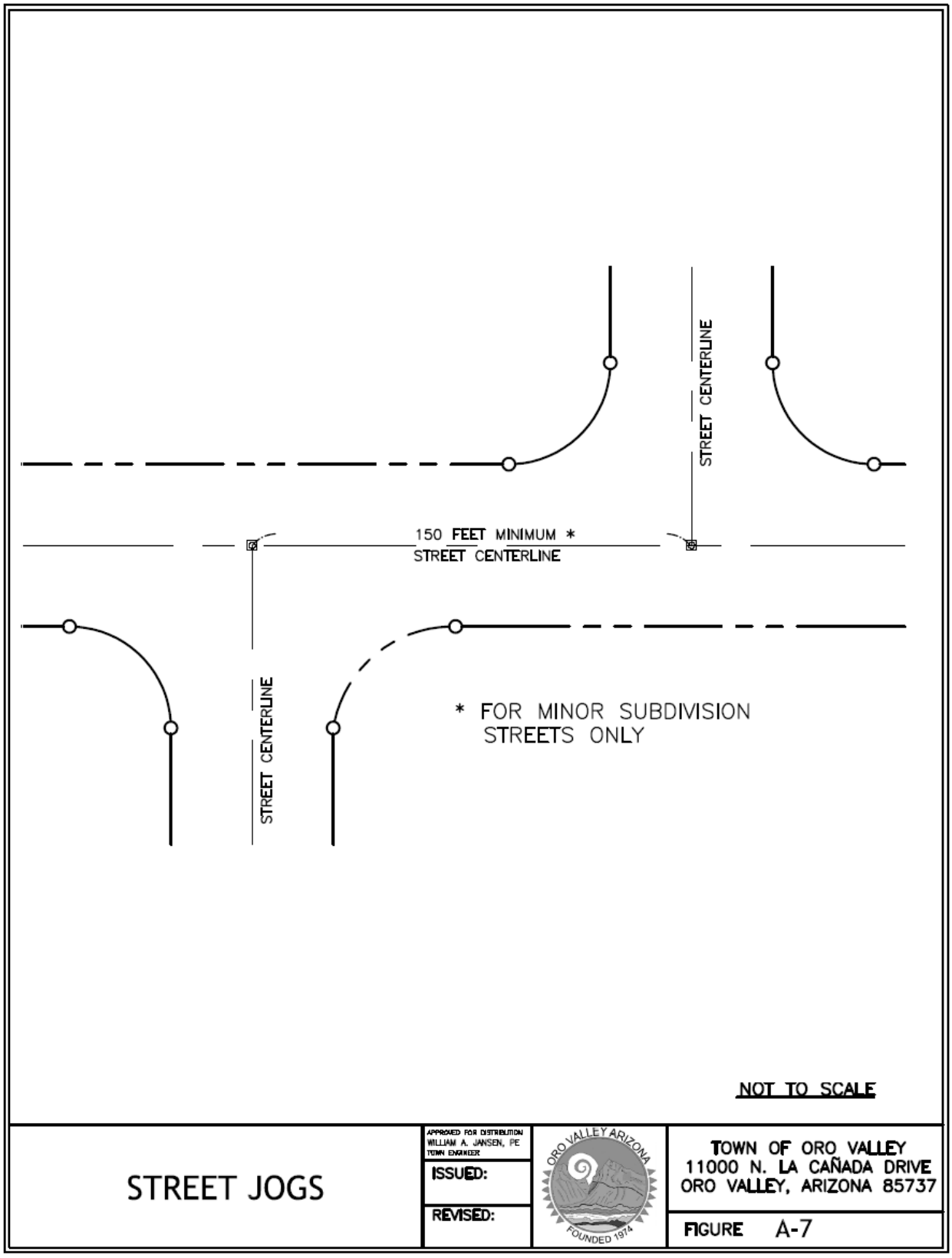
REF: PCDOT "ROADWAY DESIGN MANUAL"

APPROVED FOR DISTRIBUTION
WILLIAM A. JANSEN, PE
TOWN ENGINEER

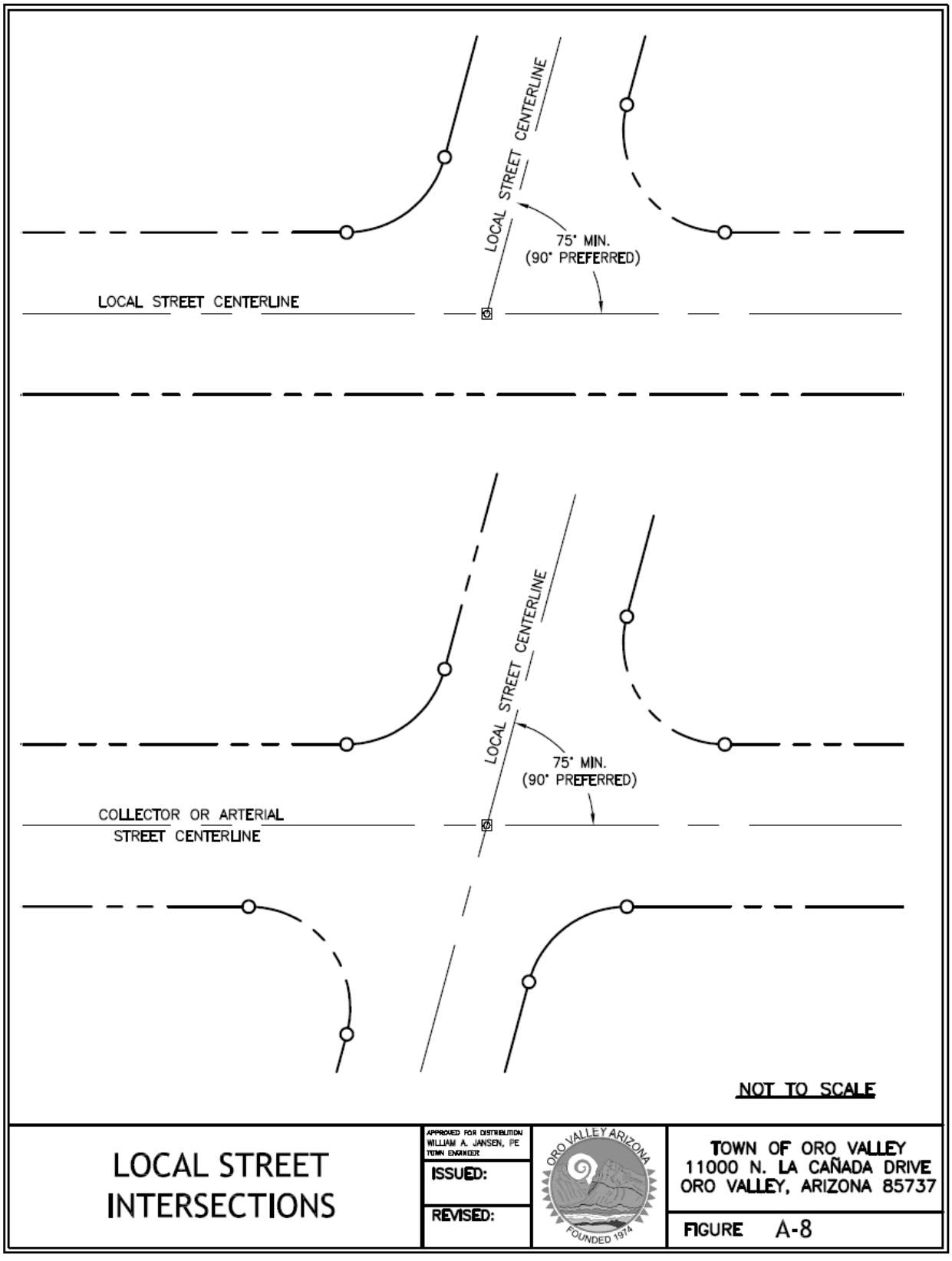
ISSUED:

REVISED:

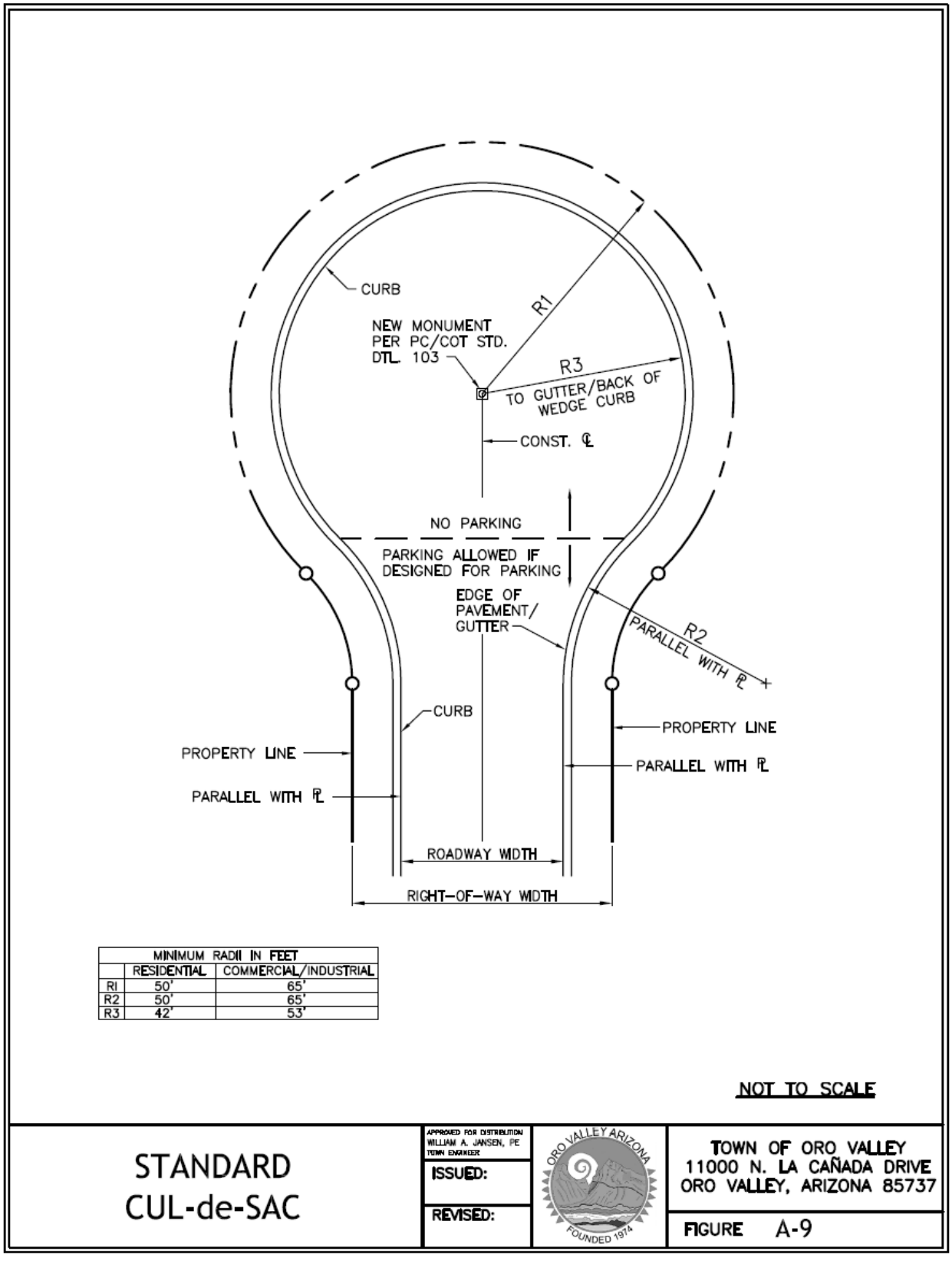
A-7 Street Jogs



A-8 Street Intersections



A-9 Standard Cul-de-Sac



MINIMUM RADII IN FEET		
	RESIDENTIAL	COMMERCIAL/INDUSTRIAL
RI	50'	65'
R2	50'	65'
R3	42'	53'

NOT TO SCALE

STANDARD
CUL-de-SAC

APPROVED FOR DISTRIBUTION
WILLIAM A. JANSEN, PE
TOWN ENGINEER

ISSUED:

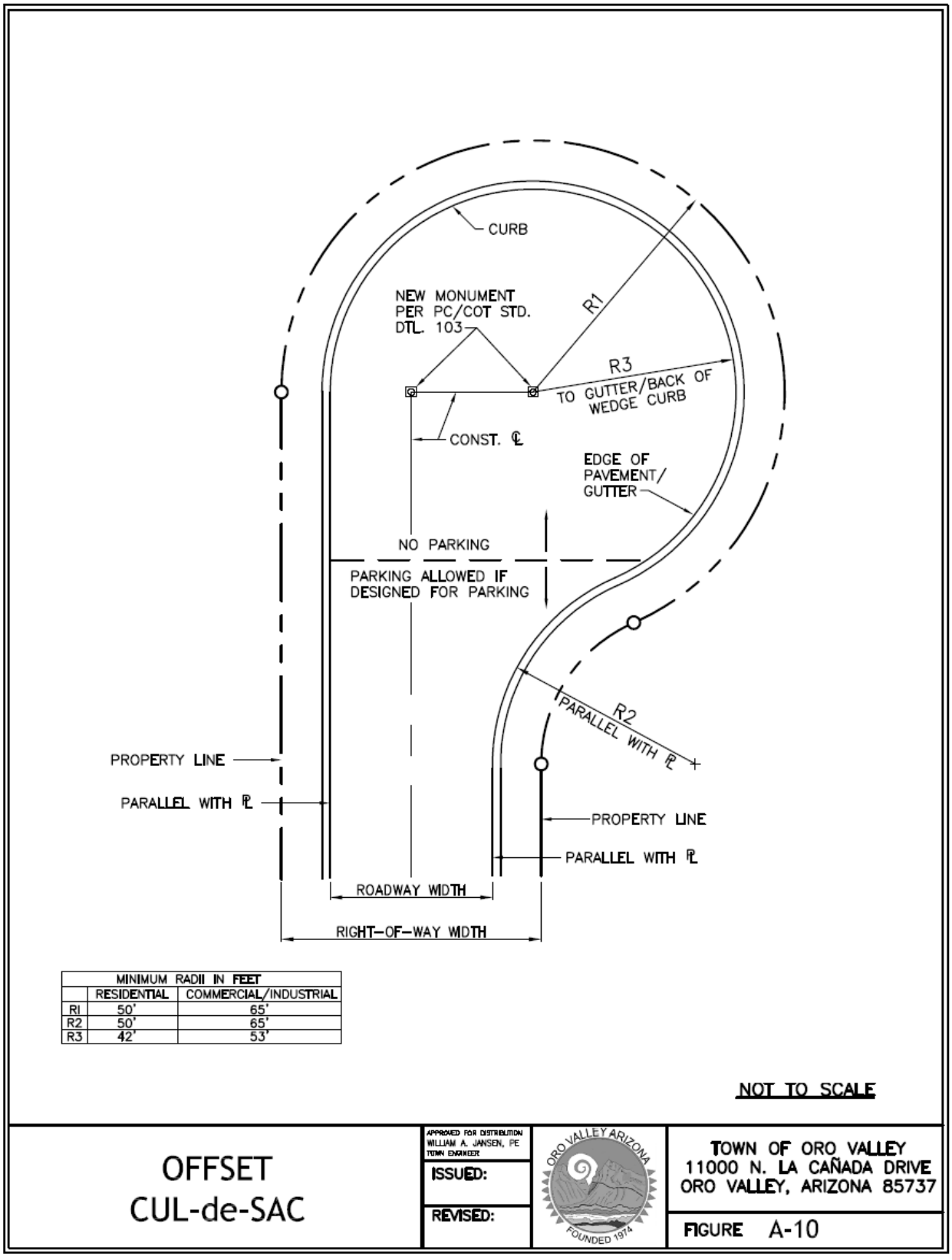
REVISED:

