County of Los Alamos

Public Works Design and Construction Standards

Revised 2024 | Supersedes 2008

Attachment B

LAC PW DESIGN AND CONSTRUCTION STANDARDS

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INTRODUCTION

The Los Alamos County Design and Construction Standards (Standards) were developed to regulate the design and construction of municipal public works infrastructure within the County. The materials presented herein are intended for the use of qualified design professionals familiar with municipal infrastructure design and construction.

The following County documents shall be utilized to ensure proposed development and associated public infrastructure are consistent with adopted County ordinances, programs and policies

- Code of Ordinances, Chapter 16 – Development Code and Chapter 24 – Floods
- Resolution 10-32 – Policy for the Design of Public Streets and Rights-of-Way
- Los Alamos Comprehensive Plan (& associated subsidiaries)
- Bicycle Transportation Plan
- Pedestrian Master Plan
- ADA Transition Plan
- Complete Streets Checklist
- Pavement Preservation Policy
- Neighborhood Traffic Management Program
- Department of Public Utilities Construction Standards

Furthermore, the most current editions of following documents and associated design criteria shall be adopted by reference for use by the Incorporated County of Los Alamos:

- AASHTO Policy of Geometric Desing of Highways and Streets
- AASHTO Guide for the Development of Bicycle Facilities
- AASHTO Guide for the Planning, Design and Operation of Pedestrian Facilities
- NACTO Design Guides
- Manual on Uniform Traffic Control Devices
- NMDOT Standard Specifications for Roadway & Bridge Construction
- NMDOT Standard Serial Drawings
- NMDOT State Access Management Manual
- NMDOT Drainage Design Manual
- LANL Low Impact Development Standards

The use of these Standards reflects accepted and well-founded civil engineering practices, construction industry specifications and conformance with national safety standards. Should a conflict arise between the standards above and those contained in this document, the County Engineer shall make the final determination of the most appropriate standard to be applied for use.

CHAPTER 1 - GENERAL REQUIREMENTS

1.01 GENERAL

(A) General Information

The Engineer shall be responsible for all studies, analysis, coordination, engineering, and all else necessary to complete any associated public infrastructure projects. It is the intent of the County that the Engineer will have full latitude and complete responsibility for developing a project in accordance with these Standards.

(B) Coordination of Proposed Improvements

Projects should be analyzed for geometric improvements, need for additional lanes, intersection design, traffic access control, drainage improvements, potential for bridge work or retaining walls, potential for cut-slope design, lighting, signalization and signing. Materials presented in these Standards are intended for the use of qualified design professionals familiar with municipal infrastructure.

(C) Scope
The Developer shall be responsible for following all applicable local, state, and federal requirements. The County will review, approve, and monitor the design and construction of all public improvements within the public right-of-way or public easements to ensure compliance with these Standards. The County has the sole authority for approving, accepting, or denying the design and construction of any public improvement. The Developer shall meet with the County Public Works Department to discuss proposed improvements.

- Criteria for Building Construction and Design are provided in the Los Alamos County Code of Ordinances Chapter 16.
- Criteria for Fire Protection and Life Safety are provided in the Los Alamos County Code of Ordinances Chapter 22.
- Criteria for Flood Plain Management are provided in the Los Alamos County Code of Ordinances Chapter 24.

Clarifications of this document shall be made by the County Engineer of Los Alamos County. Any subject/situation not addressed in this document or other County Standards shall be reviewed and approved by the County Engineer.

(D) Minimum Standards

(1) These Standards prescribe minimum requirements that shall be met or exceeded when designing and constructing all public improvements. Whenever the requirements of these Standards are found to be inconsistent with any other adopted standards, regulations, or codes, the more restrictive standards, regulations, or codes shall control. Reference to any code, regulation, standard, criterion, or manual of any technical society, organization, or association, or to any law or regulation of any governmental authority, whether such reference be specific or by implication, shall mean the most recently adopted or current law, code, regulation, standard, criterion, or manual in effect at the time of County approval of any project.

(2) The design of all public improvements shall be prepared by or under the direct supervision of a Professional Engineer duly licensed in the State of New Mexico. The construction of all public improvements shall be performed by a contractor licensed by the State of New Mexico.

(E) Terminology
Terms, words, and abbreviations used in these Standards are defined in the Glossary.

1.02 DESCRIPTION AND USE OF THESE STANDARDS

(A) Using these Standards

(1) These Standards are to be used when designing and constructing all public improvements and infrastructure within the County. For the purposes of this document, public improvements and infrastructure include without limitation: streets, sidewalks, trails, curb and gutter, curb cuts, streetscaping, manholes, stormwater infrastructure, and other improvements intended for public purposes or for the benefit of the community located within dedicated public rights-of-way and public easements.

(2) These Standards also provide design and construction requirements to be used when developing private lands that create an impact on public rights-of-way and public easements. The required private improvements associated with property development include without limitation: traffic mitigation, site access and driveway design, stormwater site drainage and detention ponding improvements, and stormwater quality and erosion control measures.

(B) Public Improvements Design

(1) These Standards prescribe minimum requirements and specifications for designing adequate and functional public improvements. The County review for approval of submitted design plans for public improvements occurs as part of the development review process as defined in the Los Alamos County Development Code Chapter 16.

(C) Construction Approvals

(1) An applicant seeking approval to construct public improvements in the County will need to develop engineering designs and construction plans that comply with these Standards.

(2) Variances

(a) When practical difficulties are involved in meeting the provisions of these Standards, the County Engineer may alter, modify, or waive the strict application of these Standards.
(b) Alterations, modifications, or waivers are intended only for the special purposes described and are not to be routinely considered or approved. Where it is necessary to vary from these Standards, an applicant for construction approval must clearly demonstrate that the provisions of these Standards cannot be met and the alteration, modification, or waiver will create the minimum variance necessary to accomplish the intended purpose.

(D) Standards

(1) Street Design: The transportation standards prescribed in Chapter 2, “Street Design,” provide for the study, design, and construction of transportation infrastructure, including but not limited to site accesses, streets, sidewalks, bicycle facilities, and trails. A traffic impact study may be required as part of construction approvals to demonstrate adequate design and mitigation for traffic impacts associated with new streets, driveways, and development.
(2) Traffic Control Design: The traffic control standards in Chapter 3, “Traffic Control Design,” provide the criteria to promote consistent and sound design of traffic control systems that follow the County’s Complete Streets Checklist, the County’s Mid-Block Crossing Policy, the U.S. Department of Transportation’s Manual on Uniform Traffic Control Devices for Streets and Highways, as well as the New Mexico Department of Transportation’s (NMDOT) relevant standards.
(3) Right of Way Design: The right of way standards in Chapter 4, “Right of Way Design,” provide direction for surveying, mapping, title reports, and monumentation, when right of way design is necessary on a plat.
(4) General Utilities Design: Chapter 5, “General Utilities Design,” states that design for electric, gas, water, and sewer service shall conform to the requirements detailed in the Los Alamos County Department of Public Utilities Utility Design Standards.
(5) Bridge Design: Chapter 6, “Bridge Design,” states that preliminary bridge design shall follow standards in the NMDOT Standard Specifications for Highway and Bridge Construction (latest) and final bridge design shall follow stands in the NMDOT Bridge Procedures and Design Guide (latest).
(6) Geotechnical Design: The geotechnical standards in Chapter 7, “Geotechnical Design,” provide criteria for Preliminary and Final Foundation Reports.
(7) Hydrology and Stormwater Design: The stormwater standards prescribed in Chapter 8, “Hydrology and Stormwater Design,” provide for the study, design, and construction of stormwater drainage, stormwater quality and flood control improvements. Detention ponding, storm sewer and drainageway systems, stormwater quality, and erosion control measures may be required as part of construction approval to mitigate the impacts of increased runoff resulting from land development. Reference is made to the NMDOT Drainage Design Manual (latest).
(8) Materials: The standards for materials prescribed in Chapter 9, “Materials,” provides information on the drainage, street, and traffic control construction materials that will be accepted by the County.

(9) Technical Drawings: The standards for construction detail drawings prescribed in Chapter 10, "Technical Drawings," provide design requirements for specific construction features associated with the general construction of public improvements and infrastructure.

CHAPTER 2 – STREET DESIGN

All roadway work shall be in accordance with these Standards, AASHTO "A Policy on the Geometric Design of Highways and Streets" (latest), NMDOT Design Manual (latest), the County's Survey Handbook (latest), and other County department manuals, standards, guidelines, specifications, and procedures.

2.01 GENERAL

(A) Intent

This section provides criteria to promote the consistent and sound design of street systems having acceptable performance characteristics for the County of Los Alamos, New Mexico. It is not intended to interfere with innovative design concepts and does not, in any way, relieve the designer of the responsibility to use sound professional judgement in the project design.

