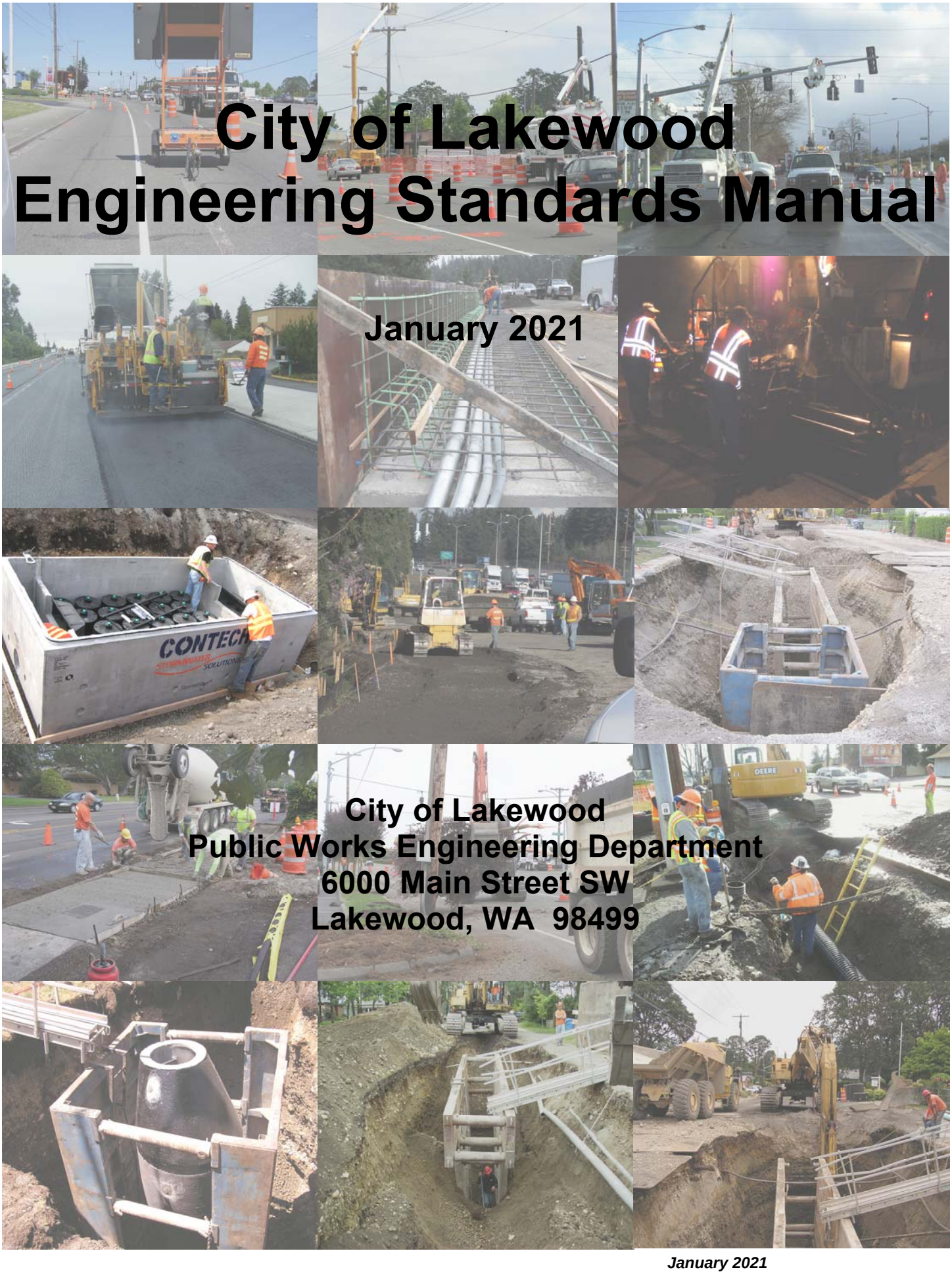

City of Lakewood
Engineering Standards Manual

January 2021

City of Lakewood
Public Works Engineering Department
6000 Main Street SW
Lakewood, WA 98499

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PREFACE

This manual has been prepared to provide a graphic and written representation of minimum standards for construction of public improvements within the public right-of-way, easements, city properties, and on private property relating to development improvements.

This manual is compiled and published by the City of Lakewood Public Works Engineering Department. The intent is to achieve maximum uniformity of engineering and construction practices within the City of Lakewood.

Table of Contents

1.0 General Considerations

All requirements contained in the Engineering Standards Manual, together with any and all amendments thereto, are applicable to all design and construction of private and public development, including utilities, within the City of Lakewood.