ORO VALLEY ARIZONA
FOUNDED 1974

TOWN OF ORO VALLEY
11000 N. LA CAÑADA DRIVE
ORO VALLEY, ARIZONA 85737

FIGURE A-9

A-10 Offset Cul-de-Sac



MINIMUM RADII IN FEET		
	RESIDENTIAL	COMMERCIAL/INDUSTRIAL
RI	50'	65'
R2	50'	65'
R3	42'	53'

NOT TO SCALE

OFFSET
CUL-de-SAC

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TOWN ENGINEER

ISSUED:

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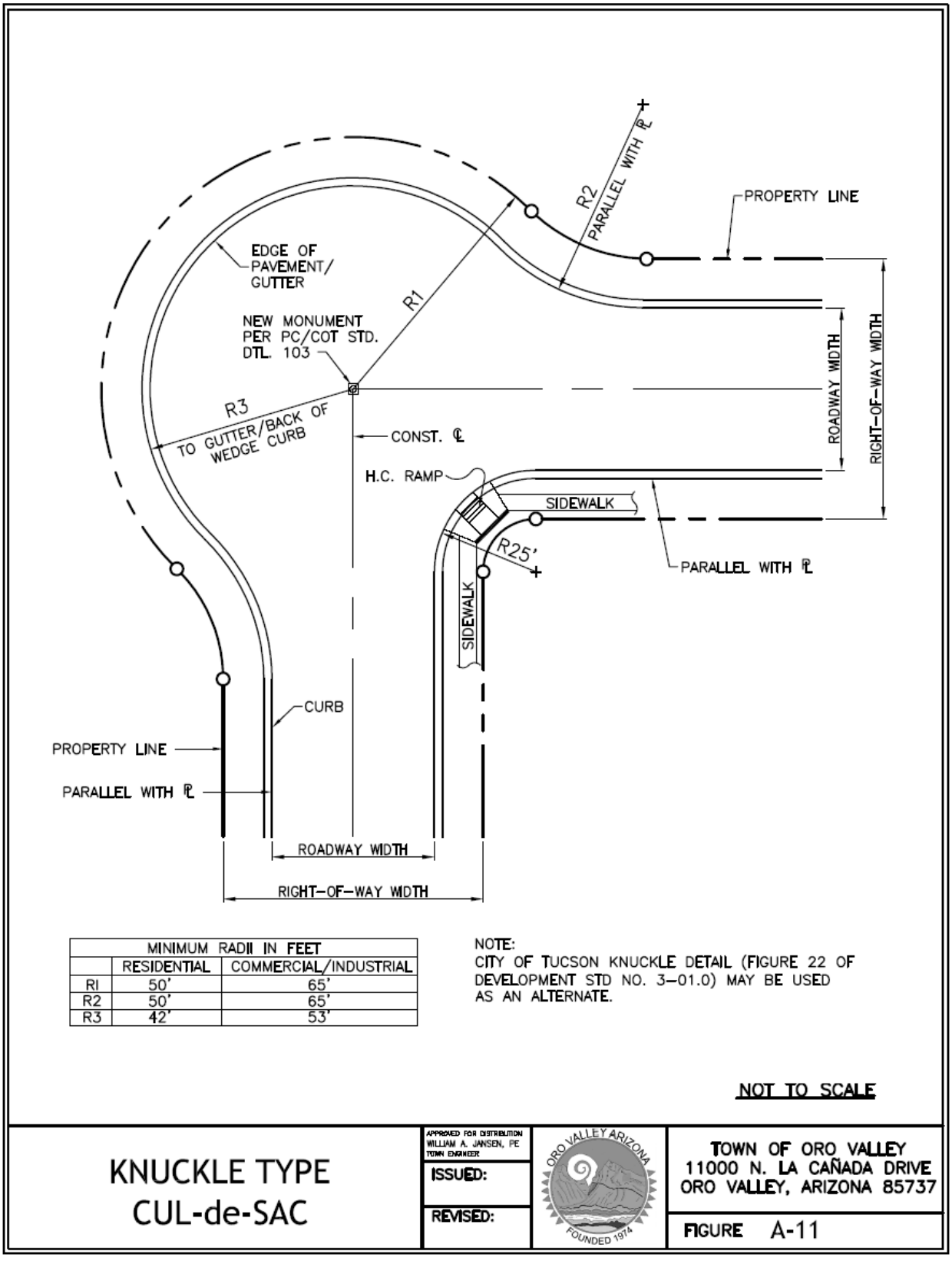
FOUNDED 1974

TOWN OF ORO VALLEY
11000 N. LA CAÑADA DRIVE
ORO VALLEY, ARIZONA 85737

FIGURE A-10

A-11 Knuckle Type Cul-de-Sac



MINIMUM RADII IN FEET		
	RESIDENTIAL	COMMERCIAL/INDUSTRIAL
RI	50'	65'
R2	50'	65'
R3	42'	53'

NOTE:
CITY OF TUCSON KNUCKLE DETAIL (FIGURE 22 OF DEVELOPMENT STD NO. 3-01.0) MAY BE USED AS AN ALTERNATE.

NOT TO SCALE

KNUCKLE TYPE
CUL-de-SAC

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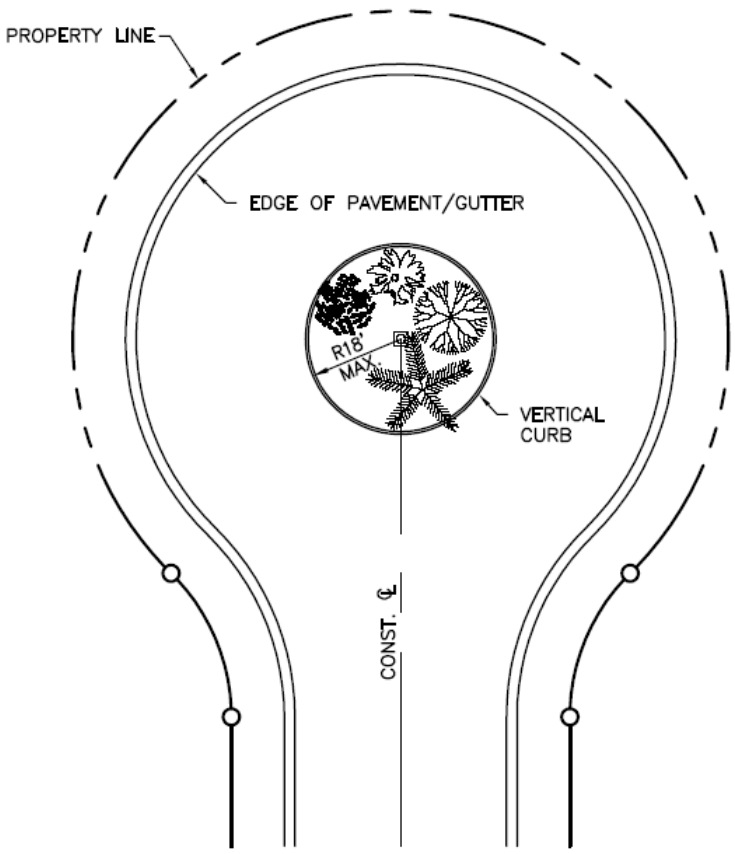
11000 N. LA CAÑADA DRIVE
ORO VALLEY, ARIZONA 85737

FIGURE A-11

A-12 Cul-de-Sac Landscaping



NOTE:
FOR FURTHER CUL-DE-SAC INFORMATION SEE FIGURE A-9

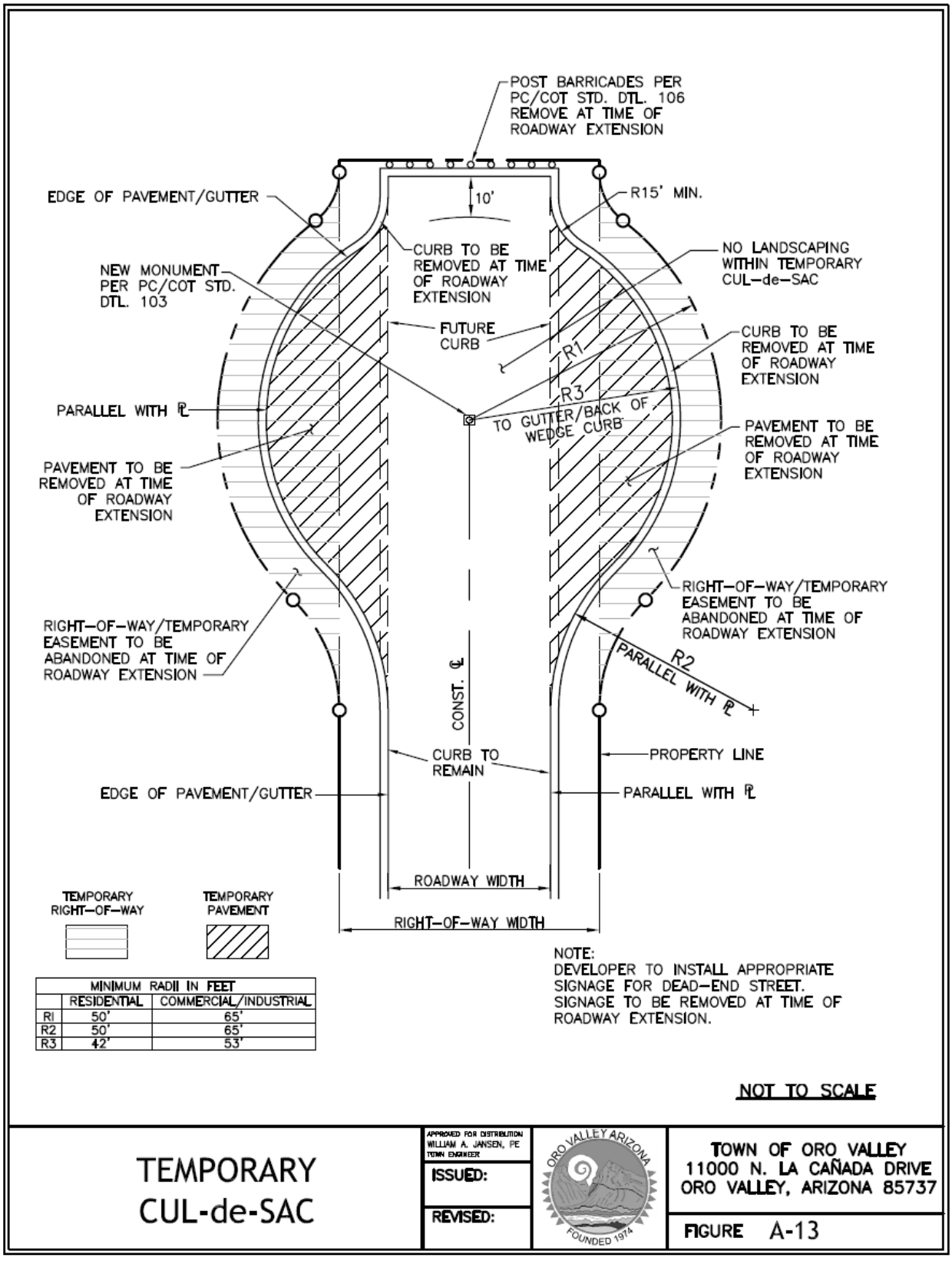
LANDSCAPE MATERIALS MUST BE SELECTED AND PLACED SO AS NOT TO INTERFERE WITH DRIVERS' VISIBILITY WITHIN THE MEDIAN BY TWO HORIZONTAL LINES LOCATED 30" AND 72" ABOVE FINISHED GRADE OF THE ROADWAY SURFACE.

LANDSCAPING/VEGETATION INSTALLED BY THE DEVELOPER/HOMEOWNER'S ASSOCIATION SHALL NOT BE MAINTAINED BY THE TOWN OF ORO VALLEY. A LICENSE AGREEMENT MUST BE EXECUTED, AND APPROVED BY THE TOWN ENGINEER PRIOR TO CONSTRUCTION.

NOT TO SCALE

CUL-de-SAC LANDSCAPING DETAIL	APPROVED FOR DISTRIBUTION WILLIAM A. JANSEN, PE TOWN ENGINEER ISSUED: REVISED:	ORO VALLEY ARIZONA FOUNDED 1974	TOWN OF ORO VALLEY 11000 N. LA CAÑADA DRIVE ORO VALLEY, ARIZONA 85737 FIGURE A-12

A-13 Temporary Cul-de-Sac



MINIMUM RADII IN FEET		
	RESIDENTIAL	COMMERCIAL/INDUSTRIAL
RI	50'	65'
R2	50'	65'
R3	42'	53'