For development focused in Downton Los Alamos and White Rock Town Center, street design standards are included in the following reference documents: The Los Alamos Downtown Master Plan and White Rock Town Center Master Plan, which can be found on the County's Public Works Engineering Division Webpage.

The Engineer shall be responsible for all studies, analysis, coordination, engineering, and all else necessary to complete the project.

The work performed by the Engineer shall be done in imperial units in accordance with the Guidelines for Geometric and Roadway Design and Surveying or International Building Code. All documents shall have only imperial units.

(B) Location and Layout

Proposed street layouts shall conform to the Functional Classifications exhibits below. Street layout shall be logically related to the topography of the land. The proposed street layout shall be continuous with and correspond in direction with any existing or platted streets that come to the boundary line of adjoining properties unless otherwise approved by the Planning and Zoning Commission. Local streets should be planned to discourage use by non-local traffic.

(C) Functional Classification

(1) Los Alamos County uses guidelines on functional classification from The Federal Highway Administration (FHWA), American Public Works Association (APWA) and Institute of Transportation Engineers (ITE).

(a) Arterial (ART) – Continuous and discontinuous cross-county and inter-district corridors that are 2 to 4 lanes across and generally have a centerline stripe or a designated bus route. The ADT generally falls in the 10,000 to 20,000 vehicle per day range. They are typically spaced on the ½ or ¼ mile section line and on occasion, may have a short non-landscaped median.

(b) Collector (COL) – Continuous and discontinues cross-country and inter-district corridors that are 2 to 4 lanes across and generally have a centerline stripe or a designated bus route. The ADT generally falls in the 1,000 to 10,000 vehicle per day range. The are typically space don the ½ or ¼ mile section line and on occasion, may have a short non-landscaped median. Major collectors are also assigned to streets segments leading to, or adjacent to, a major traffic generator site such as a reginal shopping complex. Collectors

form the entrance to communities and may have a decorative landscaped median of short duration.

(c) Local (LOC) – These are the majority of the street segments consisting of all residential roads not defined above or as industrial/commercials.

(2) The Los Alamos County Comprehensive Plan Chapter 2.6 includes maps showing the functional classifications of the roads in the Los Alamos Townsite and White Rock.

(D) Standards

(1) Minimum Right-of-Way and Pavement Widths

All right-of-way (ROW) and pavement widths shall be approved by the County Engineer. Based on specific site conditions, widths wider than the minimum may be required. The following table indicates the minimum required ROW and pavement widths based on functional classification.

Functional Classification	ROW width (ft.)	Pavement width (ft.)
Arterial	80	48
Collector	70	40
Local – w/on-street parking	50	32
Local – cul-de-sac	50 radius	45 radius

Note: Pavement widths are measured from face of curb to face of curb.

Generally, curb returns are based on the design vehicle utilizing each classification of roadway. Please refer to AASHTO Table 2-5a. The minimum curb return radius for a local street type is 25 feet, Collector is 30 feet, and Arterial is 30 feet. Curb return radii are subject to approval by the County Engineer.

(2) Driving and Parking Lane Widths

The minimum driving lane widths in each direction are based on the functional classification of the road and are provided below. Parking lane widths shall be a minimum of eight (8) feet. The gutter pan width should be considered as part of the parking lane width. Whether the parking lane is required on one side or both sides of the street is based on functional classification of the road and is indicated in the table below.

Functional Classification	Minimum Lane width (ft.)	Parking lane
Arterial	11	One side
Collector	10	One side
Local	9	Both sides

(3) Bicycle Lanes & Facilities

Bicycle facilities shall be designed in accordance with the AASHTO Guide for the Development of Bicycle Facilities, with any supportive direction from NACTO and/or the MUTCD. Coordination with the guidance provided in the Los Alamos County Bicycle Transportation Plan shall also be illustrated.

(4) Longitudinal Vertical Grade Design Criteria

Due to the topography in Los Alamos County, vertical grades differ from those required by AASHTO. Minimum and maximum vertical grade design criteria are listed in the table below based on roadway functional classification.

Functional Classification	Minimum Grade	Maximum Grade
Arterial	0.5 %	6.0 %
Collector	0.5 %	5.0 %
Local	0.5 %	5.0 %

Any vertical street grade below the minimum or above the maximum shall require prior approval from the County Engineer. In certain cases, a variance may be granted to allow for a grade of up to 7.5% for a collector roadway and 8.0% for a local roadway.

The maximum grade at an intersection is four (4) percent for a distance of 50 feet from the curb of the intersected street. All other design criteria in the AASHTO policy concerning vertical alignment (grade change, vertical curve length, stopping sight distance, etc.) shall apply – AASHTO 9.4 Alignment and Profile, and AASHTO 9.5 Intersection Sight Distance. One-fourth point grades shall be provided for each curb return.

(5) Minimum Street Pavement Sections
A pavement design shall be developed to determine an adequate pavement section. AASHTO or NMDOT procedures shall be used. If the designed pavement section depths are less than the minimum depths listed below, these minimum depths shall be used.

Functional Classification	Minimum Pavement Depth (in.)	Minimum Base Course Depth (in.)
Arterial	6	8
Collector	4	6
Local	3	4

(E) Streetlight Systems
Street light systems shall conform to the Los Alamos Development Code – Chapter 16, Article IV. Division 6. Outdoor Lighting.

(1) Construction Requirements of Streetlight Systems
Electrical taps may be made at the closest transformers or pedestals. The Engineer will coordinate the tap with Los Alamos County Traffic and Street Department and Department of Public Utilities.

Where a system is installed, i.e. subdivisions with multiple lights, lighting should be served with a meter pedestal. Wiring is to be sized to load and distances with #4 copper as a minimum size and 2-inch PVC conduit. Direct bury is not allowed. Minimum depth of bury is 24 inches.

All sizing and installations shall meet National Electric Code (NEC) requirements. Meter installations must be permitted through the State Construction Industries Division and coordinated with the County. A magnetic warning tape shall be installed 1 foot above the conduit. All empty conduits shall have a minimum of a # 12 copper wire installed in them. Where pull boxes are required, a concrete collar shall be installed. Splices and fuses shall be installed in the pull box, not in the pole and all connections shall be made watertight. Wire nuts are not acceptable. Meter pedestals shall have the photocontrol incorporated in it and all fixtures shall have a shorting cap.

(F) Road Names
See Los Alamos Development Code - Section 34-105, Road naming.

(G) Access Management on State Roads (NM 4, NM 502, NM 501)
For access management requirements on NM 4, NM 502, and NM 501, please refer to the NMDOT State Access Management Manual (latest).

(H) Driveways
Construction of driveways shall conform to the standard details contained in this publication. Development specific requirements will be handled on a case-by-case basis in coordination with County staff and may be dependent upon the outcomes of traffic generation details and site-specific constraints. Driveways will need to be ADA compliant when crossing pedestrian access routes.

All parking requirements shall be met on private property and shall conform to the Los Alamos Development Code – Section 16-33 Parking location and design. Parking area shall meet zone district related requirements within the lot, not in the right-of-way or other property not included in the lot.

(1) Exceptions

(i) Residential driveways on Arterial Streets: No exceptions

(ii) Residential driveways on Collector Streets: Maximum slope shall not exceed ten (10) percent. Designers should pay special attention to the winter conditions in Los Alamos and average vehicle clearance requirements. Steep driveways (above eight (8) percent slope) are not recommended. Heating systems should be investigated, especially on north facing lots.

(iii) Residential Driveways on Local Streets:

(a) Maximum slope shall not exceed twelve percent. Designers should pay special attention to the winter conditions in Los Alamos and average vehicle clearance requirements. Steep driveways (above eight (8) percent slope) are not recommended. Heating systems should be investigated, especially on north facing lots.

(b) Turning and maneuvering movements shall be allowed on right-of-way.

(c) Parking spaces do not need to be internally accessible.

(d) Driveways on new subdivisions shall conform to drawing Street Typical – Drive Pad Details.

(iv) All other exceptions of driveway requirements shall require approval from the County Engineer on a case-by-case basis.

(l) Sidewalks

Sidewalks are required on both sides of each street type. A six-foot minimum is required for both arterial and collector streets. A five-foot minimum width is required for residential/local streets.

Sidewalks will conform to the most current Americans with Disability Act (ADA) requirements and NMDOT Standard series 608.

A separation between the curb and sidewalk (the area used for streetscape landscaping) is required to provide separation between pedestrian traffic and vehicular traffic. The designer will recommend a separation dimension to the County Engineer for approval.