The purpose of these standards is to ensure that minimum public safety requirements are met and to provide the most effective and appropriate design elements for the function each street serves. The appropriate design elements should address safety, welfare, appearance, and economics of a street design.

These standards are intended to serve as guidelines to direct the appropriate design features of the street to be built. The standards are to be followed by and are intended to assist professional engineers, planners, and developers to apply their skills and professional judgments in the design of better quality and cost effective streets. The City Engineer will be the final authority in resolving disputes concerning questions of fact in connection with work not covered by these standards.

1.1. References

These standards are intended to be consistent with the most currently adopted provisions and editions of the City's Six-Year Transportation Improvement Program, Comprehensive Plan, other adopted plans and policies, and the works cited below:

- A Policy on Geometric Design of Highways and Streets, published by the American Association of State Highway and Transportation Officials
- Design Manual, published by the Washington State Department of Transportation
- Highway Runoff Manual, published by the Washington State Department of Transportation
- Manual on Uniform Traffic Control Devices (MUTCD), published by the U.S. Department of Transportation as adopted and amended by the State of Washington.
- Pierce County Stormwater Management and Site Development Manual
- Pierce County Standard Drawings
- Soil Survey of Pierce County Area, Washington, published by the Natural Resources Conservation Service, U.S. Department of Agriculture
- Standard Plans, published by the Washington State Department of Transportation
- Standard Specifications for Highway Bridges, published by the American Association of State Highway and Transportation Officials
- Standard Specifications for Road, Bridge and Municipal Construction, published by the Washington State Department of Transportation and the Washington State Chapter of the American Public Works Association

- Stormwater Management Manual for Western Washington, published by the Washington State Department of Ecology, and including Appendix 1 of the Western Washington Phase II Municipal Stormwater Permit, or approved equivalent
- Trip Generation Manual, published by the Institute of Transportation Engineers
- Highway Capacity Manual, published by the Transportation Research Board
- WSDOT Pavement Guide, published by the Washington State Department of Transportation
- ADA Accessibility Guidelines, published by the United States Access Board

1.2. Permits

Permits, approvals, or agreements are required by the City, and sometimes other jurisdictions, prior to the initiation of any construction described within this manual. The majority of work covered under these standards will require multiple permit authority review and approvals.

1.3. Professional Qualifications

Professionals in technical fields including Civil Engineering, Electrical Engineering, Geotechnical Engineering, Landscape Architecture, Soils Engineering, and Surveying who prepare or are responsible for the preparation of drawings, plans and specifications, or technical reports for obtaining permits and approvals shall be currently licensed or registered in the State of Washington and qualified by both experience and educational background in the technical areas as warranted by the specifics of the proposed development project.

1.4. Deviation from Standards

Provisions for deviations from these standards are described in the City of Lakewood Public Works Code, Section 12.04.020.

1.5. Transit Facilities

Transit facilities may be required as part of a development project. Contact Pierce Transit to determine if required; and if so, for design guidelines.

1.6. Survey Control

Survey control for all construction activities shall be based on the following standards:

- Coordinate system: Washington Coordinate System of 1983
- Horizontal datum: North American Datum of 1983/91 (NAD 83/91), South Zone
- Vertical datum: North American Vertical Datum of 1988 (NAVD 88)
- Unit: U.S. Survey Foot

1.7. Quality Assurance and Quality Control Standards

1.7.1 Approval of Materials, Equipment, and Material Sources

The engineer shall be required to provide quality assurance and quality control for all project materials and equipment. The engineer shall review all material submittals to verify that what is supplied and utilized on the project meets the approved plans and specifications. When required by the City, the engineer shall provide all documentation of approval of materials and material

sources, including but not limited to: requests for approval of material (RAMs); catalog cut sheets; shop drawings; and installation manuals.

If upon review of material documentation, the City finds that materials or sources were utilized that do not meet City standards and the approved plans, the permit holder will be required to either: (1) replace unacceptable materials and equipment, or (2) provide a maintenance guarantee to the City as defined in LMC Section 12.05.090.

1.7.2 Testing Requirements

The permit holder will be required to secure a certified independent testing firm to provide quality control testing as outlined in the WSDOT Construction Manual and the requirements outlined below. Some of the more typical testing frequencies and requirements are listed below. All projects must have at least one test completed regardless of quantities. When requested, test results shall be provided to the City prior to final acceptance.

1.7.3 Hot-Mix Asphalt:

- When requested, the permit holder shall provide the City a current, WSDOT-approved HMA mix-design for the mix specified in the plans and specifications.
- A compaction test shall be performed at least every 1,000 LF per lane, per lift.
- When requested, a copy of batch plant tickets showing where, date, and time mix was delivered shall be provided to the City.