TEMPORARY CUL-de-SAC

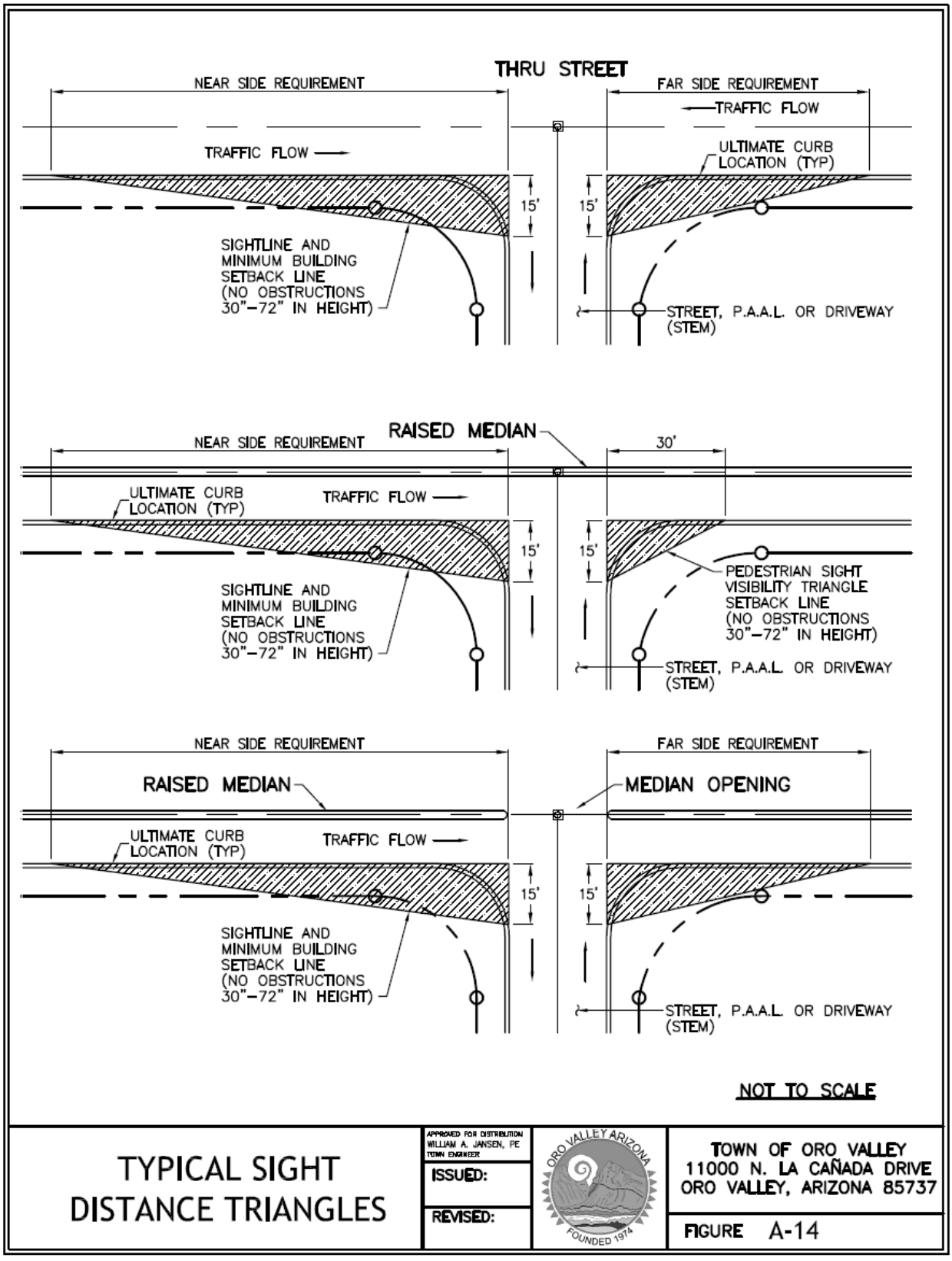
APPROVED FOR DISTRIBUTION
WILLIAM A. JANSEN, PE
TOWN ENGINEER
ISSUED:
REVISED:

ORO VALLEY ARIZONA
FOUNDED 1974

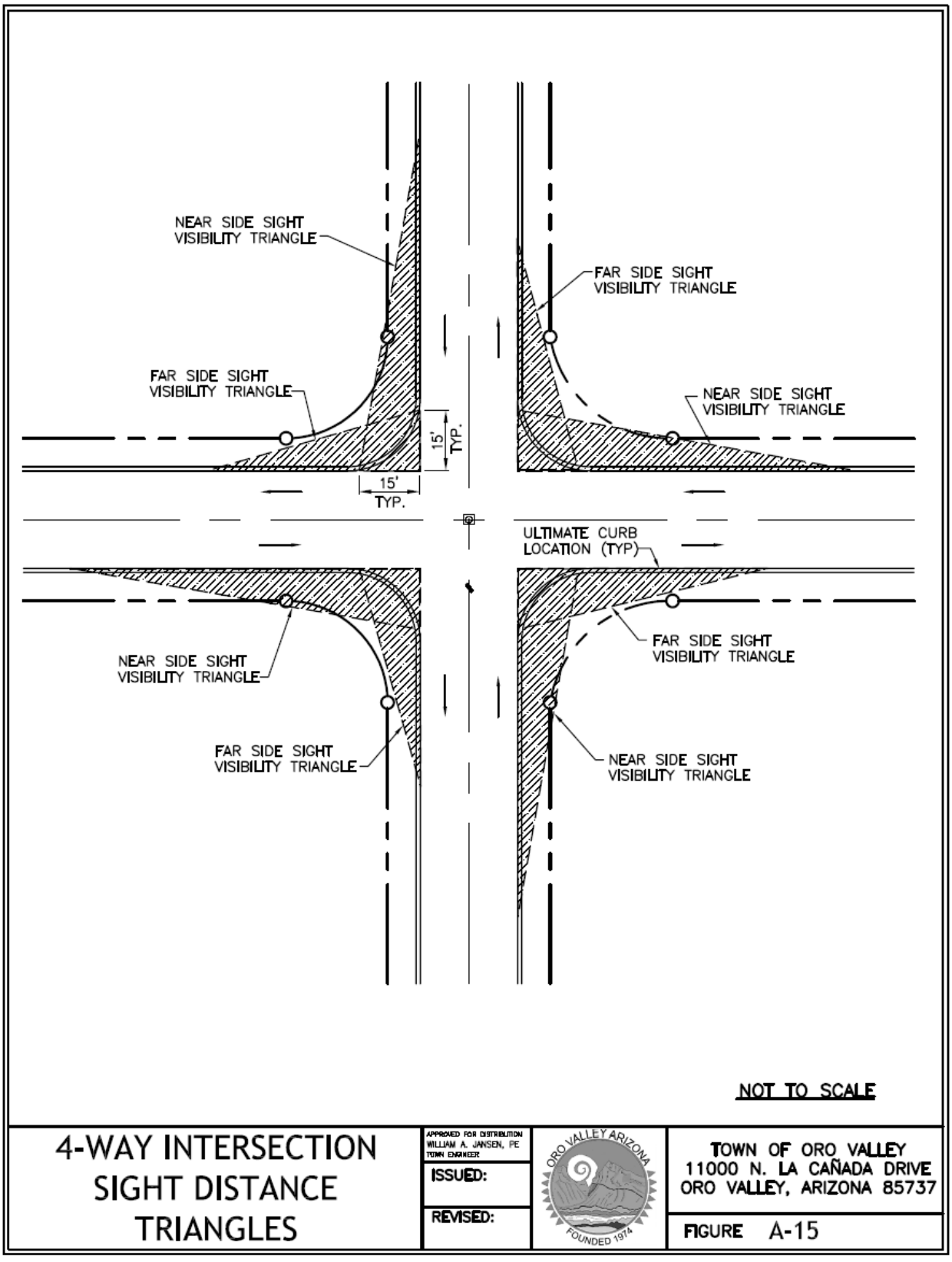
TOWN OF ORO VALLEY
11000 N. LA CAÑADA DRIVE
ORO VALLEY, ARIZONA 85737

FIGURE A-13

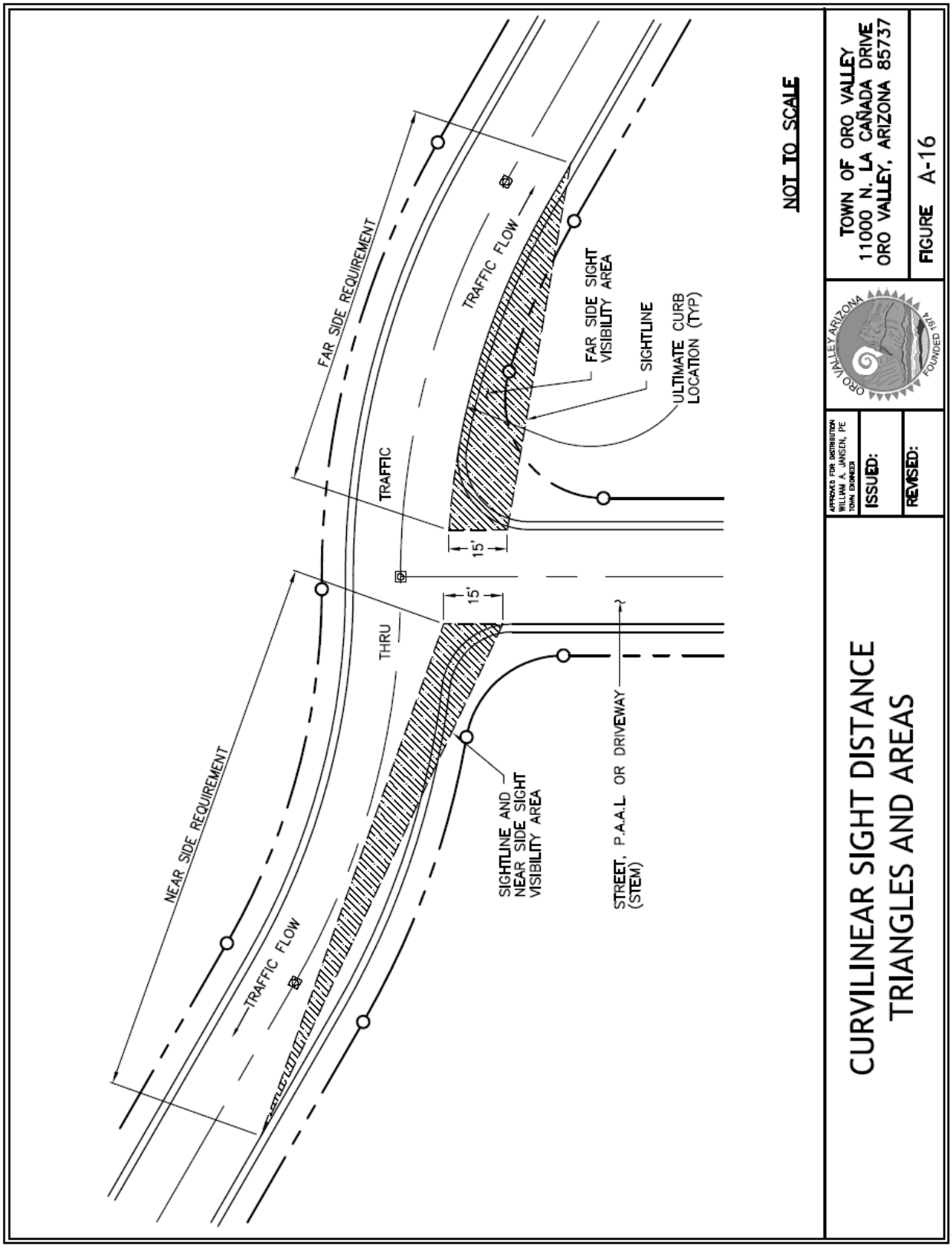
A-14 Typical Sight Distance Triangles



A-15 4-Way Intersection Sight Distance Triangles



A-16 Curvilinear Sight Distance Triangles



APPENDIX B: IMPROVEMENT PLAN CHECKLIST

NOTE: Contact Oro Valley Development Services at (520) 229-4800 or visit the Town of Oro Valley web site for the most recent updates.

GENERAL ITEMS

- ☐ 1. A legible P.E. stamp and registered engineer's signature must be provided on each sheet.
- ☐ 2. All sheets must be numbered.
- ☐ 3. All necessary details must be included on the plans.
- ☐ 4. The lettering must be appropriately sized (minimum 0.125 except for reference data at 0.10 min.)
- ☐ 5. The plans must adhere to the Oro Valley Subdivision Street Standards.
- ☐ 6. The plans must be in compliance with the Town of Oro Valley Grading Ordinance.
- ☐ 7. Each sheet must include the scale, contour interval and north arrow, where applicable. Every effort should be made to have north oriented to the top of the sheet; however, if the north arrow shall point downward, prior staff approval will be necessary. In the case of multiple sheets, the north orientation shall be the same on all sheets.
- ☐ 8. All items not to scale must be labeled "NTS".
- ☐ 9. All off-site easements must be recorded prior to improvement plan approval.
- ☐ 10. A copy of the Arizona Department of Environmental Quality's (ADEQ) N.O.I. for projects 1 acre or greater, and Stormwater Pollution Prevention Plan for projects of any size, must be provided prior to the issuance of a grading permit.
- ☐ 11. The following documents must be approved and on file with the Town of Oro Valley:
  - ☐ a. Archeological Clearance
  - ☐ b. Hydrology Report (Rip-rap sizing calculations will be provided.)
  - ☐ c. Salvage Plan and Landscape Plan
  - ☐ d. Geotechnical Report (including pavement design report). If the pavement design is revised during construction, an as-built pavement section shall be provided to be included with the approved plans.

DETAIL SHEETS

- ☐ 12. All necessary cross-sections must be shown (roadway and drainage).
  - ☐ a. Roadway cross-sections must correspond to the preliminary plat.
  - ☐ b. Drainage cross-sections must correspond to the approved Hydrology Report. Hydraulic data shall be provided with each section. (Q100, Depth, Slope and Velocity.)
- ☐ 13. All details must be correctly referenced.
  - a. From sheet to sheet.
  - b. From accepted/adopted standard literature.
- ☐ 14. The pavement design and slope treatment must correspond to the soils report. If these items were not included in the approved soils report, they must be submitted at this time. A note shall be provided stating slope stabilization and slope treatment requirements.
- ☐ 15. Typical lot drainage plan or spot elevations and flow arrows indicating lot drainage on each lot will be provided except in the case of custom lot grading.

COVER SHEET

☐ 16. Project Title must be centered at the top and contain:
   a. Project name
   b. Number of lots (if applicable)
   c. Phasing (if applicable)
   d. Public or Private streets
   e. Oro Valley case number
   f. Type of Plan(s) (ie. Grading, paving, sewer, etc.)

☐ 17. Symbol Legend must be provided.

☐ 18. Sheet Index which lists each sheet content must be provided; for example:

Sheet Index

Cover Sheet 1
Grading Plan 2
Water Plan 3

☐ 19. Location Map must be provided in the upper right-hand corner and must include:
   a. Area showing, "This Project"
   b. Scale (3"=1 mile) and north arrow
   c. Brief legal description

☐ 20. Engineer Identification must include:
   a. Company Name
   b. Address
   c. Telephone Number

☐ 21. Developer/Owner Identification must include:
   a. Name
   b. Address
   c. Telephone Number

☐ 22. General Notes must be provided when necessary.

☐ 23. Oro Valley Grading Notes and Paving Notes (attached) must be provided. Any deviation from these notes shall require the approval of the Oro Valley Public Works Department.

☐ 24. Project Overview Plan shall be provided and must contain:
   a. Scale (no smaller than 1"=400')
   b. Street names
   c. Phase lines
   d. Lot numbers
   e. Sheet index

☐ 25. Vertical and horizontal bench datum must be provided.

☐ 26. Acceptance block/date must be provided for:
   a. Town of Oro Valley
   b. P.C.W.W.M.
   c. Others as needed

☐ 27. Design Certification Statement, if Design Certification, must be shown and executed.

- ☐ 28. List of all PC/COT Details being referenced must be provided (include modification notes where applicable).
- ☐ 29. Excavation quantities must be provided. (May be noted as approximate.)