2.02 TRAFFIC STUDY

The requirements of a traffic study will be outlined in consultation with County staff and the completion of a scoping letter to determine the breadth of the traffic study details. An example scoping letter can be found on the County's Public Works Engineering Division Webpage. NMDOT Criteria for Traffic Studies shall be used as a basis for determining what type of study will be required. The County Engineer may require additional study requirements.

CHAPTER 3 – TRAFFIC CONTROL DESIGN

3.01 GENERAL

This section provides criteria to promote the consistent and sound design of traffic control systems having acceptable performance characteristics for the County of Los Alamos, New Mexico. It is not intended to interfere with innovative design concepts and does not, in any way, relieve the designer of the responsibility to use sound professional judgement in the project design.

The U.S. Department of Transportation Federal Highway Administration, current edition, Manual on Uniform Traffic Control Devices for Streets and Highways (latest) shall be the design criteria for traffic control design for the County of Los Alamos.

3.02 COMPLETE STREETS

Utilization of Complete Streets concepts will encourage the development of a more comprehensive street network and transportation system in Los Almos County. Please refer to the Los Alamos County Complete Streets Checklist, which can be found on the County's Public Works Engineering Division Webpage.

3.03 MID-BLOCK CROSSING

Refer to the Los Alamos County Mid-Block Crossing Policy, which can be found on the County's Public Works Engineering Division Webpage. Los Alamos County strives to provide safe and efficient pedestrian facilities throughout the County. The purpose of this policy is to outline the conditions and process for determining where mid-block pedestrian crossings may be installed within the County of Los Alamos. The objective of this policy is to provide a consistent procedure for considering the installation of crossing treatments. Evaluation and determination for when and where to provide crossing treatments are handled on a case-by case basis.

3.04 TEMPORARY TRAFFIC CONTROL DESIGN FOR CONSTRUCTION

Traffic control plans shall be developed in accordance with the following:

- MUTCD (latest).
- NMDOT Standard Specifications for Highway and Bridge Construction (latest).
- Appropriate NMDOT approved construction traffic control standard drawings.
- Appropriate NMDOT and County approved traffic notes.

Traffic control plans shall be prepared only after consultation with the Traffic Division Traffic Control Specialist and have approved a construction sequence plan. The proposed approved construction sequence shall be included with the traffic control plans package.

(A) Description

This work shall consist of implementing an approved traffic control plan in conformance with the contract and the Manual of Uniform Traffic Control Devices (latest), NMDOT Standard Specifications (latest), ATSSA Quality Standards for Work-zone Traffic Devices (latest), and Los Alamos County Code of Ordinances. The Contractor shall submit his proposed traffic control plan to the Project Manager and the LAC Traffic Division or designee for review and approval prior to implementation.

(B) Traffic Control Plan Requirements

The Traffic Control Plan (TCP) shall be detailed drawing which conforms to the Manual on Uniform Traffic Control Devices (MUTCD) (latest) and represent the area in which the work is to be performed. Those preparing a TCP shall follow the requirements outlined in the current version of the MUTCD.

Coordinate specific material requirements with the Los Alamos County Traffic and Street Division.

(C) Construction Requirements

(1) All construction shall be affected by the Contractor in accordance with the applicable specifications and the approved traffic control plan.

(2) All materials and devices shall be maintained and replaced, if necessary, for the duration of the project.

(3) Traffic control shall be maintained in conformance with SECTION 618 - TRAFFIC CONTROL MANAGEMENT, of the NMDOT Standard Specification for Highway and Bridge Construction (latest) for the duration of the project.
(4) Traffic Control Supervisor: A Traffic Control Supervisor will be designated and be available for callout 24 hours per day throughout the duration of the traffic permit. The Traffic Control Supervisor shall be certified in Work Zone Traffic Control and will perform daily onsite inspections on the work zone. Inspection sheets are available at the Los Alamos County Traffic Engineering Office. These inspections will occur twice daily and once nightly if the traffic control devices will be in place during nighttime hours.
(5) by Los Alamos County Traffic Engineering staff, any deficiencies noted will be immediately brought to the attention of the Traffic Control Supervisor who will be expected to correct the problem(s) immediately
and record the incident. The Traffic Control Supervisor will immediately report all accidents related to this work zone to the Los Alamos Police Department, County Project Manager, and Los Alamos County Traffic
Engineering Staff. All incidents and accidents will be recorded in the Work Zone Daily Inspection Log. The Work Zone Daily Inspection Log will be brought in to the Los Alamos County Traffic Engineering Office
no later than 12:00 p.m. every Monday (excluding holidays) for inspection and review.

It is the ultimate responsibility of the contractor and his/her employees to maintain a safe and proper work zone at all times.

3.05 TRAFFIC SIGNAL AND HIGHWAY LIGHTING SYSTEMS

All pertinent provisions of the Los Alamos County Development Code Chapter 16 shall apply. All pertinent provisions of the New Mexico Department of Transportation Standard Specifications for Highway and Bridge Construction, Current Edition, shall apply except as modified herein:

From NMDOT Section 705.3 CONSTRUCTION REQUIREMENTS.
The following should be supplemented for Section 705.31 General:

Electrical work shall conform to NEC requirements and to applicable local ordinances. The Contractor shall obtain a permit from the State Electrical Board (or equivalent state or local agency) prior to constructing traffic signals, highway lighting systems, or other electrical installations required by the contract. The Contractor shall provide permit proof to the Project Manager before work begins.

A licensed journeyman electrician(s) must be on site and directly supervise the installation of all signalization and lighting work.

In addition, the Contractor shall obtain approval from the local power company for the exact location of the electric service before its installation.

Prior to final inspection of the project, the Contractor shall submit evidence to the Project Manager that all electrical work and installations have been inspected and approved by an authorized representative of the State Electrical Board, the County Transportation Division, and County Utilities Department. All systems shall be complete and in operation to the satisfaction of the Project Manager at the time the work is accepted.

It shall be the Contractor's responsibility to know the requirements of the NEC and all local requirements, and to notify the Project Manager promptly of any conflicts with the contract documents.

3.06 TRAFFIC SIGNAL AND LIGHTING – LIGHTNING PROTECTION SYSTEM

All pertinent provisions of the New Mexico Department of Transportation Standard Specifications for Highway and Bridge Construction, Current Edition, shall apply except as modified herein:
In **Section 705,** supplement the following Los Alamos County Specification:

The contractor shall furnish all labor, materials, equipment and services to provide a complete lightning protection system for the traffic signal components(s) included in this contract. The system(s) shall include strike termination devices, interconnecting conductors, a proper grounding system, interconnection with other grounded systems, and surge suppression at service disconnects. The system design shall comply with the National Fire Protection Association (NFPA) Standard if 780, the Lightning Protection Institute (LPI) Standard if 175, and Underwriters' Laboratories, Inc. (UL) Standard 1 * 96A. The manufacturer of the material components shall be a manufacturer member of the Lightning Protection Institute, and all materials shall be listed and labeled in accordance with the requirements of UL Standard 1* 96. The system installation shall be made by a licensed Lightning Protection Installer under the supervision of an LPI Certified Master Installer, proof of licensing and certification will be required. Upon completion the contractor will deliver to the owner an as-built drawing and the appropriate system Certification documents under the UL & LPI programs.

Los Alamos County shall require installation of the items listed on the Traffic Signal Cabinet Equipment document, which can be found on the County's Public Works Engineering Division Webpage.

3.07 SIGNAGE AND STRIPING

For signage and striping requirements please refer to the Federal Highway Administration's Manual on Uniform Traffic Control Devices (MUTCD) (latest).

CHAPTER 4 – RIGHT-OF-WAY DESIGN

4.01 GENERAL

When right-of-way design is necessary on a plat, the Engineer/Surveyor will provide right-of-way surveying, mapping, title reports, and monumentation. This section is intended to provide basic direction to the Engineer/Surveyor in developing right-of-way/monumentation mapping on the proposed development. All sections of the County Development Code shall be adhered to.

All right-of-way documents shall use imperial units.

The Engineer/Surveyor will be responsible for making all revisions to the right-of-way plans and documents. If easements are added during construction of the development, it will be the responsibility of the Developer/Surveyor to update the plat on the development to reflect as-built conditions.

4.02 RIGHT-OF-WAY SURVEYING

The Engineer/Surveyor shall follow the Minimum Standards for Surveying in New Mexico (latest). The development of the right-of-way surveying work shall be closely coordinated with the Engineering Division Surveying Section staff.