1.7.4 Portland Cement Concrete

- When requested, the permit holder shall provide the City a current, WSDOT-approved PCC mix-design for the class specified in the plans and specifications.
- The completed mix shall be sampled for air, temp, slump, and comp. strength.

1.7.5 Backfill, Embankment, and Subgrade

- For backfilling trenches compaction testing shall be performed at a minimum of 2 foot depth increments and at the top of subgrade.

2.0 Public Works Engineering Review Process

The Public Works Engineering Department plan review process is independent of the review processes of all other City departments. Therefore, plans or other materials requiring Public Works Engineering review and approval shall be submitted directly to the Public Works Engineering Department.

2.1. Pre-Application Conference (Optional)

The pre-application conference is strongly encouraged and is scheduled through the Community Development Department. The applicant, and his/her contractor and engineers meet with review staff to discuss their proposal. The purpose of this conference is to prepare the applicant for the project submittal process.

2.2. Fee Schedule

Permit fees shall be paid at the time of permit application in accordance with the adopted fee schedule.

2.3. Plan Checklist

The Plan Set Requirements (Section 3.0 of this manual) are included as a guide to help the engineer in the plan preparation process. The City recommends that these standards be used by the engineer to help facilitate the plan review process.

2.4. Plan Approval and Review Sequence

2.4.1. Submittal Procedure

Plans shall be submitted to the with an appropriate permit application. For proposed street and drainage construction by a developer, complete street plans and profile, together with drainage calculations, supported topography mapping, contributing areas, etc., shall be signed and stamped by the applicant's engineer for the City's review. Plans shall be reviewed by the City according to the date they were submitted. Previously approved plans submitted to the City for revisions shall be considered a new submittal. Approved plans under construction will be reviewed prior to new submittals.

2.4.2. Time Limitation of Approval

Site development permit approval shall be valid for a period of two years, and may be renewed for up to one additional year at the discretion of the City Engineer. Plans not implemented within this time period shall require a new permit and all applicable fees. The new plans shall be subject to code requirements at the time of re-submittal. The new plans shall be submitted with revisions or modifications to the City for review and approval by the City.

2.4.3. Revisions to Approved Plans

When the City has authorized revisions to the approved construction plans, the engineer shall submit to the City record drawings of construction plans, stamped and signed, reflecting the approved revisions in accordance with LMC Section 12.06.000.

3.0 Plan Set Requirements

3.1. Plan Sheets

3.1.1. Formatting Standards

Plan-profile sheets and plan sheets shall use a sheet size of 22" x 34", or 24" x 36". Sheets shall be engineering grade bond paper. All lettering shall be greater than one-eighth (1/8) of an inch high.

The project name, the applicant's and the applicant's engineer's name, address, and telephone number shall be included in the title block. All submitted work shall be stamped by the applicant's engineer before review by the City. Prior to approval, the applicant's engineer shall stamp, sign, and date submitted work.

Typical project plans will include but not be limited to information on streets, grading, stormwater, erosion and sediment control, utilities, channelization, signage, and illumination. Smaller projects may combine information onto fewer sheets when space allows. Regardless of project size, all project plans shall be laid out in a logical, easy to follow sequence.

3.1.2. Cover Sheet

Construction plans submitted to the City for review and approval for streets in a proposed formal plat, short plat, large lot division, or work in existing City right-of-way shall have a plan cover sheet.

The plan cover sheet shall be Sheet 1 of the construction plans and shall contain the following information:

- An approval block containing the following information:

  CITY OF LAKEWOOD PUBLIC WORKS ENGINEERING DEPARTMENT

  APPROVED THIS _____ DAY OF _____, 20___
  BY THE CITY OF LAKEWOOD PUBLIC WORKS ENGINEERING DEPARTMENT

  _____
  CITY ENGINEER OR DESIGNEE

- An overall site plan drawn to an appropriate scale; such as, 1" = 100', 1" = 200', or 1" = 400' showing the entire development and street system network including its connection to an existing City street or State highway.
- Section, Township, and Range on each page, plat, or project name.
- North arrow pointing to the top or to the right side of the sheet.
- The project's storm sewer system along with easements, tracts, drainage facilities, all buffer and screening areas, off-site and on-site natural drainage courses or areas shall be shown on the overall site plan.
- Soil logs and soil log locations when an on-site storm drainage percolation system is proposed.
- A vicinity map drawn to a scale of 4" = 1 mile or other similar scale, showing project site, existing public street system and any other pertinent information.
- Standard notes which are applicable to the project.
- When more than three (3) sheets are used, a table of contents shall be shown.