PLAN AND PROFILE SHEETS (PAVING OR GRADING)

PAVING PLANS

- ☐ 30. All uncurbed returns must have concrete headers.
- ☐ 31. Uncurbed returns must have a minimum 40-foot radius. Curbed returns must have a minimum 25-foot radius. Radii shall be noted at all locations.
- ☐ 32. Cul-de-sacs must meet or exceed minimum radius requirements per the Oro Valley Subdivision Street Standards.
- ☐ 33. The maximum grade break allowed without a vertical curve shall be 1.00%.
- ☐ 34. The turning radius must meet the minimum requirements for the design vehicle as approved on the preliminary plat or development plan.
- ☐ 35. "Trim, tack and join to existing pavement" shall be provided where applicable.
- ☐ 36. Centerline bearings, distances and curve data must be provided.
- ☐ 37. Survey monuments must be provided:
  - ☐ a. At all P.C.'s and P.T.'s
  - b. Cul-de-sac radius points (R.P. of eyebrow, if a non-conforming design)
  - c. Intersections of all public streets
- ☐ 38. Handrails must be shown for all necessary areas.
- ☐ 39. All centerline grades must be shown in profile.
- ☐ 40. All vertical curve data must be shown.
- ☐ 41. Existing ground shall be shown in profile.
- ☐ 42. All points of change must be shown by station and elevation in plan and profile.
- ☐ 43. Vertical curves must meet Town standards.
- ☐ 44. "Tick marks" must be provided at 100-foot stations for road centerlines.
- ☐ 45. Warp sections shall be shown in profile.
- ☐ 46. Superelevation sections shall be shown in profile with elevations at gutter (left or right) given at all transition points, high points, low points and points relative to a centerline vertical curve, when applicable.

GRADING PLANS

- ☐ 47. Detention/retention information must be addressed:
  - a. Volume
  - b. WSEL
- ☐ 48. Detention/retention barrier must be provided per PCDOT/FCD Stormwater Detention/Retention Manual requirements.
- ☐ 49. Filter fabric should be placed under all hand placed and dumped rip-rap.
- ☐ 50. Plans must conform with the Grading Ordinance and/or HDZ
  - ☐ a. Cut and fill slopes and heights must conform.
    1. Slope ratio (for proper mitigation)
  - ☐ b. All grading limits must be shown.

- ☐ c. Finish grades on all pads must be shown.
- ☐ d. F.F.E. of all buildings on flood prone lots must be provided.
- ☐ e. For all sites greater than five acres, 100 feet of additional topography outside the grading limits will be provided.
- ☐ 51. Sight visibility triangles will be shown and the area within the sight visibility triangle shall be free of obstructions.
- ☐ 52. All culverts must show:
  - ☐ a. Invert elevations
  - ☐ b. Size and type
  - ☐ c. Length and skew
- ☐ 53. Profiles of culvert crossings when being constructed with the grading, shall be provided.
- ☐ 54. Culvert crossings shall be shown on road profiles (relative to street centerline).
- ☐ 55. Post-development 100-year floodplain limits must be provided. Developed WSEL sections shall be shown.
- ☐ 56. Post-development concentration points shall be shown and developed Q100 drainage data shall be provided for each point.
- ☐ 57. Existing contours, and proposed contours when applicable, shall be identified at frequent intervals. Topography shall be accurate and legible.
- ☐ 58. A table of minimum F.F.E. for flood prone lots shall be provided. Minimum F.F.E. shall be WSE + 1 foot.

BOTH PAVING AND GRADING PLANS

- ☐ 59. All adjacent offsite parcels must be referenced.
  a.Show proposed lot lines, subdivision name and current zoning or,
  b.Identify as unsubdivided and provide current zoning.
- ☐ 60. If flow is other than continuous at left and right gutter, flow arrows shall be shown and water must flow as directed by plan.
- ☐ 61. 100-year Q's must be noted at:
  - a. All dip crossings
  - b. All culverts
- ☐ 62. Longitudinal grades and cross slopes must be verified:
  - ☐ a. They must be correctly plotted.
  - ☐ b. They must be calculated correctly.
  - ☐ c. Grade break points, high points, low points, and the corresponding elevations will be shown.
- ☐ 63. The minimum centerline and flowline at gutter longitudinal slopes shall be 0.5%, or as approved by Town Engineer.
- ☐ 64. "Begin" and "End Project" shall be noted where necessary.
- ☐ 65. Lot access locations as approved or designated on the preliminary plat or development plan must be shown.

APPENDIX C: TYPE II GRADING PERMIT CHECKLIST

A pre-construction meeting must be arranged prior to issuance of a grading permit. All items listed below, must be approved (A) and/or on file (F) to receive a grading permit, and completed prior to scheduling a pre-construction conference.

Owner/ Developer _____ Grading Permit # _____
Project Name _____ OV# _____
Engineer / Agent _____ Phone _____

- ☐ (F) Proof of review fee payment, date paid: _____
- ☐ (F) Archeological Clearance Letter
- ☐ (F) Soils report
- ☐ (F) Pavement design report
- ☐ (F) Final Hydrology Report (2 copies)
- ☐ (F) 404 Compliance correspondence paperwork
- ☐ (F) ADEQ N.O.I. (for disturbance of 1 acre or greater site)
- ☐ (A) Stormwater Pollution Prevention Plan (EPA compliant for all development)
- ☐ (F) Approved Improvement Plans: 5 (subdivision) or 7 (commercial) blueline sets of civil plans including PPP sheets
- ☐ (F) Completed Grading Permit Application
- ☐ (A) Construction Bond Estimate: (amount: $ _____)
- ☐ (F) Construction Bond, date received: _____
- ☐ (A) Restoration Bond Estimate: (amount: $ _____)
- ☐ (F) Restoration Bond, date received: _____
- ☐ (A) Landscape Bond Estimate: (amount: $ _____)
- ☐ (F) Landscape Plan/Landscape Bond, date received: _____
- ☐ (A) Approved Public Water Plans (Oro Valley Water Utility)
- ☐ (F) Copies of Recorded Easements/Letters of Agreement
- ☐ (F) Executed Assurances
- ☐ (F) Floodplain Use Permit, if required for project
- ☐ (A) Salvage Per Approved Salvage Plan
- ☐ (A) Grading Limits staking accepted by Zoning Inspector
- ☐ (F) Grading Permit fee (amount: $ _____)

APPENDIX D: GENERAL GRADING NOTES

1. ALL MATERIALS AND WORKMANSHIP ARE TO BE IN ACCORDANCE WITH PIMA COUNTY/CITY OF TUCSON STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS (PC/COT SSPI), EDITION OF 2003, EXCEPT AS MODIFIED HEREBY.

2. ALL CONSTRUCTION AND TESTING METHODS SHALL BE IN CONFORMANCE WITH PC/COT SSPI, EDITION OF 2003, EXCEPT AS MODIFIED HEREBY.

3. ALL WORK SHALL BE IN CONFORMANCE TO GRADING STANDARDS, CHAPTER 15 OF THE ORO VALLEY ZONING CODE REVISED.

4. EXCAVATION AND BACKFILL FOR STRUCTURES SHALL CONFORM TO PC/COT SSPI, SECTION 203-5.

5. ALL CONCRETE SHALL CONFORM TO PC/COT SSPI, SECTION 1006, CLASS S, 3,000-PSI COMPRESSIVE STRENGTH AT 28 DAYS, UNLESS OTHERWISE SPECIFIED.

6. A STAMPED SET OF APPROVED PLANS SHALL BE KEPT IN AN EASILY ACCESSIBLE LOCATION ON THE JOB SITE AT ALL TIMES OR DURING CONSTRUCTION.

7. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.

8. CONTRACTOR SHALL CALL BLUE STAKE (1-800-782-5348) TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

9. CONTRACTORS SHALL OBTAIN ALL PERMITS REQUIRED BY GOVERNMENTAL AGENCIES.

10. UPON COMMENCEMENT OF WORK, TRAFFIC CONTROL DEVICES SHALL BE POSTED AND MAINTAINED BY THE CONTRACTOR UNTIL SUCH TIME AS THE WORK IS COMPLETED. ALL WARNING SIGNS, BARRICADES, ETC., SHALL BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES ADOPTED BY THE STATE OF ARIZONA PURSUANT TO A.R.S 28-650.

11. IF UNANTICIPATED CONDITIONS ARE ENCOUNTERED DURING THE COURSE OF CONSTRUCTION AND ARE BEYOND THE SCOPE OF THE DESIGN, THE ENGINEER SHALL SUBMIT THE NECESSARY REVISED OR SUPPLEMENTAL IMPROVEMENT PLANS FOR REVIEW AND APPROVAL BY THE TOWN OF ORO VALLEY PRIOR TO SUCH REVISONS/CHANGES BEING MADE IN THE FIELD.

12. ALL STATIONING SHOWN ON PLAN AND PROFILE ARE ALONG CONSTRUCTION CENTERLINE UNLESS OTHERWISE NOTED.

13. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CARE AND MAINTENANCE OF EXISTING IMPROVEMENTS AND VEGETATION IN THE WORK AREA. PAVEMENT, CURBS, CART PATHS AND ANY OTHER OBSTRUCTIONS DAMAGED DURING CONSTRUCTION ARE TO BE REPLACED BY THE CONTRACTOR. ANY UNDERGROUND PIPES, IRRIGATION LINES, IRRIGATION CONTROLS, DRAINS, STRUCTURES, OR OBSTRUCTIONS NOT SHOWN ON THESE PLANS SHALL BE MOVED, ALTERED, OR REPAIRED BY THE CONTRACTOR WHEN ENCOUNTERED, AS DIRECTED BY THE ENGINEER, AND IS A DEFINITE PART OF THIS PROJECT.

14. ACCEPTANCE OF THESE PLANS DOES NOT CONSTITUTE OR IMPLY ACCEPTANCE OF ANY OF THE FOLLOWING:

    a) WALL(S), RETAINING OR OTHER TYPE(S).

    b) ANY REINFORCED CONCRETE STRUCTURE(S).

    c) ANY EMBANKMENT(S) WHOSE PRIMARY PURPOSE IS TO FUNCTION AS A RETENTION/DETENTION STRUCTURE.

    THE ITEMS LISTED ABOVE ARE APPROVED FOR LOCATION ONLY. SEPARATE PLAN CHECKS AND PERMITS ARE REQUIRED, ALL IN ACCORDANCE WITH THE APPLICABLE CODES OF THE TOWN OF ORO VALLEY.

15. THE CONTRACTOR SHALL GIVE FORTY-EIGHT (48) HOURS NOTICE WHEN HE SHALL REQUIRE THE SERVICES OF THE ENGINEER OR ANY OTHER PERSON PROPERLY AUTHORIZED FOR SUCH PURPOSE FOR LAYING OUT ANY PORTION OF THE WORK. HE SHALL ALSO DIG ALL STAKE HOLES NECESSARY TO GIVE LINE AND LEVELS AND SHALL PROVIDE ASSISTANCE CALLED FOR BY THE ENGINEER OR HIS ASSISTANTS UPON ANY PART OF THE WORK WHENEVER SO REQUESTED, AND SHALL PRESERVE ALL STAKES SET FOR THE LINES, LEVELS OR MEASUREMENTS OF THE WORK IN THEIR PROPER PLACES UNTIL AUTHORIZED TO REMOVE THEM BY THE ENGINEERS. ANY EXPENSE INCURRED IN REPLACING ANY STAKES WHICH THE CONTRACTOR OR HIS SUBORDINATES MAY HAVE FAILED TO PRESERVE SHALL BE CHARGED TO THE CONTRACTOR.

16. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FURNISH, HAUL AND APPLY ALL WATER REQUIRED FOR COMPACTION AND FOR THE CONTROL OF DUST FROM CONSTRUCTION ACTIVITY. THE COST THEREOF IS TO BE INCLUDED IN THE GRADING CONSTRUCTION PRICE.

17. IT SHALL BE THE CONTRACTOR'S REPSPONSIBILITY TO FULLY COMPLY WITH ADEQ STORMWATER DISCHARGE PERMIT IN ACCORDANCE WITH THE REPORT AND POLLUTION PLANS PREPARED BY THE ENGINEER. THE COST THEREOF TO BE INCLUDED IN THE GRADING CONSTRUCTION PRICE.

18. BUILDING SITES SHALL BE CONSTRUCTED TO WITHIN 0.10 FOOT OF FINISH BUILDING PAD ELEVATIONS AS STAKED BY THE ENGINEER. STREETS AND PARKING AREAS SHALL BE CONSTRUCTED TO WITHING +0.10 FEET OF FINISH SUBGRADE AS STAKED BY THE ENGINEER.

19. A REPORT OF SOILS INVESTIGATIONS, INCLUDING RECOMMENDATIONS FOR GRADING PROCEDURES HAS BEEN PREPARED BY _____ DATED _____ JOB NO. _____ FOR THIS PROJECT. EARTHWORK SHALL CONFORM TO THE RECOMMENDATIONS CONTAINED IN SAID REPORT AND ANY AMENDMENTS MADE THERETO.

20. THE SOILS ENGINEER SHALL OBSERVE, INSPECT AND TEST ALL CONSTRUCTION OPERATIONS, INCLUDING BUT NOT LIMITED TO: CLEARING, GRUBBING, SUBGRADE PREPARATION, STRUCTURAL, TRENCH EXCAVATION AND BACKFILL, MATERIAL TESTING, TOGETHER WITH PLACEMENT OF FILL. SAID ENGINEER SHALL CERTIFY IN WRITING, THAT ALL SOILS OPERATIONS AND MATERIALS USED FOR THIS DEVELOPMENT WERE PERFORMED IN ACCORDANCE WITH THE RECOMMENDATIONS AS SET FORTH IN THE GEOTECHNICAL INVESTIGATION OF RECORD AND ARE IN CONFORMANCE WITH THE ACCEPTED PLANS AND SPECIFICATIONS. CERTIFICATION, IN WRITING, IS TO BE RECEIVED BY THE TOWN OF ORO VALLEY PRIOR TO THE REQUEST FOR FINAL INSPECTION AND RELEASE OF ASSURANCES.

21. GRADING BOUNDARIES SHALL BE CLEARLY MARKED, AND ALL WORK WILL BE CONFINED TO APPROVED PROJECT LIMITS AS SHOWN ON THESE PLANS.

22. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR THE SURVEYOR PROVIDING THE CONSTRUCTION LAYOUT TO VERIFY THE BENCHMARK AND COMPARE THE SITE CONDITIONS WITH THE PLANS AND SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OBSERVED. SHOULD ANY BENCHMARK, GRADE OR DESIGN INDICATED ON THE PLANS BE SUSPECT, THE ENGINEER SHALL BE NOTIFIED OF SAID BENCHMARK, GRADE OR DESIGN PROBLEM AT LEAST TWENTY-FOUR HOURS BEFORE CONSTRUCTION IS SCHEDULED TO BEGIN ON THE AFFECTED AREA.

23. IT SHALL BE THE SOLE RESPONSIBILITY OF THE OWNER(S), THEIR SUCCESSORS OR ASSIGNS, (AND/OR THEIR CONTRACTOR, THEIR SUCCESSORS OR ASSIGNS AS APPLICABLE) TO PURSUE ANY NEGOTIATIONS, OBTAIN ANY AGREEMENTS AND/OR PERMITS, ETC., FROM ALL NECESSARY OWNERS, PRIVATE AND/OR GOVERNMENTAL AGENCIES IN CHARGE OF PROPERTIES AND/OR RIGHTS-OF-WAY ADJACENT TO (OR NEIGHBORING) THIS PROJECT,

THAT MAY BE REQUIRED TO DO ANY WORK (CONSTRUCTION, ACCESS, MODIFICATIONS, GRADING, DRAINAGE, STRUCTURES, ROADS, ETC.,) ENCROACHING OR AFFECTING - DIRECTLY OR INDIRECTLY - ON THESE ADJACENT PROPERTIES AND RIGHTS-OF-WAY IN ANY CONCEIVABLE MANNER, REGARDLESS OF WHETHER OR NOT THIS WORK IS SHOWN OR DESCRIBED ON THESE PLANS (OR) ON THIS PLAT.