All right-of-way surveying shall be performed by a qualified Professional Surveyor licensed in New Mexico and ultimately should conform with 12.8.2.13 NMAC of the Minimum Standards for Surveying in New Mexico. Right-of-way surveying, mapping, and monumentation should also conform with the associated requirements detailed in the NMDOT Design Manual (latest) and subsequent guidelines, standards, revisions, and amendments.

Prior to commencing right-of-way mapping, the Engineer/Surveyor shall meet with the County Surveyor to review and concur on the scope of right-of-way surveying and mapping and monumentation required on the development. Information such as preliminary development design plans, reports, and preliminary property ownership layout maps will be reviewed by the County Surveyor. Right-of-way surveying, mapping, and monumentation will be performed as determined by development design requirements and areas where surveying, mapping, and monumentation or existing right-of-way may be required.

The Engineer/Surveyor, having obtained all necessary field data, will prepare the right-of-way survey maps, and will show all pertinent survey data, existing right-of-way limits, easements, intersection property lines, accepted and rejected monuments, encroachments, buildings, structures within one hundred feet of the right-of-way, etc. Include relevant annotation and notes upon which future right-of-way acquisition boundaries will be electronically overlaid and computed.

4.03 RIGHT-OF-WAY MAPPING

The Engineer will prepare the preliminary right-of-way maps for presentation and review at the pre-final design submittal. Immediately following the review and prior to the final design review, the Engineer shall submit one (1) full size final right-of-way maps exactly as listed in the title reports. These final maps shall locate all right-of-way fee parcels and easements. The County Surveyor will not provide an extensive detail check of any of the final maps and plans. Therefore, any errors, and/or omissions in the final maps, legal descriptions, and subsequent monumentation mapping and staking will be the full responsibility of the Engineer.

The second review prior to the Final Design submittal review is primarily for the purpose of assuring that the red-lined markups of the first review set have been made and to assure that items of concern resulting from the first review are adequately addressed and communicated to the Engineer/Surveyor.

Please refer to the Los Alamos County control maps, which can be found on the County's Public Works Engineering Division Webpage.

4.04 TITLE REPORTS

All title services work shall be performed in accordance with Executive Order No. 89-15, dated March 30, 1989 and the policies and procedures as contained in the NMDOT Right-of-way Handbook (latest), utilizing the forms and/or formats set out therein or as recommended by the County Surveyor.

4.04.01 RIGHT-OF-WAY FEE PARCELS AND EASEMENTS (CME's, DE's, UE's, PE's)

The Engineer/Designee shall provide the following:

- A minimum thirty-three (33) year certified title search on every parcel affected in the right-of-way acquisition.
- A Chain of Title (Index) reflecting all transactions affecting said parcel.
- Copies of all pertinent documents described in the Chain of Title (Index).
- A five-year tax search (or computer printout) reflecting the current assessed owner, address, description of property and the amount of taxes for the current assessed year reflecting whether paid or unpaid.
- Caption sheet or title sheet showing current owner and address of record, description of property being abstracted.
- Work map and index identifying each parcel abstracted.
- Information on any mortgages, liens, or judgments that have been released of record does not need to be shown on said search. For any probates or district court proceedings only pertinent proceedings need be shown, not the complete case file.

4.04.02 TEMPORARY CONSTRUCTION PERMITS (TCP's)

(A) General

The Engineer/Designee shall:

- Confer with the County Engineer or designee prior to commencement of title services regarding preparation and format of title work. The County Surveyor must be present at this initial conference.
- Execute and submit with each title report the "Certificate of Title" form and hold the title reports in confidence and reveal title reports or opinions only to the County Surveyor unless otherwise directed in writing by the County Engineer.
- Deliver title reports to the County Engineer "satisfactorily completed" in a timely manner. Delivery of such shall be defined as (1) actual transfer of possession in the form approved by the County Engineer incorporating all required corrections and clarifications, and (2) written acceptance by the County Engineer of the Engineer/Designee's work.
- The County Surveyor acceptance or rejection of the Engineer/Designee's work product shall be given in writing. The Survey Section shall return deficient or inadequate title reports within 30 calendar days of receipt.
- The dates for the submission of title reports shall be determined at the initial meeting between Public Works and the Engineer/Designee.
- All documents must be letter size, except for surveys and/or maps which may be folded. All title reports must be bound securely (abstract form). A licensed and bonded Title Company must prepare all title reports submitted.
- Promptly correct all deficiencies and return the title reports for further review within (30) calendar days from date of return.
- Be fully responsible for the accuracy of all work.

(B) The Engineering Division – Survey Section

The Survey Section representative shall:

- Return to the Engineer/Designee, within thirty (30) calendar days of receipt, individual title reports found to be deficient or inadequate with the reviewer's comments, if applicable.
- May hold a review of the title work for the purpose of further discussion of the type of title work required.
- Make available to the Engineer/Designee, Survey Section records as may be available and pertinent for the purpose of the work herein described.
- May schedule and hold a review with the Engineer/Designee and representatives of the County involved in the project as necessary.

4.05 MONUMENTATION

Upon assignment of a final right-of-way map date by the County Surveyor, the Engineer/Surveyor shall prepare the preliminary monumentation mapping. Field staking of right-of-way limits as defined by the final Right-of-Way Maps and Right-of-Way Certification and recordation of the final Right-of-Way Monumentation Map(s) will be required. Field staking in accordance with approved final Monumentation Maps shall not occur prior to the issuance of the Right of Way Certification letter by the County Surveyor. The final monumentation maps shall meet NMDOT Monumentation Mapping Unit guidelines/policies and pertinent provisions of the Minimum Standards for Surveying in New Mexico, current edition.

4.05.01 PERMANENT MONUMENTS

All primary subdivision boundary corners shall be marked with permanent monuments at the point or if necessary, with an offset marking. A permanent monument shall be concrete with brass or aluminum cap, The concrete monument shall be a minimum of 6 inches in diameter and shall be placed 30 inches below the finished grade; and, subject to applicable requirements of New Mexico Survey Standards:

1. Any described mark shall be permanently affixed to rock or concrete through the use of an expansion bolt, set and a drilled hole with ferrous metal rod (rebar or pipe) of a minimum length of 48 inches.
2. A survey post approved by the County Surveyor.
3. Any monument of higher standard may be substituted.

4.05.02 SECONDARY MONUMENTS

Secondary monuments may be rebar, pipe or other metal rod, not less than 1/2 inch diameter and 16 inches in length with surveyor's registration number on the cap which may be aluminum, plastic, brass or comparable material. Secondary monuments shall be set at all corners, points of curve, easements, and boundary angle points.

4.06 STREETSCAPE DESIGN AND TREE PROTECTION

For tree preservation standards please request a copy of the Tree Preservation and Mitigation Policy from the Engineering Division. For general landscape standards and streetscape landscaping, please refer to the Los Alamos County Development Code Chapter 16-39.

CHAPTER 5 – GENERAL UTILITIES DESIGN

Design for electric, gas, water, and sewer service shall conform to the requirements detailed in the Los Alamos County Department of Public Utilities Rules and Regulations, which can be found on the County's Public Works Engineering Division Webpage.

CHAPTER 6 – BRIDGE DESIGN

6.01 BRIDGE DESIGN

Follow standards in The NMDOT Bridge Procedures and Design Guide (latest).

6.02 PRELIMINARY BRIDGE DESIGN

Follow standards for preliminary bridge design in the NMDOT Standard Specifications for Highway and Bridge Construction (latest).

6.03 FINAL BRIDGE DESIGN

Follow standards for final bridge design in The NMDOT Bridge Procedures and Design Guide (latest).

CHAPTER 7 – GEOTECHNICAL DESIGN

7.01 INTRODUCTION

The Engineer shall provide geotechnical recommendations related to any structures and submit Preliminary and Final Foundation Reports. The Preliminary Foundation Report will be submitted as part of the Pre-Final Inspection. The Final Foundation Report will be submitted as part of the final design.

The Foundation Reports, to include detailed recommendations for structures and retaining walls, shall be prepared for the selected structure alternatives.

7.02 PRELIMINARY FOUNDATION REPORT

The following activities shall be conducted during Design for the development of the Preliminary Foundation Report.

(A) Geotechnical Investigation and Laboratory Testing

Foundation and geologic/geotechnical exploration shall follow the procedures, requirements and guidelines as outlined in the NMDOT Materials Geotechnical Manual (latest). The geotechnical exploration and laboratory testing shall include at least the following:

- For bridge elements, one soil boring and/or rock core shall be completed at each abutment and each pier element. At the abutments the borings should be taken to a depth of 80 feet. At the piers, the borings should be taken to a depth of 100 feet. Lesser depths of exploration will be acceptable with the presence of bedrock or very dense soil strata.
- For retaining walls, one soil boring and/or rock core shall be completed every 200 feet with no less than two borings completed per wall. Borings should be taken to a depth of twice the height of the walls.
- For drainage structures, the need for borings will be determined on a site-by-site basis.
- Perform required lab testing and soil classifications as required by the Manual. Lab testing may require consolidation and tri-axial testing of undisturbed samples if clay soils are encountered, direct shear tests, or rock core point load and unconfined compression tests.

(B) Preliminary Foundation Report

The Preliminary Foundation Report shall document the recommendation for the most suitable structure foundation and/or retaining wall alternatives based on the geology documented from the geologist's field exploration cards. Analysis shall include development of two conceptual bridge foundation and/or retaining wall alternatives. A cost comparison should be performed between the two alternatives as well as a comparison of which alternative is most constructable. A recommendation shall be made for the most suitable foundation/wall alternative with concurrence given by the County Engineer. Preliminary points-of-fixity shall be provided for deep foundation alternatives. Recommended state of stress lateral soil pressures and equivalent soil-spring constants shall be provided as required. Three (3) copies of this report shall be submitted to the County Engineer.

7.03 FINAL FOUNDATION REPORT

The following activities shall be conducted during the design for the development of the Final Foundation Report.

(A) Retaining Walls

Retaining walls shall be designed based on AASHTO and/or FHWA DEMO 82 Reinforced Soil Structures design guidelines. Bearing capacity, settlement, and global stability analyses shall be performed at all retaining walls to insure serviceability of the walls. Requirements for stabilization of unsuitable subsoil's will be specified where required to meet serviceability requirements. Mechanically Stabilized Earth (MSE) walls will utilize the County's approved MSE wall manufacturers.

(B) Bridge Foundation Analysis

Perform geotechnical analyses of foundations to determine type, size and depths of foundations recommended. Load capacity analysis for vertical loads including immediate and long-term settlement analysis will be required. Lateral load analysis will be required to develop equivalent points of fixity, substructure stiffness and design forces of substructure elements. Suitable design methods are covered in the Manual or as recommended by the County Engineer. Provide a written report, showing completed soil boring lab test results, engineering analysis, foundation recommendations and required foundation depths.

(C) Approach Embankment Analysis
Approach embankments shall be analyzed for long term settlement potential, including settlements due to low in-situ density, hydro-collapsible soils. Requirements for stabilization of unsuitable subsoil's will be specified where required to meet serviceability requirements. Approach embankments shall be specified for 100% standard Proctor density as required by NMDOT standard details with approach slabs bearing on AASHTO A-1-a material.

(D) Final Foundation Report
The Final Foundation Report shall document the results of the field exploration and laboratory testing, bridge foundation recommendations and analyses retaining wall recommendations and analyses. All work shall be completed according to the standards set forth in the NMDOT Materials Geotechnical Manual (latest) or as approved by the County Engineer. A digital version of this report shall be submitted to the County Engineer. The requirements are detailed as follows.

(E) Geotechnical Design Recommendations
Final design recommendations shall address some or all of the following:

- Stabilization/densification of unsuitable embankment or native soils
- Slope stability/steepened slope design
- Mitigation of settlements
- Rock excavation and blasting requirements
- Rock fall mitigation
- Maximum cut slope angles in soil and rock
- Suitability of foundation soils or rock to support an embankment or structure
- Shrink and swell factors of earthwork
- Groundwater affecting the project/need for cut-off trenches
- Special treatments, i.e. use of geotextiles, soil nails, pressure grouting, etc.

CHAPTER 8 – HYDROLOGY AND STORMWATER MANAGEMENT

8.01 GENERAL

(A) Intent
This section provides criteria to promote the consistent and sound design of drainage systems having acceptable performance characteristics for the County of Los Alamos, New Mexico. It is not intended to interfere with innovative design concepts and does not, in any way, relieve the designer of the responsibility to use sound professional judgment in the project design.

When required by the Planning and Zoning Commission or the County Engineer a Drainage Report shall be prepared for a project. A New Mexico registered professional engineer with knowledge and experience in storm water analysis and management shall prepare this report. The Drainage Report shall-include the following information unless the County Engineer grants a written waiver:

• Drainage Report Information Sheet
• Purpose and Scope of the Project
• Site Location
• Existing Drainage Conditions, Including Off-Site Drainage
• Existing Condition Hydrologic Analysis
• Proposed Condition Hydrologic Analysis
• On-Site Storm Water Management and Drainage Structures
• Off-Site Drainage Structures

(B) Drainage Report
(1) Please follow standards in the NMDOT Drainage Design Manual (latest).

(2) Purpose and Scope of Project
A description of the project purpose and scope is to be included as part of the Drainage Report.

(3) Site Location
A written description of the project site location and site map shall be included as part of the Drainage Report. The written description shall include proximity to major roads and structures (i.e.: Diamond Drive, North Road, Golf Course, Mesa Public Library).

(4) Existing Drainage Condition Including Off-Site Drainage
A description of existing site conditions shall be included in the Drainage Report. This section shall provide a description of the site slope, soil conditions, vegetative cover, and historic storm water flow patterns. Any off-site storm water that flows through the project site shall be identified in this section. A map may be helpful in describing the existing conditions but is not required.

(5) Existing Condition Hydrologic Analysis
This section shall include an analysis of the existing site conditions to determine storm water runoff quantities (both peak flow rate and volume) including off-site storm water runoff that flows across the project site. The rational method shall be used to determine the quantities. A written request must be submitted to and approved by the County Engineer prior to analysis if a different method is used.
Please refer to the existing condition hydraulic analysis requirements in the NMDOT Drainage Design Manual (latest).

(6) Proposed Condition Hydrologic Analysis
The site shall be analyzed based on the proposed uses and conditions. The same method of analysis used for existing conditions shall be used for the proposed conditions. A comparison of the runoff conditions shall be included in this section of the Drainage Report. The grading plan submitted for the project shall be consistent with the proposed conditions and storm water flow paths indicated in the Drainage Report. All calculations shall be included as an attachment to the Drainage Report.

(7) On-Site Storm Water Management and Drainage Structures
All off-site storm water runoff flowing across the site at the time the Drainage Report is submitted shall be included as part of the runoff quantities for the project site. If flow paths of the off-site storm water runoff are changed, drainage easements will need to be dedicated for the new flow paths. Existing drainage easements not needed by the change in flow paths may be vacated.

All necessary structures shall be constructed in conformance with the current NMDOT Standard Specifications for Highway and Bridge Construction (latest) and applicable Serials Drawings. A minimum culvert size of 24 inches shall be used unless previously approved by the County Engineer. Inlet capacities of structures shall be determined, and calculations shall be included as part of the Drainage Report. For further guidance on the determination of the capacity of channels and storm drains, please reference the NMDOT Drainage Design Manual (latest).

Drainage systems shall not be pressurized unless the County Engineer grants prior approval. A hydraulic grade line analysis shall be included in the Drainage Report if the system is pressurized. All outlets shall require erosion control structures or measures and shall be described in this section of the Drainage Report.

(8) Off-Site Drainage Structures
If the storm water runoff quantities for the proposed site condition are greater than existing conditions, the effect on downstream drainage structures and systems shall be determined. The

use of detention and retention ponds is acceptable. This information shall be included in the Drainage Report.

(C) National Pollutant Discharge Elimination System and SWPPP

The Engineer shall prepare an erosion and sediment control plan in accordance with the requirements of the most current NMDOT NPDES handbook. The completed plans shall include the temporary erosion and sediment control measures in accordance with the NPDES requirements. If the disturbed area is greater than 1 acre, the Engineer shall submit an NPDES package that includes:

(1) A stormwater pollution presentation plan (SWPPP). Please reference the EPA's guidelines on developing a SWPPP for appropriate actions necessary to develop your plan.

(2) The Engineer shall also prepare a temporary erosion and sediment control plan (TESCP). Sample drawings and details are available in the Public Works Department – Engineering Division.

(D) Storm Drainage and Erosion Control Plan

Please refer to the EPA's Construction Stormwater Pollution Prevention Plan Template. Applicants shall submit a storm drainage and erosion control plan demonstrating on- and off-site drainage compliance in accordance with the requirements of this section. Such plans shall include:

(1) A topographic map indicating the boundaries and total acreage of on-site and off-site drainage areas pertaining to the site. For off-site conveyance, a U.S.G.S. quadrangle map may be used. For drainage generated or conveyed on-site, the topographic map shall be at a scale and contour interval which adequately delineates the drainage pattern as determined by a licensed surveyor or professional engineer and approved by the County Engineer. If the topographic map is not accurate and clear, the County Engineer may require that a topographic map be signed and sealed by a registered land surveyor, professional engineer or other qualified professional.