24. THE PROFESSIONAL ENGINEER OF RECORD SHALL SUBMIT AS-BUILT RECORD DRAWINGS AND CERTIFY IN WRITING THAT ALL IMPROVEMENTS, WHETHER PRIVATE OR PUBLIC, HAVE BEEN CONSTRUCTED, PLACED, INSTALLED, ETC. IN SUBSTANTIAL CONFORMANCE WITH THE ACCEPTED PLANS FOR THIS DEVELOPMENT. CERTIFICATIONS IN WRITING AND THE AS-BUILT RECORD DRAWINGS ARE TO BE RECEIVED BY THE TOWN OF ORO VALLEY A MINIMUM OF TWO (2) WEEKS PRIOR TO THE REQUEST FOR CERTIFICATES OF OCCUPANCY AND/OR FINAL INSPECTION BY THE DEPARTMENT OF PUBLIC WORKS AND THE RELEASE OF ASSURANCES, EXCEPT FOR MODEL HOMES INTENDED TO BE USED FOR SALES PURPOSES. IF THE PROJECT IS PHASED THE ABOVE PERTAINS TO EACH PHASE.

25. THE BASIS OF ELEVATION IS A _____.

26. BENCH MARKS
    BENCH MARKS NO. 1 IS A _____. SAID BENCHMARK NO. 1 HAS AN ELEVATION OF _____.

    BENCHMARK NO. 2 IS A _____. SAID BENCHMARK NO. 2 HAS AN ELEVATION OF _____.

27. OWNER/DEVELOPER:

28. ALL EASEMENTS MUST BE ACQUIRED BY OWNER/BUILDER PRIOR TO CONSTRUCTION.

APPENDIX E: GENERAL PAVING NOTES

1. ALL MATERIALS AND WORKMANSHIP ARE TO BE IN ACCORDANCE WITH PIMA COUNTY/CITY OF TUCSON STANDARD SPECIFICATIONS FOR PUBLIC IMPROVEMENTS (PC/COT SSPI), EDITION OF 2003, EXCEPT AS MODIFIED HEREBY.

2. ALL CONSTRUCTION AND TESTING METHODS SHALL BE IN CONFORMANCE WITH PC/COT SSPI, EDITION OF 2003, EXCEPT AS MODIFIED HEREBY.

3. EXCAVATION AND BACKFILL FOR STRUCTURES SHALL CONFORM TO PC/COT SSPI, SECTION 203-5.

4. EARTHWORK, EXCEPT AS MODIFIED BY THE SOILS REPORT OF RECORD, SHALL CONFORM TO PC/COT SSPI, SECTION 203.

5. AGGREGATE BASE COURSE SHALL CONFORM TO PC/COT SSPI, SECTION 303.

6. ASPHALTIC CONCRETE SHALL CONFORM TO PC/COT SSPI, SECTION 406, ASPHALTIC CONCRETE MIXTURE No. 2 SPECIFICATIONS.

7. ALL CONCRETE SHALL CONFORM TO PC/COT SSPI, SECTION 1006, CLASS S, 3,000-PSI COMPRESSIVE STRENGTH AT 28 DAYS, UNLESS OTHERWISE SPECIFIED.

8. A STAMPED SET OF APPROVED PLANS SHALL BE KEPT IN AN EASILY ACCESSIBLE LOCATION ON THE JOB SITE AT ALL TIMES OR DURING CONSTRUCTION.

9. CONTRACTOR SHALL COMPLY WITH ALL APPLICABLE OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION REGULATIONS.

10. CONTRACTOR SHALL CALL BLUE STAKE (1-800-782-5348) TO VERIFY LOCATION OF ALL UTILITIES PRIOR TO COMMENCEMENT OF CONSTRUCTION.

11. CONTRACTOR SHALL OBTAIN ALL PERMITS REQUIRED BY GOVERNMENTAL AGENCIES.

12. CONTRACTOR SHALL INSTALL STREET SIGNS IN ACCORDANCE WITH THE TOWN OF ORO VALLEY SUBDIVISION STREET STANDARDS – SIGNAGE POLICY.

13. PAVING CONTRACTOR SHALL ADJUST BOTH EXISTING AND NEW WATER VALVES, BOX COVERS, WATER METER BOXES, SANITARY SEWER MANHOLES AND CLEANOUT RINGS AND COVERS, TELEPHONE AND ELECTRIC MANHOLE RING AND COVERS TO THE NEW FINISHED GRADE.

14. UPON COMMENCEMENT OF WORK, TRAFFIC CONTROL DEVICES SHALL BE POSTED AND MAINTAINED BY THE CONTRACTOR UNTIL SUCH TIME AS THE WORK IS COMPLETED. ALL WARNING SIGNS, BARRICADES, ETC., SHALL BE IN ACCORDANCE WITH THE MANUAL OF UNIFORM TRAFFIC CONTROL DEVICES ADOPTED BY THE STATE OF ARIZONA PURSUANT TO A.R.S. 28-650.

15. IF UNANTICIPATED CONDITIONS ARE ENCOUNTERED DURING THE COURSE OF CONSTRUCTION AND ARE BEYOND THE SCOPE OF THE DESIGN, THE ENGINEER SHALL SUBMIT THE NECESSARY REVISED OR SUPPLEMENTAL IMPROVEMENT PLANS FOR REVIEW AND APPROVAL BY THE TOWN OF ORO VALLEY PRIOR TO SUCH REVISIONS/CHANGES BEING MADE IN THE FIELD.

16. ALL STATIONING SHOWN ON PLAN AND PROFILE ARE ALONG CONSTRUCTION CENTERLINE UNLESS OTHERWISE NOTED.

17. THE CONTRACTOR SHALL BE RESPONSIBLE FOR THE CARE AND MAINTENANCE OF EXISTING IMPROVEMENTS AND VEGETATION IN THE WORK AREA. PAVEMENT, CURBS, CART PATHS AND ANY OTHER OBSTRUCTIONS DAMAGED DURING CONSTRUCTION ARE TO BE REPLACED BY THE CONTRACTOR. ANY UNDERGROUND PIPES, IRRIGATION LINES, IRRIGATION CONTROLS, DRAINS, STRUCTURES, OR OBSTRUCTIONS NOT SHOWN ON THESE PLANS SHALL BE MOVED, ALTERED, OR REPAIRED BY THE CONTRACTOR WHEN ENCOUNTERED, AS DIRECTED BY THE ENGINEER, AND IS A DEFINITE PART OF THIS PROJECT.

18. ACCEPTANCE OF THESE PLANS DOES NOT CONSTITUTE OR IMPLY ACCEPTANCE OF ANY OF THE FOLLOWING:

    a) WALL(S), RETAINING OR OTHER TYPE(S).
    b) ANY REINFORCED CONCRETE STRUCTURE(S).
    c) ANY EMBANKMENT(S) WHOSE PRIMARY PURPOSE IS TO FUNCTION AS A RETENTION/DETENTION STRUCTURE.

    THE ITEMS LISTED ABOVE ARE APPROVED FOR LOCATION ONLY. SEPARATE PLAN CHECKS AND PERMITS ARE REQUIRED, ALL IN ACCORDANCE WITH THE APPLICABLE CODES OF THE TOWN OF ORO VALLEY.

19. THE CONTRACTOR SHALL GIVE FORTY-EIGHT (48) HOURS NOTICE WHEN THEY SHALL REQUIRE THE SERVICES OF THE ENGINEER OR ANY OTHER PERSON PROPERLY AUTHORIZED FOR SUCH PURPOSE FOR LAYING OUT ANY PORTION OF THE WORK. THEY SHALL ALSO DIG ALL STAKE HOLES NECESSARY TO GIVE LINE AND LEVELS AND SHALL PROVIDE ASSISTANCE CALLED FOR BY THE ENGINEER OR THEIR ASSISTANTS UPON ANY PART OF THE WORK WHENEVER SO REQUESTED, AND SHALL PRESERVE ALL STAKES SET FOR THE LINES, LEVELS OR MEASUREMENTS OF THE WORK IN THEIR PROPER PLACES UNTIL AUTHORIZED TO REMOVE THEM BY THE ENGINEERS.

ANY EXPENSE INCURRED IN REPLACING ANY STAKES WHICH THE CONTRACTOR OR THEIR SUBORDINATES MAY HAVE FAILED TO PRESERVE SHALL BE CHARGED TO THE CONTRACTOR.

20. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FURNISH, HAUL AND APPLY ALL WATER REQUIRED FOR COMPACTION AND FOR THE CONTROL OF DUST FROM CONSTRUCTION ACTIVITY. THE COST THEREOF IS TO BE INCLUDED IN THE GRADING CONSTRUCTION PRICE.

21. IT SHALL BE THE CONTRACTOR'S RESPONSIBILITY TO FULLY COMPLY WITH ADEQ STORMWATER DISCHARGE PERMIT IN ACCORDANCE WITH THE REPORT AND POLLUTION PLANS PREPARED BY THE ENGINEER. THE COST THEREOF TO BE INCLUDED IN THE GRADING CONSTRUCTION PRICE.

22. BUILDING SITES SHALL BE CONSTRUCTED TO WITHIN 0.10 FOOT OF FINISH BUILDING PAD ELEVATIONS AS STAKED BY THE ENGINEER. STREETS AND PARKING AREAS SHALL BE CONSTRUCTED TO WITHIN 0.10 FEET OF FINISH SUBGRADE AS STAKED BY THE ENGINEER.

23. A REPORT OF SOILS INVESTIGATIONS, INCLUDING RECOMMENDATIONS FOR GRADING PROCEDURES HAS BEEN PREPARED BY _____DATED_____ JOB NO. _____ FOR THIS PROJECT. EARTHWORK SHALL CONFORM TO THE RECOMMENDATIONS CONTAINED IN SAID REPORT AND ANY AMENDMENTS MADE THERETO.

24. THE SOILS ENGINEER SHALL OBSERVE, INSPECT AND TEST ALL CONSTRUCTION OPERATIONS, INCLUDING BUT NOT LIMITED TO: CLEARING, GRUBBING, SUBGRADE PREPARATION, STRUCTURAL, TRENCH EXCAVATION AND BACKFILL, MATERIAL TESTING, TOGETHER WITH PLACEMENT OF FILL. SAID ENGINEER SHALL CERTIFY IN WRITING, THAT ALL SOILS OPERATIONS AND MATERIALS USED FOR THIS DEVELOPMENT WERE PERFORMED IN ACCORDANCE WITH THE RECOMMENDATIONS AS SET FORTH IN THE GEOTECHNICAL INVESTIGATION OF RECORD AND ARE IN CONFORMANCE WITH THE ACCEPTED PLANS AND SPECIFICATIONS. CERTIFICATION, IN WRITING, ARE TO BE RECEIVED BY THE TOWN OF ORO VALLEY PRIOR TO THE REQUEST FOR FINAL INSPECTION AND RELEASE OF ASSURANCES.

25. GRADING BOUNDARIES SHALL BE CLEARLY MARKED, AND ALL WORK WILL BE CONFINED TO APPROVED PROJECT LIMITS AS SHOWN ON THESE PLANS.

26. IT SHALL BE THE RESPONSIBILITY OF THE CONTRACTOR AND/OR THE SURVEYOR PROVIDING THE CONSTRUCTION LAYOUT TO VERIFY THE BENCHMARK AND COMPARE THE SITE CONDITIONS WITH THE PLANS AND SHALL NOTIFY THE ENGINEER OF ANY DISCREPANCIES OBSERVED. SHOULD ANY BENCHMARK, GRADE OR DESIGN INDICATED ON THE PLANS BE SUSPECT, THE ENGINEER SHALL BE NOTIFIED OF SAID BENCHMARK, GRADE

OR DESIGN PROBLEM AT LEAST TWENTY-FOUR HOURS BEFORE CONSTRUCTION IS SCHEDULED TO BEGIN ON THE AFFECTED AREA.

27. IT SHALL BE THE SOLE RESPONSIBILITY OF THE OWNER (S), THEIR SUCCESSORS OR ASSIGNS, (AND/OR THEIR CONTRACTOR, THEIR SUCCESSORS OR ASSIGNS AS APPLICABLE) TO PURSUE ANY NEGOTIATIONS, OBTAIN ANY AGREEMENTS AND/OR PERMITS, ETC., FROM ALL NECESSARY OWNERS, PRIVATE AND/OR GOVERNMENTAL AGENCIES IN CHARGE OF PROPERTIES AND/OR RIGHTS-OF-WAY ADJACENT TO (OR NEIGHBORING) THIS PROJECT, THAT MAY BE REQUIRED TO DO ANY WORK (CONSTRUCTION, ACCESS, MODIFICATIONS, GRADING, DRAINAGE, STRUCTURES, ROADS, ETC.) ENCROACHING OR AFFECTING – DIRECTLY OR INDIRECTLY - ON THESE ADJACENT PROPERTIES AND RIGHTS-OF-WAY IN ANY CONCEIVABLE MANNER, REGARDLESS OF WHETHER OR NOT THIS WORK IS SHOWN OR DESCRIBED ON THESE PLANS (OR) ON THIS PLAT.

28. THE PROFESSIONAL ENGINEER OF RECORD SHALL SUBMIT AS-BUILT RECORD DRAWINGS AND CERTIFY IN WRITING THAT ALL IMPROVEMENTS, WHETHER PRIVATE OR PUBLIC, HAVE BEEN CONSTRUCTED, PLACED, INSTALLED, ETC. IN SUBSTANTIAL CONFORMANCE WITH THE ACCEPTED PLANS FOR THIS DEVELOPMENT. CERTIFICATIONS IN WRITING AND THE AS-BUILT RECORD DRAWINGS ARE TO BE RECEIVED BY THE TOWN OF ORO VALLEY A MINIMUM OF TWO (2) WEEKS PRIOR TO THE REQUEST FOR CERTIFICATES OF OCCUPANCY AND/OR FINAL INSPECTION BY THE DEPARTMENT OF PUBLIC WORKS AND THE RELEASE OF ASSURANCES, EXCEPT FOR MODEL HOMES INTENDED TO BE USED FOR SALES PURPOSES. IF THE PROJECT IS PHASED THE ABOVE PERTAINS TO EACH PHASE.

29. THE TOWN WILL, UPON RECEIPT OF ALL NECESSARY CERTIFICATIONS AS OUTLINED ON THE IMPROVEMENT PLANS AND FINAL PLAT, PERFORM A FIELD REVIEW OF THE DEVELOPMENT. FIELD CONDITIONS, DESIGN OVERSIGHTS, ETC., MAY REQUIRE ADDITIONAL WORK AND/OR IMPROVEMENTS AS A RESULT OF SAID REVIEW.

30. THE BASIS OF BEARINGS FOR THIS PROJECT IS _____.

31. THE BASIS OF ELEVATION IS A _____.

32. BENCHMARKS

    BENCHMARK NO. 1 IS A _____. SAID BENCHMARK NO. 1 HAS AN ELEVATION OF _____.