(2) A map at the same scale as the plat, development plan, or site plan, as applicable, indicating predevelopment and post-development drainage conditions, soil types, areas contained within a floodway, and areas contained within a flood fringe.

(C3 Calculation of quantities of water, measured in cubic feet per second (cfs) for a 100-year frequency, 24-hour duration storm, reaching and being expelled from the site, for conditions existing prior to construction of the development; and, for conditions representing the development after completion of all phases of construction predicting runoff prior to and after any site mitigation measures to regulate runoff.

(4) A minimum of 3 typical cross sections shall be surveyed for each major watercourse with a design storm discharge "Q" in excess of 100 cubic feet per second (100 cfs) if any development is proposed in or within 25-feet of the bank or edge of the drainage way as determined by the County Engineer; additional information may be required if the "Q" is 1,000 cubic feet per second or greater.

(5) The location, type, size, and design of proposed mitigation measures to regulate excess storm water runoff; the conveyance capacity; the calculated flow, maximum water depth, and velocity for a 1 00-year frequency, 24-hour duration storm for each control structure; and all other appropriate design details necessary to shall clearly explain the construction and operation of all surface and subsurface drainage and erosion control structures.

(6) Pursuant to paragraphs A through E of this subsection, the applicant shall design and construct check dams, energy dissipaters or other drainage improvements in order to control and reduce runoff from the Buildable Area. The design and specifications for these drainage facilities shall be prepared by a professional engineer registered in the State of New Mexico and submitted to the County Engineer for approval.

(7) County approval for detention in lieu of the plan required above shall be allowed for single-family residential development meeting the following criteria:

(a) Proposed development sites are located outside of a regulated 100-year floodplain and on slopes less than 10 percent;

(b) Proposed development site including patios, garages, accessory structures, driveways and other development that decreases the permeability of infiltration of pre-development surfaces is no more than 6,000 square feet and total impermeable surfaces (roofs, paved areas, patios etc.) do not exceed 2,500 square feet; and

(c) Detention ponds or check dams with a minimum volume of 600 cubic feet will be installed at a location approved by the County Engineer. Such ponds shall be integrated with the landscaping or revegetation on the lot.

In addition, the engineer or developer must follow the County's NPDES General Permit for Storm Water Discharge from Construction Activities (current version).

(E) Refer to Los Alamos County Code of Ordinances Chapter 24 for Flood Plain Management.

8.02 DRAINAGE AND EROSION CONTROL STANDARDS

(A) Calculation of the design peak discharge of storm water shall be based on a 100-year frequency, 24-hour duration rainstorm. Distribution SCS Type II-A Peak at 6.0 hour.

(B) The peak discharge of storm water resulting from the development shall not exceed the peak discharge calculated prior to the development and differences between pre- and post-development discharge shall be detained or retained on site.

(C) Provisions for design storm drainage shall detain or safely retain storm water. Runoff discharge accumulated into drainage channels, storm sewers or natural watercourses shall not cause increased damage or increased flooding downstream, decreased time of concentration, lag time, time to "Q", or alter downstream drainage patterns.

(D) Storm drainage facilities shall have the sufficient carrying capacity to accept peak discharge runoff from the development in addition to that originating upstream.

(E) Incorporation of landscaped areas in the storm drainage and erosion control plan for the retention and use of excess storm water is encouraged. Any ponding areas used in drainage control facilities shall be landscaped and maintained. The landscaping may consist of native grasses or other vegetation for the slopes of the pond and bottom. A Landscaping Plan and
maintenance agreement for ponding areas shall be submitted as part of the storm drainage and erosion control plan.

(F) Ponding uphill from the development shall not be counted toward detention ponding volumes unless approved by the County Engineer.

(G) Pursuant to paragraphs A through F of this subsection, the applicant may be required to design and construct berm ditches along the top of cut slopes in order to intercept the tributary drainage above the cut slope. The design for these berm ditches shall be submitted with the storm drainage and erosion control plan.

(H) No on-site building, development or construction activity shall disturb any existing watercourse or other natural drainage system, whether on-site or off, in a manner which causes a change in watercourse capacity or time to peak, time of concentration or lag time or other natural drainage system or increase of the pre-development "Q".

(I) All floodways shall be designated as drainage easements or drainage rights-of-way. All natural drainage ways and arroyos which traverse or affect one or more lots or buildable areas shall-be identified on the plan and/or plat with a notation indicating the approximate area, extent or area of inundation of the 1 00-year floodplain or tributaries thereof.

(J) An applicant requesting a development on lands where periodic flooding occurs is encouraged to establish the area contained within the floodplain as permanent open space with a drainage easement.

(K) The following note shall be added to plats or plans where a 100-year floodplain exists: NOTE: No alteration of or development within the 100-year floodplain can occur without the prior written approval of the County Flood Plain Manager.

(L) In order to avoid flood and erosion hazards, a 25-foot minimum setback from the natural bank or edge, as determined by the County Floodplain Manager, of streams, waterways, drainage ways or arroyos that have a capacity to convey a "Q" of 100 cubic feet per second (cfs) or more generated by a design storm (100-year recurrence, 24-hour duration) is required. Such drainage ways shall be set aside as No Build Areas. The bank or 'edge of stream" shall be determined based on analysis of the drainage plan submitted pursuant to this section. The required setback may be increased if the Flood Plain Manager determines that a clear hazard exists based on slope stability and hydrologic/hydraulic conditions. In evaluating the need to increase the setback the County Flood Plain Manager shall consider property and channel slope, velocity of channel flow, hydraulic radius, roughness coefficient and sectional area of the drainageway. Development of roads and bridges to cross such drainage ways to access the building site of a lot may occur with approval by the County Engineer. A requirement for increased setback imposed by the Floodplain Manager for a particular project shall not be considered an engineered development plan for purposes of development or encroachment to any FEMA designated 1 00-year floodplain or significant tributary thereof. The County Engineer shall review drainage affecting a County owned or maintained Road.

(M) Drainage affecting a County-owned or -maintained road shall be reviewed by the County's Public Works Department.

8.03 TERRAIN MANAGEMENT PLAN FOR DEVELOPMENTS

The Los Alamos County Terrain Management Plan is intended to protect and promote health, safety, and welfare of citizens and landowners. All changes to property within the county, including plats that involve disturbing the natural topography and/or drainage characteristics must follow the standards in this subsection. These are intended to minimize soil and slope stability, erosion, sedimentation, and storm water run-off and to protect water quality and natural character of the land. The standards (also known as grading and drainage, erosion control, slope analysis, etc.) are guidelines. They are intended to give homeowners and home builders a simplified overview of terrain management requirements in the County. Of course, a complex site or large-scale development will require professional architectural and/or engineering assistance.

Site planning standards are applicable for all new development for residential uses and structures, subdivisions, and commercial and industrial uses and structures. The Los Alamos County Terrain Management Checklist shall be used to assist in the preparation of the building of home plans. In addition, the property owner/architect/engineer must follow the Los Alamos County Terrain Management Plan as a

requirement in the building permit process. The Terrain Management Checklist and Plan can be found on the County's Public Works Engineering Division Webpage.

8.04 DRAINAGE ANALYSIS ON DEVELOPMENTS ADJACENT TO STATE ROADS

Any development adjacent to state roads is required to prepare preliminary and final drainage reports. The drainage reports shall follow standards in the NMDOT Drainage Manual and Submittal and Review Process (latest).

It is the Policy Administrative Memorandum Number 221, Rural/Urban Drainage, of the New Mexico NMDOT to design drainage structures to meet certain minimum standards. In general, drainage structures are designed to safely pass a flood flow, the magnitude of which is commensurate with an appropriate level of public safety and economic risk. This document establishes minimum standards in terms of design frequency floods and their effects on the transportation facility. Design frequency floods shall be estimated using the standard procedures described in the NMDOT Drainage Manual (latest). **Drainage Design Criteria for NMDOT projects is subject to change without notice. All drainage designers are encouraged to verify that they are using the current Drainage Design Criteria by contacting the NMDOT Drainage Section in Santa Fe.** Also, the Engineer shall use the NMDOT National Pollutant Discharge Elimination System (NPDES) Handbook (latest) for methodologies in preparation of the Final Drainage Report.

CHAPTER 9 – MATERIALS

9.01 GENERAL INFORMATION

Unless otherwise noted in this document, the NMDOT Standard Specifications for Highway and Bridge Construction (latest) shall provide the specifications for drainage, street, and traffic control construction. The following pages in this section are intended to provide specific and supplemental information on materials that will be accepted by the County of Los Alamos.