    BENCHMARK NO. 2 IS A _____. SAID BENCHMARK NO. 2 HAS AN ELEVATION OF _____.

33. OWNER/DEVELOPER

34. ALL EASEMENTS MUST BE ACQUIRED BY OWNER/BUILDER PRIOR TO CONSTRUCTION.

35. DESIGN SPEED = _____

    DESIGN VEHICLE = _____

APPENDIX F: ROADWAY ACCEPTANCE PROCEDURES

DEPARTMENT OF PUBLIC WORKS
OPERATING PROCEDURES AND DIRECTIVES NO. 29

To: **Department of Public Works Staff**

From: **William A. Jansen, Town Engineer**

Date: **March 27, 2003**

Subject: **Acceptance of Public Improvements**

The purpose of this operating procedure is to clearly define the roles and expectation of the Public Works Department in regards to the acceptance for maintenance of deeded or dedicated public streets.

Acceptance of Public Improvements.

Once items 1-5 as defined below are submitted and, upon due notice from the developer of presumptive completion of all public improvements as called for on the approved public works improvement plans and required under the provisions of this Code, the Town Engineer will make an inspection. If all construction is found to be completed to his satisfaction, then that inspection shall constitute the final inspection and the Town Engineer will accept the public improvements for maintenance by the Town, upon receipt of the following items:

1. **Final As-Built Plans**

The developer shall submit final as-built plans drawn in India ink, or a reproducible mylar, showing all street, drainage, and sewer improvements constructed, and copies of final as-built plans showing all electrical, lighting, gas, telephone, cable television and water improvements constructed within public right-of-way or public easements for inclusion in the Town's permanent files. Final as-built plans shall show the approved design conditions and reflect any field changes approved by the Town Engineer and the developer's engineer. The developer's engineer shall certify that the final plans represent as nearly as possible the actual field conditions of all improvements as constructed. Reproducible copies shall be defined as a copy prepared using an archival photographic image process conforming to standards established by the American National Institute on a polyester material .004 of an inch thick with a matte finish. Paper sepias are not considered acceptable reproducible copies.

2. **Affidavit Regarding Settlement of Claims**

The developer shall certify that all bills for labor and materials incorporated in the work have been paid and agree to indemnify and save harmless the Town against any and all liens, claims of liens, suits, actions, damages, charges, and expenses whatsoever, which the Town may suffer arising out of the failure of the developer to pay for all labor performed and materials furnished in the construction of the required improvements.

3. **Guarantee**

The developer and contractor shall guarantee all work against defective workmanship or materials for a period of one year from the date of its final acceptance by the Town Engineer. Upon final acceptance of the public improvements by the Town Engineer, he will notify the developer, in writing, of this acceptance as of the date of final acceptance.

4. **Affidavit of Cost**

The developer shall submit to the Town engineer the total costs of all dedicated public improvements. Said costs shall be detailed on a bid schedule format and certified by the developer.

5. **Pavement Preservation Bond**

Prior to the acceptance of the streets for maintenance, the developer shall post a cash assurance or other assurance acceptable to the Town Engineer in an amount determined by the Town Engineer, to ensure that construction defects are repaired and an acceptable surface treatment is performed upon cessation of new home construction within the subdivision. If improvements are phased, the amount of the assurance shall be based upon the phase under construction. The cash assurance and accrued interest will be returned to the developer upon completion of repairs of deficiencies identified and a surface treatment acceptable to the Town Engineer is provided. In the event that issuance of building permits for new homes at the subdivision is discontinued for six months, or immediate repairs not performed by the developer are necessary, the Town may utilize the assurance to perform required maintenance.

6. **Street Sweeping**

The developer, his successors or assigns shall be responsible for street sweeping until new construction activities have ceased and the surface treatment has been placed on the streets.

7. **Acceptance of Arterial Streets and Off-Site Street Improvements**

Upon the completion of construction of arterial streets and off-site street improvements the developer shall submit as-built plans for those improvements, certified by the engineer of record for the project. The as-built plans shall show the approved design conditions and reflect any field changes approved by the Town Engineer and the developer's engineer. The developer's engineer shall certify that the final plans represent as nearly as possible the actual field conditions of all

improvements as constructed. The as-built plans will be field-reviewed by Department of Public Works staff and a list will be generated noting discrepancies, if any. After those discrepancies have been addressed and resolved to the satisfaction of the Town Engineer the improvements shall be accepted for maintenance by the Town. The developer and contractor shall guarantee all work against defective workmanship or materials for a period of one year from the date of its final acceptance by the Town Engineer. Upon final acceptance of the public improvements by the Town Engineer, he will notify the developer, in writing, of this acceptance as of the date of final acceptance.

APPENDIX G: STANDARD LICENSE AGREEMENT

LICENSE AGREEMENT

THIS LICENSE made and entered into by and between the Town of Oro Valley, Pima County, Arizona, a Body Politic, hereinafter called the LICENSORS and_____hereinafter called the LICENSEE.

WITNESSETH:

THAT WHEREAS, the licensors are the owners of the land hereinafter described, said land having been dedicated as _____
WHEREAS, a portion of said right-of-way is requested to be encroached upon by _____
_____
_____

Licensee requests authorization for the encroachments.

WHEREAS, the Licensee required from the Licensors to encroach into said right-of-way;

NOW, THEREFORE, for and in consideration of the sum of One ($1.00) Dollar and the faithful performance by the Licensee or his heirs and assigns; the Licensors do hereby grant and demise to the Licensee, his heirs and assigns, a permit, license and privilege, for the period of time hereinafter mentioned and subject to the conditions hereinafter contained, to enter in upon the following described land of the Licensors, in Exhibit "A" attached.

THIS LICENSE is subject to the following terms and conditions, to-wit:

1. This license is granted for the purpose of _____
   _____
   _____
2. The Licensee shall only be permitted to use the aforesaid land for the stated purpose.
3. Notwithstanding any other agreement or condition, it is expressly agreed that the license may be revoked by the Licensors upon NINETY (90) DAYS WRITTEN NOTICE to the Licensee.
4. That when said License is revoked, the Licensee will remove the encroachments from said right-of-way, at no expense to the Licensors and to the satisfaction of the Licensors and will restore the right-of-way to the pre-license condition or as may be mutually agreed.
5. That nothing herein contained shall be construed as granting title to the land belonging to the Licensors, or as vesting in the Licensee any right of entry to said land after the termination of this License.

6. This License may be transferred to the Licensee's successors and assigns upon written approval of the Licensors subsequent to written request of the Licensee. This License shall run for a period of 25 years.
7. That the Licensee assumes the responsibility and all liability for any injury or damage to said highway, or to any person while using said highway in a lawful manner caused by or arising out of the exercise of this Permit or License.
8. That all work done shall be at the sole cost and expense of the Licensee.
9. The Licensee shall indemnify, defend and hold harmless the Licensors, its officers, departments, employees and agents from and against any and all suits, actions, legal or administrative proceedings, claims, demands or damages of any kind or nature arising out of this contract which are attributed to any act or omission of the Licensee, it's agents, employees, or any one acting under its direction, control, or on its behalf, or any act or omission of the Licensors, its officers, departments, employees and agents, whether intention or negligent, in connection with or incident to this license.
10. The Licensee will obtain a $1,000,000.00 public liability insurance policy to cover those encroachments within the Licensors right-of-way. Nothing contained herein shall preclude the requirements of additional insurance coverage in the event the Licensors so require. The Licensee or the Licensees successors shall maintain the said policy throughout the term of this License. This License will become null and void if the insurance lapses. A certificate of insurance will be supplied to the Licensors with the stipulation that the Insurance Company will notify the Licensors in writing, an intent to cancel the liability insurance. This notification shall be required no later than thirty (30) days prior to cancellation and Licensee is required to remove all encroachments at their expense within sixty (60) days of notification.
11. The licensee will abide by all applicable local, state and federal ordinances, statutes, and regulations.
12. Approval of this License is subject to compliance with all conditions and provisions of the approved plans and specifications, which by this reference are incorporated and made a part hereof.
13. Encroachments will be maintained by Licensee and shall not interfere with safe sight distance. Licensee will be responsible for Blue Stake locations of all underground encroachments, including, but not limited to, electric lines and irrigation systems.

IN WITNESS WHEREOF the parties hereto have caused this License Agreement to be executed, this_____day of_____, 2003.

LICENSOR
The Town of Oro Valley, an Arizona Municipal Corporation
_____ Paul H. Loomis, Mayor

ATTEST:

_____
Kathryn E. Cuvelier, Town Clerk

APPROVED AS TO FORM:

_____

Mark Langlitz, Town Attorney

LICENSEE

_____ By:

STATE OF ARIZONA)

) ss.

County of Pima)

SUBSCRIBED AND SWORN to before me this _____ day of _____, 200_ by _____ who is known to me or has satisfactorily been identified as _____ and is a duly authorized agent to sign on behalf of _____ on matters relating to real property.

_____

Notary Public

My Commission Expires: _____

APPENDIX H: TRAFFIC CALMING POLICY

TOWN OF ORO VALLEY

DEPARTMENT OF PUBLIC WORKS

TRAFFIC CALMING PROGRAM

MARCH 2002

TOWN OF ORO VALLEY
Department of Public Works
11000 N. La Cañada Drive
Oro Valley, Arizona 85737
(520) 229-4880 Fax (520) 229-4899

The Traffic Calming Program detailed in the following report is intended to provide guidance for traffic calming procedures for the Town of Oro Valley. This document is also intended to provide assistance to designers of Town streets by providing traffic calming designs that should be incorporated into the initial project design. Intelligent design of subdivision streets is the best way to provide traffic calming and thereby increasing the safety and livability of the Town's neighborhoods. Nothing in this plan is intended to restrict the inventiveness of the designer in the project street design by requiring specific traffic calming techniques but it is intended to require the focus of the designer on the issue.

The following Traffic Calming Program dated March 2002 is hereby incorporated into the Town of Oro Valley Subdivision Street Standards.

William A. Jansen, P.E., FASCE
Director of Public Works/Town Engineer
March 14, 2002

TOWN OF ORO VALLEY
Traffic Calming Program
May 2001

Section I, Introduction

Summary: The Town has regularly received requests from citizens concerning local residential streets regarding traffic operational problems. The most common request is to reduce the speed of traffic, which in some cases is traveling 10 to 15 mph above the posted speed limit. These residents are primarily concerned about safety. The second request is to reduce the number of motorists using particular local residential streets to bypass congestion on the arterial street system. Other communities in Arizona and elsewhere have successfully addressed these problems using a neighborhood traffic calming program.

Definition: The Traffic Calming Program has three elements: Pre-Development, Education/Enforcement, and Neighborhood Traffic Management. The best way to achieve traffic calming is to incorporate traffic calming methods in the subdivision at the design stage by the addition of traffic calming methods in the Development Standards. The second step is to address traffic operational complaints with Education/Enforcement. The last step, when all other methods are exhausted, is the Engineering Solution or Neighborhood Traffic Management.

Responsible Department: Pre-Development is addressed in the Oro Valley's Subdivision Street Standards which is published by the Public Works Department. Education/Enforcement will be administered by the Police Department and will address special programs to enhance education such as the speed display trailer and programs such as the "Keep Kids Alive Drive 25" to help enhance education. The Neighborhood Traffic Management Program will be administered by the Public Works Department and will address the Engineering Solution, including installation of traffic calming devices such as speed humps and traffic circles.

Resources Required: It is acknowledged that the traffic calming will have a cost for the Town associated with staff time. Any and all costs including the administration, design, and construction will be the responsibility of the property owner.

Report Organization: This report is divided into four sections: Introduction, Pre-Development, Education/Enforcement, and Neighborhood Traffic Management. Each section will have Policy and administrative procedures and resources required.

Section II, Development Standards

POLICY:

PURPOSE:
The purpose of these standards is to incorporate traffic calming methods in development standards in order to discourage cut-through traffic thereby reducing speed-related problems in proposed local subdivisions.

APPLICABILITY:
Traffic Calming Development Standards will be incorporated into the Oro Valley Subdivision Street Standards and all future subdivisions will be subject to these requirements.

POLICY:
Local streets should be discontinuous and generally should be interrupted with jogs and offsets resulting in an S-curve configuration. For R1-7 zoning, streets without curves should not exceed 600 feet. For R1-144 zoning, streets without curves should not exceed 900 feet. Curves re defined to have a minimum centerline radius of 250' and have a minimum arc length of 125'.

The intent of traffic calming is to minimize the potential cut-through traffic between major streets. Major streets are defined as arterials and collectors. Minimizing the potential cut-through traffic between major streets can be accomplished by preventing connections between major streets and/or, maximizing the travel distance between major streets.

In order to create discontinuous streets in a curvilinear street system that will discourage the cut-through traffic, four-way intersections should be avoided and replaced with short stretches of road ending in T-intersections and with circuitous routes. If four-way intersections are utilized, they shall be enhanced with a landscaped traffic circle or colored pavement/concrete at the crosswalks.

When safety is a concern, traffic engineering practices will supercede traffic calming practices.

ADMINISTRATIVE PROCEDURE:
The Department of Public Works will be responsible for reviewing subdivision proposals for compliance with the traffic calming development standards at the plan submittal phase for subdivisions. Public Works and Planning and Zoning can work with the Police Department when reviewing plans and note if adequate traffic calming methods are being incorporated into the development. If the plan is deficient, changes should be made at this stage rather than adopting a "wait-and-see" policy and making changes at build-out when complaints about traffic surface.

Section III, Education/Enforcement

POLICY:

PURPOSE:
The purpose of this policy is to set forth the conditions under which the Oro Valley Police Department, Town of Oro Valley and individual neighborhoods will cooperatively work together to develop and maintain the Education and Enforcement criteria for the Neighborhood Traffic Management Program. (NTMP)

APPLICABILITY:

In the Education and Enforcement phase, the Police Department will maintain their current policies of enforcement and assist with the education of the communities requesting assistance.

POLICY:
The Police Department at the request of the designated contact person from the OVDPW, will assist with the gathering of data, program development, education and enforcement on roadways that are under consideration of NTMP. The initiation of the program shall come from the public to either the OV NTMP Manager / designee or from the OVPD designee. The two departments shall evaluate the request and the necessary actions from each department will be initiated. This relationship and continuous open lines of communication are critical and will be maintained between the departments and community representatives.

ADMINISTRATIVE PROCEDURE:

1. Subsequent to a request from a neighborhood representative, the Police Department, implementing the SMART trailer, will respond as follows:
   A. Submit the request for the study to be initiated and approval granted.
   B. Meet with the requesting party and NTMP Manager to ensure the needs of all parties are met.
   C. Assess the location and determine if the Police Department or OV NTMP Manager will conduct the study and which, if any, study will be conducted.
   D. Evaluate the data and create a report.
   E. Determine the severity of the problem and discuss with the NTMP Manager what programs may resolve their problems.

2. Assist as needed with the implementation of education programs.
   KKAD25 (keep Kids Alive Drive 25)
   HOA newsletters
   HOA board meetings
   Community / Neighborhood meetings

3. Determine what enforcement will be taken, if any, in conjunction with the OVDPW and NTMP Manager.

4. Implement the enforcement programs.
   A. Through the data gathered, establish targeted enforcement directed at the times and days that are identified through the data.
   B. Determine measures to be implemented.

5. Report the outcome of the data and enforcement details to the NTMP Manager who will work with all parties to develop a NTMP program for the individual neighborhoods.

Section IV, Public Work's Neighborhood Traffic Management

POLICY:

PURPOSE: The purpose of this policy is to set forth the conditions under which the Town of Oro Valley (the Town) and the residents of individual neighborhoods or streets may work cooperatively to develop and finance roadway improvements to resolve or mitigate traffic operational problems on low speed, local residential streets.

APPLICABILITY: The streets targeted for the neighborhood traffic management program shall be local residential streets with 25 mph posted speed limits.

POLICY: The Town, at the request of the residents of individual neighborhoods or streets, shall evaluate traffic operational problems on local residential streets with 25 mph posted speed limits. Working together, the residents and the Town shall develop effective solutions to these problems. If improvements other than traffic control signing and pavement markings are required, they shall be financed by the residents.

RESPONSIBLE DEPARTMENT:
The Public Works Department will administer the Neighborhood Traffic Management Program.

ADMINISTRATIVE PROCEDURES:

I. Statement:

The program documented in these administrative procedures will provide a working environment within which the Public Works staff and the residents of individual neighborhoods or streets or groups of streets (defined as the benefit areas) may create a partnership to develop and finance roadway improvements which resolve or mitigate traffic operational problems on low speed, local residential streets. The success of this program will depend on fruitful meetings with the residents.

II. Application:

The streets targeted for the Neighborhood Traffic Management Program (NTMP) shall be local residential streets with 25 mph posted speed limits.

III. Procedure:

Phase I – Initiation and Evaluation Activities

a. The neighborhood representative will contact DPW in order to discuss the neighborhood traffic problems. When a neighborhood has an existing HOA, the neighborhood representative must be an HOA board member.

b. The NTMP will be explained to the neighborhood representative(s). A documentation package explaining the program in greater detail will be given to the neighborhood representative(s) for information in the neighborhood.

c. If the neighborhood residents want to participate in the NTMP after reviewing the program documentation, a program application and a petition supporting participation in the NTMP shall be submitted to DPW. The petition supporting participation in the NTMP must be signed by a minimum 70 percent of the property owners in the benefit area. The Town Engineer will determine the extent of the benefit area. The Town engineer may change the extent of the benefit area as additional information is presented (see Part 2d). The benefit area may or may not include an individual street. Only one signature per property will be allowed on this petition and on other petitions or approval sign-off forms required by these administrative procedures.

d. If neighborhood traffic problems cannot be substantiated, no further action will be taken by the DPW staff and the program procedure will be terminated.

Phase 2 - Traffic Management Plan Development Activities

a. If neighborhood traffic problems do exist, development of a traffic management plan will be initiated. The improvements included in the traffic management plan may be minor traffic control device modifications or they may be major geometry modifications. The development of the traffic management plan will be a cooperative effort involving the DPW staff an ad hoc committee representing the residents of the benefit area. Representatives of the local school district and the emergency service providers serving the area will be consulted as this phase progresses. The Town Engineer shall consider objectives and/or input from the emergency services (i.e. police & fire). It will be the responsibility of the ad hoc committee to keep the other neighborhood residents informed of the status of the traffic management plan. The DPW staff will be responsible for preparing all documentation related to the traffic management plan.

b. If the traffic management plan appears to adversely affect the traffic conditions of an adjacent neighborhood or a nearby street, steps will be taken to expand the benefit area to include the affected neighborhood or street or to modify the traffic management plan to eliminate these adverse effects. However, if the study area is modified, the residents of the expanded area must be represented on the ad hoc committee.

c. After the traffic management plan has been prepared, it will be submitted for approval to The Town Engineer and a copy will be forwarded to the ad hoc committee.

d. Before the NTMP can advance to the next phase, the traffic management plan must be formally approved by seventy (70) percent of the property owners in the benefit area affected. A petition or an approval sign-off form will be used to document this approval.

Phase 3 – Trial Period Activities

a. Whenever possible, the traffic management plan will be implemented on a trial basis for a 60 day period. Speed humps, however, will not be installed on a trial basis. This will allow the residents and the DPW staff to determine the effectiveness of the traffic management plan modifications and the impact of the modifications on nearby streets and neighborhoods. The DPW staff will collect data to document the changes. If either the DPW staff or the ad hoc committee determines that the traffic management plan is not performing satisfactorily, it may be abandoned or modified or a completely new traffic management plan may be developed.

b. If it is determined by both the DPW staff and the ad hoc committee that the traffic management plan is performing satisfactorily; it will be presented for approval to the property owners of the benefit area. Seventy (70) percent of the property owners of the benefit area must approve the traffic management plan in order for the modifications to be made permanent. A petition or an approval sign-off form will be used to document this approval.

c. If the traffic management plan involves only traffic control signing and pavement marking modifications (no geometry modifications), the signs and pavement markings that were installed and applied on a trial basis will remain in place permanently. The program procedure will terminate at this point.

d. If the traffic management plan involves geometry modifications, e.g., speed humps and traffic circles, the property owners will be required to provide a direct contribution to finance the design and construction activities.

Phase 4 – Geometry Modification Design and Construction Activities

a. All costs including the administration, design, and construction activities will be the responsibility of the property owners in the benefit area.

b. During the construction phase, inspection of the improvements will be performed by the DPW staff and paid for by the property owners within the benefit area.

c. If the property owners so choose, they may finance the geometry modification design and construction activities by a direct contribution to Town of Oro Valley. The direct contribution to the Town of Oro Valley may be reduced to the cost of the inspection if the property owners arrange for their own contractor to construct the improvements to Town of Oro Valley specifications.

Phase 5 – Maintenance Activities

a. If the traffic management plan involves only traffic control signing and pavement marking modifications, DPW will perform regular maintenance to these traffic control devices at no additional cost to the property owners.

b. If the traffic management plan involves geometry modifications, DPW will be responsible for all of the maintenance activities related to the improvements implemented in Phase 3 and Phase 4 at no additional cost to the property owners.

IV Responsibilities:

The Department of Public Works Operations Division will assume the leadership role in this program. It is this staff that will be meeting with residents, evaluating the neighborhood traffic problems, guiding the development of solutions, and providing coordination with the staffs of other DPW Divisions.

The staff of the Engineering Division will provide construction inspection and materials testing services.

The staff of the Operations Division will perform traffic control signing and pavement marking.

IV. Removal of Devices:

If the property owners choose, they may remove the traffic calming devices with seventy (70) percent of the property owner of the benefit area approval. A petition or an approval sign-off form will be used to document this approval.

If the property owners so choose, they may finance the removal of devices by a direct contribution to the Town of Oro Valley. The direct contribution to the Town of Oro Valley may be reduced to the cost of the inspection if the property owners arrange for their own contractor to construct the improvements to the Town of Oro Valley specifications.

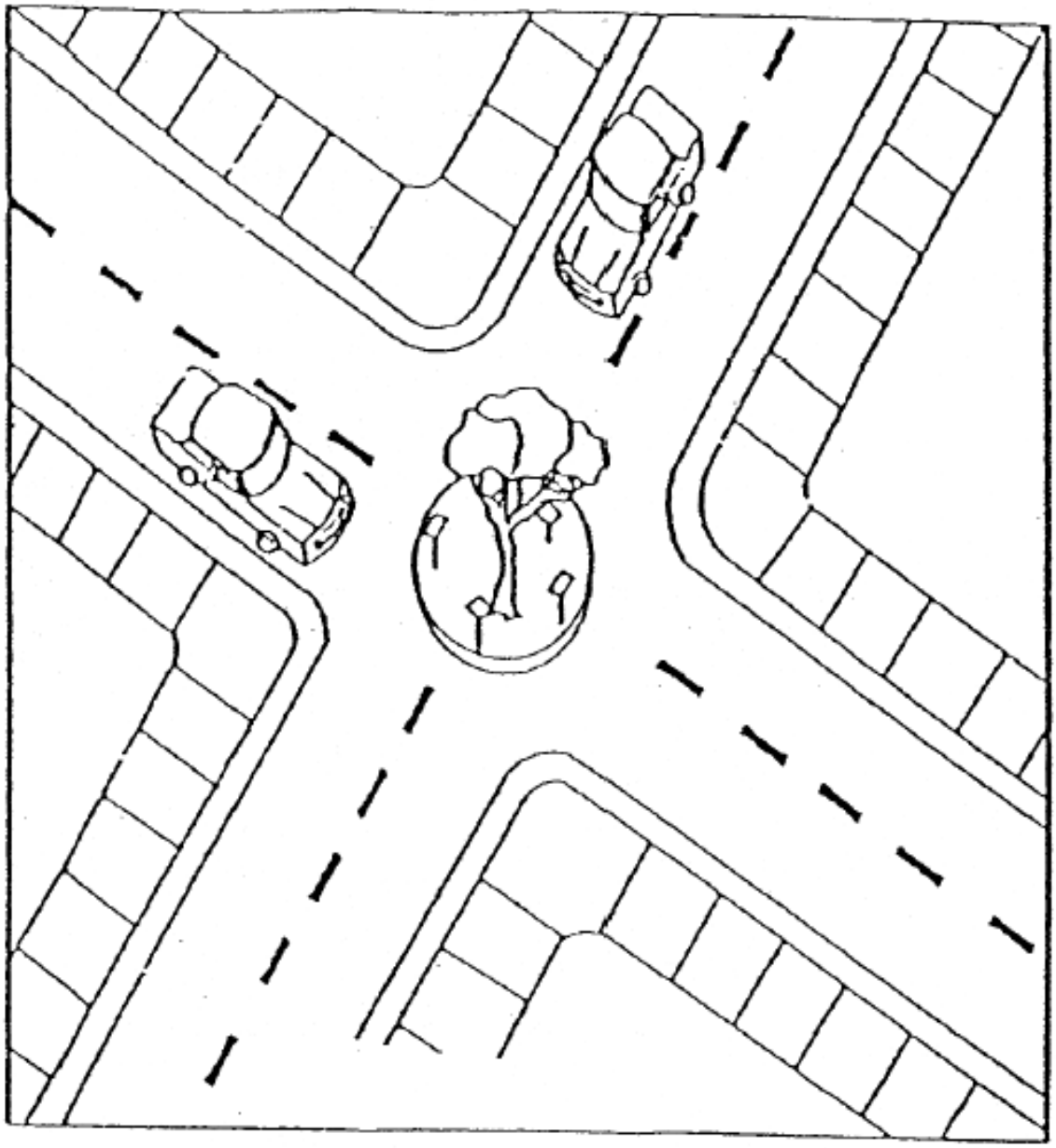
Traffic Circle

Typical Application

In the City of Tucson Traffic Calming Report, this method was considered effective at intersections that had relatively high accident rates.

Effects or Impacts

Speed	Reduction in speed is generally noted in the area of the traffic circle, however, the device may have only limited impact on mid-block speeds.
Noise, Energy, Air Quality	Noise reduction is associated with the perceived reduction in volume
Safety	There is evidence that traffic circles are effective in reducing vehicle collisions at intersections. Traffic circles may present a hazard to bicyclists and pedestrians by bringing cars and trucks closer to the curb, but are normally not a problem. Design provisions must be made for emergency vehicles and city service vehicles.
Uniform Standards and Warrants	Traffic circles in neighborhoods are not specifically covered in the MUTCD, however, they are recognized in basic traffic engineering texts and in practice.
Community Reaction	There has been mixed reaction to traffic circles. Residents near the intersection perceive a reduction in traffic speed, others may see them mainly as a nuisance.



Traffic Circle

Cul-de-Sac

Typical Application

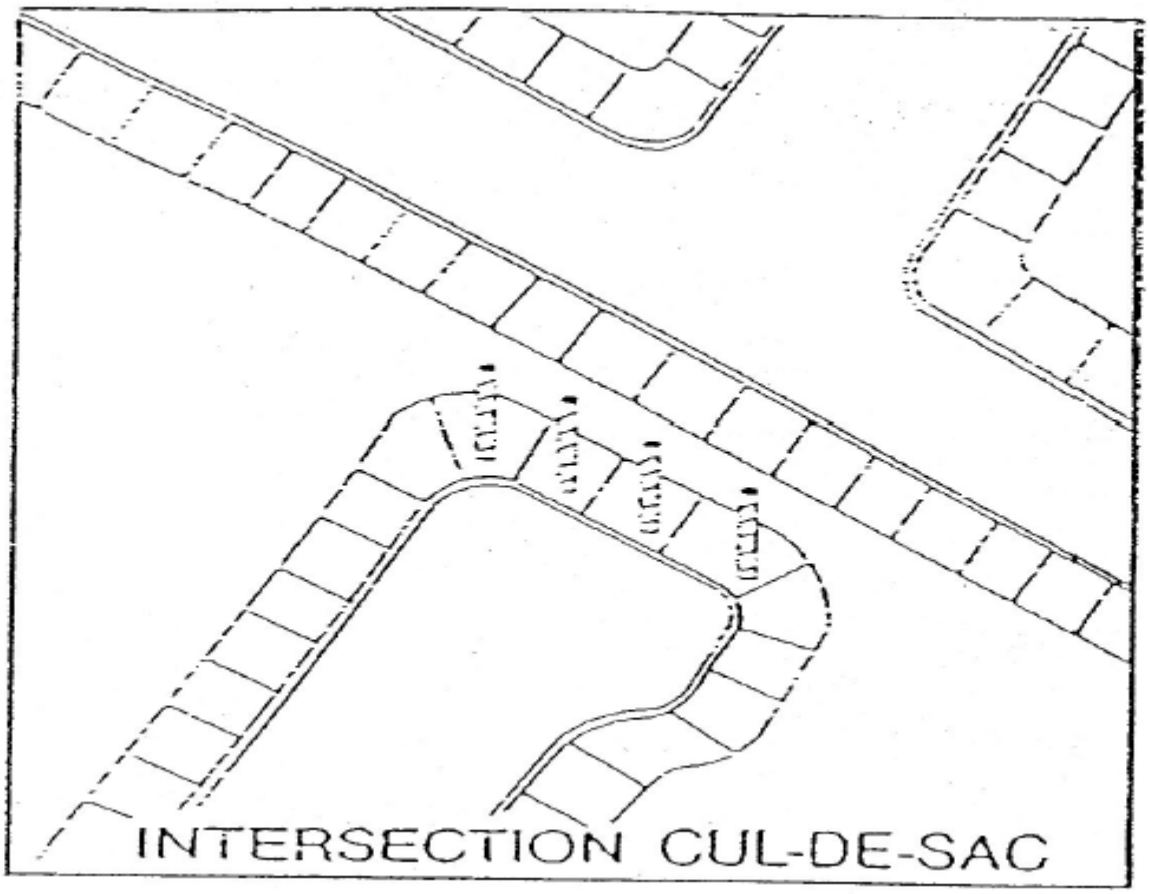
Effective in areas near high traffic generators where the residents are less concerned about access by emergency vehicles than they are about excess traffic. Also found to be effective in areas where other diversion methods are frequently violated.