All materials and equipment used for public improvements shall be of new and good quality. Recycled materials and equipment may be used if they meet the quality standards and conditions equivalent to new materials and equipment. All materials and equipment shall be applied, installed, connected, erected, used, cleaned, and conditioned in accordance with the instructions of the applicable supplier or manufacturer, except as otherwise prescribed.

9.02 EXCAVATION, BORROW, AND EMBANKMENT

All provisions of Section 203 of the NMDOT Standard Specifications for Highway and Bridge Construction (latest) shall apply except as appended below:

From NMDOT Section 203.331 Blasting Requirements. All information on the specification shall apply. Add, no blasting shall be allowed in the County of Los Alamos unless a blasting permit has been obtained from the Los Alamos County Fire Department.

9.03 BASE COURSE AND SUBBASE

All provisions of Section 303 of the NMDOT Standard Specifications for Highway and Bridge Construction (latest) shall apply.

Unless otherwise specified, the Contractor shall use the Type I gradation.

9.04 HOT MIX ASPHALT (SUPERPAVE –QLA AND NON-QLA)

HMA used in the County of Los Alamos shall meet the requirements of HMA SP-III or SP-IV.

All provisions of Section 423 of the NMDOT Standard Specifications for Highway and Bridge Construction (latest) shall apply unless a special provision is required.

From NMDOT Standards Section 423.2.2.1 Gradation and Quality Requirements. All subsection text will apply. The County will utilize SP-IV with high quality crude oil on roadway, Bike Path and Pedestrian Path projects, with minimum lift thickness of 1.5 inches and maximum lift thickness of 3.0 inches.

9.05 UTILITY ACCESS COVER ADJUSTMENTS

Construction work involving County utilities (Gas, Water, Sewer, and Electric) access covers shall conform to the current Department of Public Utilities Construction Standards and Technical Design Details.

9.06 PORTLAND CEMENT CONCRETE

All pertinent provisions of the current New Mexico State Department of Transportation Standard Specifications for Highway and Bridge Construction shall apply and be supplemented by the following.

Concrete supplied for the specific construction of Curb and Gutter, Sidewalk and Drive Pads shall be High Risk Freeze/Thaw Class AA (4000 psi) fiber reinforced concrete. Fiber reinforcement shall be Polypropylene fibers of length between 1/2" and 1-1/2". No wire mesh reinforcement shall be used in these items.

High Risk Freeze/Thaw Class A (3000 psi) fiber reinforced concrete may be used for drainage structures, unless specified otherwise on the design plans.

For Valley Gutters and Fillets refer to the Technical Design Detail

9.07 SEEDING

All relevant provisions of the NMDOT Standard Specifications for Highway and Bridge Construction (latest) shall apply for Zone 2 Seed List for Rocky Mountains and High Valleys. Please request a copy from the County's Public Works Engineering Division.

9.08 MINIMUM TESTING REQUIREMENTS

Special Provisions for Minimum Testing Requirements located in Appendix B shall apply to all projects. If directed by the County, NMDOT Section 906 Minimum Testing Requirements shall apply.

CHAPTER 10 – TECHNICAL DRAWINGS

Refer to the Los Alamos County website for specific design detail sheets including the following.

Concrete Scupper
Valley Gutter and Fillet Details
Manhole and Valve Adjustments
Curb Ramp Flared Curb Detail
Street Name Sign Lettering and mounting details

APPENDIX A - GLOSSARY

Words and phrases contained in these Standards shall be read in context and construed according to the rules of grammar and common usage. Words and phrases that have acquired a technical or particular meaning, whether by definition, adoption herein, or otherwise, are intended to be construed accordingly.

The definitions in this Glossary apply throughout these Standards. The words or phrases presented have the following meaning unless the context clearly indicates otherwise:

“Approach” means the portion of an intersection leg which is used by traffic approaching the intersection.
"Approved plan" means the engineering design and construction drawings for public improvements, prepared by an engineer, which has been granted final approval by the Director of Public Works in accordance with these standards.
"As-built" means an engineering drawing of record, prepared under the direction of a licensed New Mexico registered professional engineer, reflecting the actual construction of public improvements in the service area, including, but not limited to, final grading, alignments, dimensioning, elevations, locations and materials sizing and type.
"County" means Los Alamos County, New Mexico.
"Contractor" means a person, firm, partnership, subcontractor or corporation, licensed and that is responsible for the construction of approved public improvements associated with a specific project, or projects, within the Los Alamos County service area. This term also includes the contractor’s superintendent and on-site manager.
"Developer" means the person, owner, firm, or corporation responsible for the development and completion of all public improvements associated with a proposed project in accordance with these standards.
“Diameter” means the diameter size measurement of a tree's trunk, and is measured around the trunk at 4.5 feet above the tree base grade for trees greater than eight (8) inch caliper.
“Director” or "Director of Public Works" means the authorized County employee, or his/her designee, responsible for the enforcement of these standards and approval of the design and construction of public improvements within the Los Alamos County service area, and the overall management and direction of the Public Works Department.
"Engineer" means the New Mexico registered professional engineer responsible for the design of all public improvements submitted to the County for a proposed project in accordance with these standards, including all plans, calculations, specifications, and coordination of field surveys.
"Construction plan" means the engineering design and construction drawings for public improvements, prepared by an Engineer which has been submitted for final approval by the Director of Public Works in accordance with these standards.
“Lateral load” is a live load with the horizontal force acting as the main component. A lateral load acts parallel to the ground unlike vertical loads that act downward. Commonly known lateral loads are wind loads, seismic loads, and water and earth pressure.
“Load capacity” refers to the maximum demand, stress, or load that may be placed on a given system under normal or otherwise specified conditions for an extended period of time.
“Modification” means a request to change or modify a standard or the parameters of a standard because the particular application may not require the degree of rigor which the standard requires.

"Public improvements" means any public facility, system or infrastructure in the Los Alamos County service area including, but not limited to: earthwork or landscaping, streets, sidewalks, bike paths, trails, parking and traffic control devices; water supply, treatment, storage and distribution systems; wastewater collection and treatment systems; and stormwater and flood control collection and conveyance systems in public easements or right-of-way.
"Shall" means a mandatory duty to conform to the specified standard. Where certain requirements in these standards are described with the "shall" stipulation, it is mandatory that these requirements be met or exceeded.
"Should" means an advisory condition. Where "should" is used, it is considered to be recommended or advisory, but not mandatory.
"Standards" means the "Design and Construction Standards" manual for Los Alamos County.
“Vertical loads” are forces that are applied perpendicular to a bridge.
“Waiver” means a request to delete or omit the application of a particular standard.
"Work" means any activity involved in the performance of constructing, installing, repairing or maintaining public improvements.

APPENDIX B – MINIMUM TESTING REQUIREMENTS

SPECIAL PROVISIONS

FOR

SECTION 906 MINIMUM TESTING REQUIREMENTS (MTR's)

(August 2021 – Not to be used on Federally Funded Projects)

The special provision shall supersede section 906 of the 2019 Edition of New Mexico Department of Transportation Standard Specification for Highway and Bridge Construction:

906.1 DESCRIPTION

906.1.1 General

This Work consists of Minimum Testing Requirement's (MTR's) for the County and Contractor which includes construction sampling, tests, and testing frequencies of Materials incorporated into the Work for Acceptance and Quality Control.

906.1.2 Minimum Testing Requirements

Earthwork				
ITEM	**Test Required**	**Sampling/Testing Location**	**Minimum Testing Frequency**	**NMDOT Requirements (Revised, Same)**
Embankment, Unclassified Excavation and Borrow	Moisture/Density Tests (Proctor), Soils Classification	Roadway	1 per material type	Same
	In-Place Density and Moisture	Roadway	1/500 cy	Revised
Natural Ground (NMDOT Standard Spec. Section 203.3.5.1)	Moisture/Density Tests (Proctor), Soils Classification	Roadway	1 per material type	Same

	In-Place Density and Moisture	Roadway	1/500lf per 2 lane Roadway	Revised
Surfacing Required (NMDOT Standard Spec. Section 203)	Estimated "R" Value	Top 2 feet of Roadway	1/500lf per 2 lane Roadway	Revised
Foundations/Backfill for Culverts and Minor Structures	In-Place Density and Moisture	Structure	See Table A	See Table A
	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same
	Gradation		1/300cy	Same
Subgrade Preparation	Moisture/Density Tests (Proctor), Soils Classification	Roadway	1 per material type	Same
	In-Place Density and Moisture		1/500lf/lane	Revised