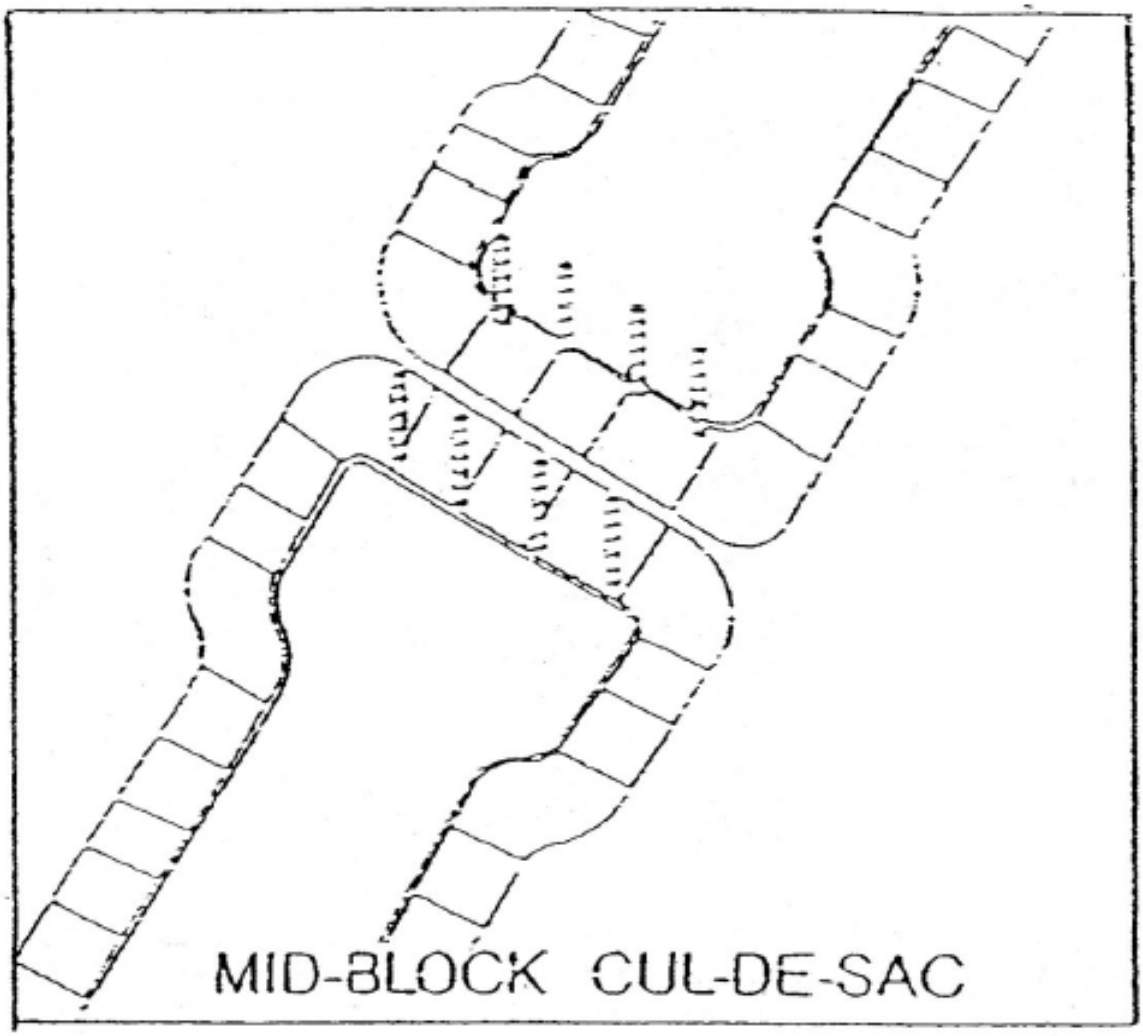
Effects or Impacts

Volume	Reported to be extremely effective in reducing traffic volumes
Speed	Speeds are reduced if the cul-de-sac cuts off a formerly used through route.
Noise, Energy, Air Quality	Noise is reduced as a function of traffic reduction.
Safety	Safety is enhanced on the local street based upon the reduction in volume.
Uniform Standards and Warrants	Acknowledged in basic traffic engineering texts and in practice
Community Reaction	Generally favorable on the streets where they are used; disliked by others in the community if traffic is shifted to their street or if long detours are caused. Emergency service access can be provided through removable or flexible barriers or through tire track passages.

Descriptions

The use of cul-de-sacs is common and a very effective way of eliminating non-local traffic on a street. There are inherent problems in closing a street, however. The response time of emergency vehicles may be increased. Residents will have only a single ingress/egress, which may be a problem if the street intersects with an arterial. If unwanted through traffic is a persistent problem, and a high violation rate is noted with other traffic devices, a cul-de-sac may be an alternative. Cul-de-sacs can be landscaped to add to the environment of the street and may add to the feeling of community.


INTERSECTION CUL-DE-SAC


MID-BLOCK CUL-DE-SAC

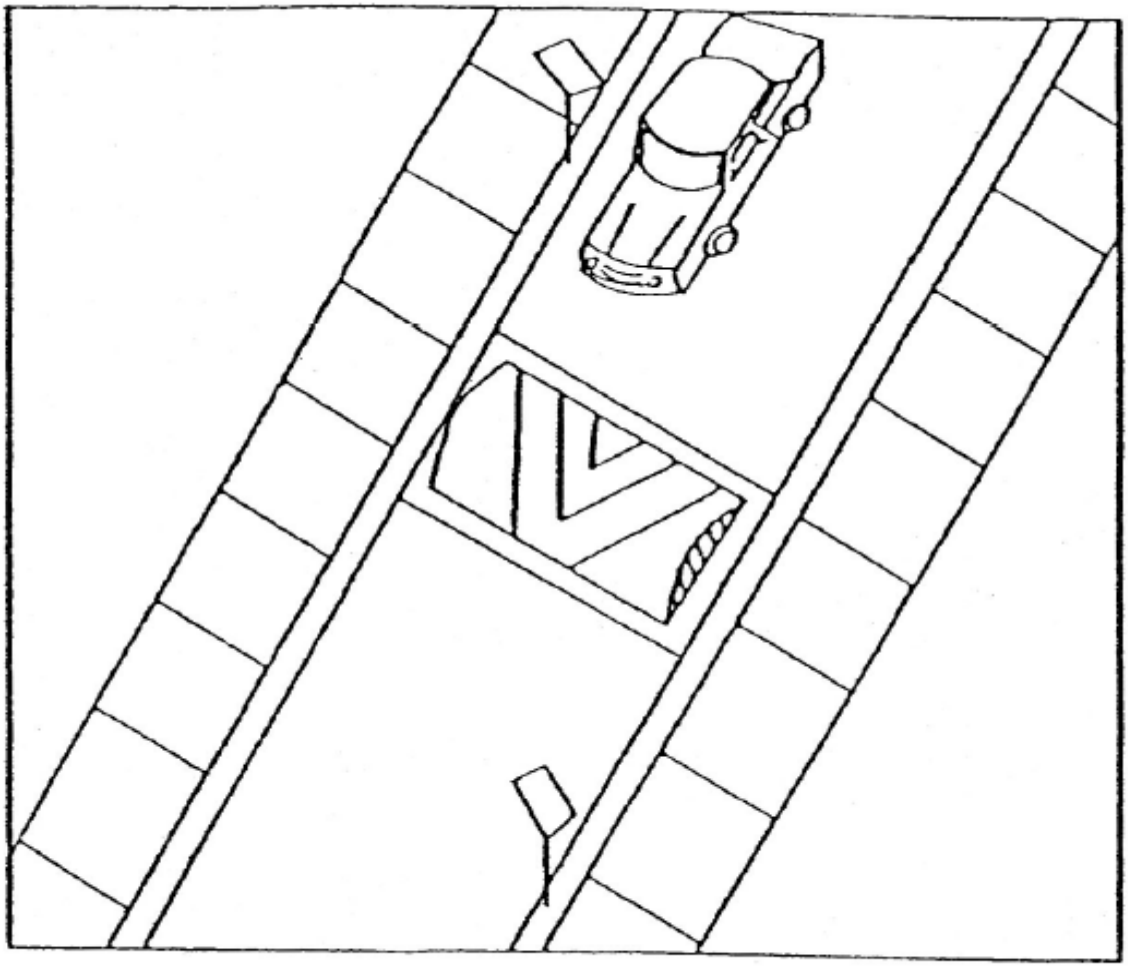
Speed Hump

Typical Application

Effective as a speed and volume reduction technique onlocal streets with limited truck traffic.

Effects or Impacts

Volume	Tucson found the volume of traffic did not change as expected. The same volume of traffic continued to travel through the neighborhood, but slower speeds with the exception of some isolated speeding.
Speed	A single hump can reduce the 85th percentile speed between 14-20 mph at the device itself, with normal speeds returning soon after the encounter of the hump. A series of humps (undulations) with spacings less than 600 feet will reportedly have an increased effect on speed reductions.
Noise, Energy, Air Quality	Reportedly, some reductions in noise energy levels can be experienced on low volume streets. Noise levels can actually increase if there is substantial truck traffic on the street.
Safety	There has been a great deal of debate and discussion as to the impact undulations have on vehicle safety. Most issues deal with vehicle damage, passenger injury and decreased emergency response time. While felt by some engineers to be a serious hazard, a study by a subcommittee of the California Traffic Control Devices Committee found that with between 150 and 200 million crossings for the state's 150 to 160 undulations, very few claims for damages had been filed and damage awards were minimal.
Uniform Standards and Warrants	Not covered by the MUTCD but recently accepted by the Institute of Transportation Engineers
Community Reaction	Mixed reaction has been noted. Local residents note an apparent decrease in speed and feel speed bumps are the least expensive approach to their problems.



Speed Hump

APPENDIX I: RIGHT-OF-WAY PERMIT CONDITIONS

1. **A COPY OF THIS PERMIT SHALL BE KEPT AT THE WORKSITE AT ALL TIMES**.
2. The applicant shall provide or cause to be provided a detailed traffic control plan conforming to the requirements as outlined in Part VI of the Manual of Uniform Traffic Control Devices (MUTCD), latest edition, including all subsequent revisions thereof and any Town of Oro Valley Engineering Directives, and shall and will take such additional measures of precaution as the Town Engineer or his authorized Representative directs. **NO TRENCHES SHALL REMAIN OPENED OVER NIGHT OR WEEKENDS.**
3. Applicant shall submit Detailed Plans and Record Drawings as required by the Town Engineer.
4. The applicant shall indemnify and hold the Town of Oro Valley and all its officers and agents harmless from any and all claims, demands and suits arising out of the applicant's use and occupancy of the Town right-of-way, both during the course of construction by the applicant of any improvements in the Town right-of-way, and during the existence of any such improvements in the Town right-of-way. The applicant may be required to submit bonds or insurance to hold the Town harmless and free of liability arising from said work.
5. A cash bond or similar security may be required to ensure satisfactory and workmanlike completion of the work covered by this permit. This determination and the amount thereof shall be made on a case by case basis.
6. All work shall be done at the sole cost and expense of the applicant and shall be done at such a time and in such a manner as to be the least inconvenient to the public, be it vehicular or pedestrian traffic, as directed by the Town Engineer, or his authorized Representative.
7. If the work performed under this Permit fails to pass final inspection, the applicant will remove or replace the same within such time as specified by written notice from the Town Engineer, or his authorized Representative, or if any material used by the applicant in replacing or reconstructing an part of the work, material, or workmanship performed under this Permit proves defective, the applicant will replace the same as specified by the Town Engineer or his authorized Representative.
8. Boring(s) shall be required on all pavements unless specific authorization to cut the pavement is granted by the Town Engineer or his authorized Representative. If the work requires cutting the existing pavement, temporary pavement must be completed prior to leaving the worksite. All trenching under paved streets shall be backfilled with controlled low-strength material per ADOT Specification 501-3.02(A)(3). Temporary pavement repair shall be provided and maintained in a condition acceptable to the Town Engineer or his authorized Representative. Permanent pavement repairs shall be provided within fourteen (14) calendar days of the initial pavement removal, or sooner if requested by the Town Engineer or his authorized Representative. Permanent pavement repair must be completed by a duly licensed Contractor of the State of Arizona, qualified to make such repairs. Major streets will require boring – if boring is not feasible, then the surface of the roadway shall be milled to a depth of 1" for a distance of at least 500' in each direction from the patch and repaved with a 2" course of rubberized asphalt. Any existing rubberized pavement shall be

entirely removed. The aplicant shall submit an AR-AC mix design to the Town for approval prior to issuance of the permit. All pavement cuts are subject to the following fee schedule:

a) Single cut of pavement transverse to traffic: $262.80, plus associated right-of-way ($20.00) and inspection fees ($60.00) for a total of $342.80.

b) Pavement cuts across streets which have been constructed or overlaid within the previous 48 months or received a surface treatment within the previous 24 months shall be assessed a pavement cut impact fee of $525.60, plus associated right-of-way ($20.00) and inspection fees ($60.00) for a total of $605.60.

A Town representative shall approve the striping layout 24 hours prior to commencing placement of the striping.

9. The applicant will not allow any condition to occur or exist which would be a hazard or source of danger to the public, be it vehicular or pedestrian traffic, or to the individuals engaged in performing the work. If the work presents or becomes a hazard to the public, the Town of Oro Valley (without the transfer of liability) may take corrective action(s) to mitigate said condition(s) and bill the applicant for the full cost incurred for the said action(s).
10. There shall be no disruption of traffic flows on high volume streets between the hours of 7 A.M. – 9 A.M. or 4 P. M. – 6 P.M.
11. It shall be the responsibility of the applicant to notify Blue Stake or any affected utility company before starting any work which may involve their facilities, and make all necessary arrangements therewith, including any payments required for any necessary removal or relocation work or permits.
12. No work shall commence without first obtaining a permit from the Town of Oro Valley. A Permit Penalty Fee of Two Hundred and Fifty Dollars ($250.00) will be charged for work started prior to the issuance of a permit in addition to any civil or criminal penalties.
13. If at any time hereafter the rights-of-way or any portion thereof, occupied and used by the applicant under this Permit is needed or required by the Town, upon sufficient notice, the applicant, at their expense, shall remove all property belonging to the applicant or placed in the rights-of-way by the applicant.
14. The Contractor shall minimize disturbance of the surrounding natural vegetative community. All native trees and cacti shall be salvaged and replanted to maintain the existing vegetative density.
15. All workmanship and materials shall be guaranteed for a period of one (1) year after the acceptance of said work by the Town. Failure of the Town Inspector to detect flaws in workmanship or materials shall not relieve the applicant of this responsibility.
16. If conditions of the permit are not met a stop work order will be issued and work will be stopped for a minimum of 2 working days.
17. Proposed communication facilities within the Town or A.D.O.T. rights-of-way will require Planning and Zoning approval prior to applying for or obtaining a right-of-way use permit.
18. Any flagmen used as a part of the traffic control plan shall be certified by completing a recognized Flagger Instruction Training Course.