Backfill for Major Structures	In-Place Density and Moisture	Structure	See Table A	See Table A
	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same
	Gradation		1/300cy	Same
Backfill for Mechanical Stabilized Earth (MSE) Retaining Structures (NMDOT Standard Spec. Section 506)	In-Place Density and Moisture	Structure	See Table A	See Table A
	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same
	Gradation, PI		1/300cy	Same
Foundations for Slope and Erosion Protection Structures (NMDOT Standard Spec. Section 602)	In-Place Density and Moisture	Structure	1 per 25sy	Same
	Moisture/Density Tests (Proctor), Soils Classification	Foundation Material location	1 per material type	Same

Foundations For Sidewalks, Drive pads, and Concrete Median Paving (NMDOT Standard Spec. Section 608)	In-Place Density and Moisture	Roadway	1/500lf and at least 1 per day	Revised
	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same
Bed Course Material for Sidewalks, Drive Pads, and Concrete Median Paving (NMDOT Standard Spec. Section 608)	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same
	In-Place Density and Moisture	Roadway	1/500lf and at least 1 per day	Revised
Foundations For Curb and Gutter (NMDOT Standard Spec. Section 609)	In-Place Density and Moisture	Roadway	1/500lf and at least 1 per day	Same
	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same
Bed Course For Curb and Gutter (NMDOT Standard Spec. Section 609)	In-Place Density and Moisture	Stockpile	1 per material type	Same
	Moisture/Density Tests (Proctor), Soils Classification	Roadway	1/500lf and at least 1 per day	Same
Foundations/Backfill for Drop Inlets and Junction Boxes (NMDOT Standard Spec. Section 623)	In-Place Density and Moisture	Structure	See Table A	See Table A
	Moisture/Density Tests (Proctor), Soils Classification	Foundation Material location	1 per material type	Same
Base Course				
ITEM	**Test Required**	**Sampling/Testing Location**	**Minimum Testing Frequency**	
Base Course	In-Place Density and Moisture	Roadway	1/500ft/lift	Revised

*if the percent passing the No. 10 sieve is less than 10% of AASHTO T-27 test procedure,	Moisture/Density Tests (Proctor), Soils Classification	Stockpile	1 per material type	Same

than this test does not need to be performed.	Gradation	Processed Material	1 per source and 1 per 1000 tons of placement	Revised
	FF, LL*, PI*	Processed Material	1 per source and 1 per 1000 tons of placement	Revised
	Thickness	Roadway after Compaction	1/500ft/lane	Revised
Asphalt				
ITEM	**Test Required**	**Sampling/Testing Location**	**Minimum Testing Frequency**	
Pavement	Asphalt Content	Roadway	1/500 tons/lift, with a minimum of 1 per day's run	Revised
	Air Voids, Roadway Compaction (Cores)	Roadway after Compaction	1 per days run or as required by the County Inspector	Revised
	Roadway Compaction (Nuclear Densometer)	Roadway after Compaction	1 per 500ft/lane	Revised
	Gradation, FF, PI, SE, F&E, FAA, Moisture	Cold Feed before addition of lime or Anhydrite material	1/segment	Revised
Performance Graded Asphalt Binder	The manufactures certificate of compliance will suffice for testing credits	From storage tank of injection line to the plant	1 per binder type per project	Revised

Portland Cement Concrete				
ITEM	**Test Required**	**Sampling/Testing Location**	**Minimum Testing Frequency**	
Fine Aggregates	Gradation	Stockpile	1/100cy	Revised
	SE, FM		2 per project	Revised
Course Aggregates	Gradation	Stockpile	1/100cy	Revised
	FF, F&E		2 per project	Revised
Non-Shrink Mortar Aggregate	Gradation	Stockpile	1/10 cy	Revised
Project Acceptance Test	Compressive Strength Cylinders	See Table B	1 set (4) of cylinders from one of the first three trucks, minimum of 1 per day	Same
	Slump, Unit Weight, Air Content, Temperature		1 per first three trucks, then 1 within the next 6 trucks,	Same
			minimum of 1 per day	

Table 906.1.2:14

Method of Placement	Sample Location
Pumped	Point of discharge from pump into Structure
Direct Discharge from Truck	At end of discharge chute of truck
Crane and Bucket	From discharge chute of bucket
Conveyor belt	From Material on Roadway after being discharged from conveyor
Slip Form (Curb and Gutter/Barrier Walls)	Point of discharge into extrusion machine
Slip Form Paver (PCCP)	From grade in front of paving machine
Drill Shafts	At end of discharge chute of truck

Table 906.1.2:15
Tolerances for Comparison of Independent Assurance Sample Tests to Acceptance and Process Control Tests

Characteristics	Tolerances
Moisture/Density Test (Proctor)	± 3.0 PCF*, ± 2 Units for Moisture
In Place Moisture/Density (Roadway)	± 3.0 PCF, ± 2 Units for Moisture
Plasticity Index (P.I.)	± 3 Units
*Only if proctors are run by both District and Project. If proctors are not run by both District and Project ± 5.0 PCF.	
Gradation	**Tolerances**
1 1/2" to ¾	± 6 Units
1/2" to No. 4	± 5 Units
No. 8 through No. 200	± 4 Units
Fractured Faces	± 5 Units
Flat & Elongated	± 5 Units
Fine Aggregate Angula	± 3 Units
Sand Equivalent	± 4 Units
Aggregate Specific Gra	± 0.020
Concrete	**Tolerances**
Slump	± 0.5 Inch
Unit Weight	± 2.0 PCF
Compressive Strength	10% or less = Range / Average x 100%
Hot Mix Asphalt (HMA)/Warm Mix Asphalt (WMA)	**Tolerances**
Roadway Density (Cores from Project, retained by Agency and Contractor Personnel)	± 0.025 Units
Density (Nuclear)	± 4 Units
VMA	± 1.0 Units
Asphalt Content (Ignition Burn Oven)	± 0.50
Bulk Specific Gravity at Ndes	± 0.025 Units
Maximum Specific Gravity	± 0.020 Units
Air Voids	± 1.5 Units

Los Alamos County Public Works

Minimum Testing Requirements

Table A

Structure Definitions, Foundation and Backfill Requirements

1. Transverse or skewed culvert or concrete box culvert (CBC) not connected to an underground drainage network, including end sections, wing walls if backfilled simultaneously, structural plate, pipe, storm drains and sewer lines[1]:

   Foundation: One density per 200 linear feet. For pipe in a batter, up to 4 pipes may be considered as a unit for purposes of foundation density.[3]

   Backfill Density: 1 per 1 foot of fill per side* and to top of trench per 200 linear feet. [2] *For a battery of pipes, the number of backfill densities required will be as follows:

   One-half (1/2) of the required densities for up

   to 4 pipes.[4] One-third (1/3) of the required

   densities for more than 4 pipes. [4]

2. End section of CBC wing wall if backfilled separately from culvert pipe or CBC2[2]:

   Backfill Density: 1 per 1 foot of fill per side.[3]

3. Drop Inlet (DI), junction box, cattle guard, light and signal base, manhole, etc.:

   Foundation: 1 per structure[4]

   Backfill Density: 1 per 1 foot of fill[3]

4. Underground drainage network including interruptions such as DI, manhole, junction box, plug service connection, slotted drain, etc., if backfilled simultaneously:

Foundation: 1 per

structure[4] Backfill

Density: 1 per 1

foot of fill[3]

5. Retaining Wall/MSE wall:

   Foundation: One foundation density per 50 linear feet.[3]

   Backfill Density: 1 per 1 foot of fill per 50 linear feet.[3]

6. Bridge abutment back wall, wing wall or approach slab.

   Backfill Density: 1 per 6 inches of fill[4]

7. Pier Footing:

   Foundation: 1 per footing[4]
   Backfill Density: 1 per 6 inches of fill[4]

Notes:

1. All extensions will be considered increments and as such structure units.
2. Determination of backfill Depths Governing Minimum Testing Criteria Requirements:
   a. When backfill construction is performed in trench conditions, the depth of compacted backfill to be tested shall be measured form the foundation to the top of the trench.
   b. When backfill construction is performed in non-trench conditions, the depth of compacted backfill to be tested shall be determined through the use of the appropriate NMDOT standard drawings unless where Los Alamos County Utilities Specifications would apply.
3. Revised from NMDOT minimum testing requirements
4. Same testing requirements as NMDOT Minimum Testing Requirements

Table B

Method of Placement	**Sample Location**
Pumped	Point of Discharge from pump into structure
Direct Discharge from Truck	At end of discharge chute of truck

Crane and Bucket	From discharge chute of bucket
Conveyor belt	From material on roadway after being discharged from conveyor
Slip Form (C&G, Sidewalk, CWB, etc.)	Point of discharge into extrusion machine
Slip For Paver (PCCP)	From Grade in front of paving machine