At the City Engineer's discretion, cover sheet information may be shown on additional sheets.

3.2. Submittals

3.2.1. First Submittal

The first submittal shall include but not be limited to the following: two sets of prints of plans, profiles, and detail sheets, stormwater calculations, and site distance calculations and exhibits if necessary.

3.2.2. Final Submittal

Red line drawings (marked up plans) and three sets of corrected plans, containing the following information shall be included in the final submittal:

- Corrected plans, profiles, and detail sheets.
- Corrected stormwater calculations if necessary.
- Quantity take-off and engineer's cost estimate of proposed construction when the project is required to have a financial guarantee.

3.3. General Site Plans

3.3.1. General Site Plan Standards

The following information shall be included on site plans:

- Plans shall be drawn at a scale range of 1" = 20' to 1" = 40'. Details for clarification may be shown on a more convenient scale.
- Identification of all existing City streets and adjoining subdivisions when it is pertinent to the scope of the project.
- Right-of-way lines and width for proposed street(s) and intersecting streets.
- Dimensioned lot lines and lot numbers to properly locate and dimension all tract and easement areas.
- All topographic features within right-of-way limits and sufficient area beyond to resolve questions of setback, slope, drainage, access onto abutting property, and street continuations. This shall include, but is not limited to, ditch flow lines, all drainage structures with invert elevations, utility locations, fences, structures, existing curbing and approaches, pertinent trees and shrubbery, and other appurtenances which would affect the construction of the project.
- Existing and proposed contours at 2-foot intervals.
- Field topographic information including contour lines of the property in its natural undeveloped condition. City or USGS topographic mapping must be field verified and supplemented with additional field topographic information when necessary to provide an accurate depiction of the property. Field topographic information submitted for the project's storm drainage plan does not have to be duplicated on the street construction plans. A 2-foot contour interval shall be used except when the property is extremely flat or undulating and the cross slope varies or when pothole areas, wetlands, swales, or drainage courses exist on the property, then a topographic map with 1-foot contour intervals shall be required. Topographic surveys shall be stamped and signed by a Washington State licensed professional land surveyor.
- Utility locations (new and existing) for: water system, sanitary sewer system, gas, telephone, power, cable TV.
- Delineation of critical areas.

- Lakes, rivers, streams, flood plains, wetlands, sensitive slopes, and other sensitive areas.
- Limits and elevations of 100-Year Flood Plain, including delineation of the floodway and flood fringe where applicable.

3.3.2. General Site Plan Notes

The following general notes shall be shown on site plans.

GENERAL NOTES:

1. All work in City right-of-way requires a Right-of-Way permit from the City of Lakewood.
2. After completion of all items shown on these plans and before acceptance of the project, the contractor shall obtain a "punch list" prepared by the City's inspector detailing remaining items of work to be completed. All items of work shown on these plans shall be completed to the satisfaction of the City prior to acceptance of the project.
3. All materials and workmanship shall conform to the City of Lakewood Public Works Code, Engineering Standards Manual, and other referenced manuals or documents.
4. A copy of these approved plans, specifications, and details shall be on site during construction.
5. Any revisions made to these plans must be reviewed and approved by the developer's engineer and the City Engineer prior to any implementation in the field. The City shall not be responsible for any errors and/or omissions in these plans.
6. The contractor shall have all utilities verified on the ground prior to any construction. Call 811 or 1-800-424-5555 (Call Before You Dig Hotline) at least 48 hours in advance. The applicant and applicant's engineer shall be contacted immediately if a conflict exists.
7. Any structure and/or obstruction which require removal or relocation relating to this project shall be done so at the developer's expense.
8. Locations of existing utilities are approximate. It shall be the contractor's responsibility to determine the true elevations and locations of hidden utilities. All visible items shall be the engineer's responsibility.
9. The contractor shall install, replace, or relocate all signs, as shown in the plans or as affected by construction.
10. All construction surveying for extensions of public facilities shall be done under the direction of a Washington State licensed professional land surveyor or professional civil engineer.
11. During construction, all public streets adjacent to this project shall be kept clean of all material deposits resulting from on-site construction, and existing structures shall be protected as directed by the City.
12. Certified record (as-built) drawings are required prior to project acceptance per LMC Section 12.06.010.
13. A NPDES Construction Stormwater General Permit & Coverage may be required by the Washington State Department of Ecology for this project. Contact the Department of Ecology for more information.

14. Any disturbance or damage to Critical Areas and associated buffers, or significant trees designated for preservation and protection shall be mitigated in accordance with a Mitigation Plan reviewed and approved by the City of Lakewood Community Development Department. Preparation and implementation of the Mitigation Plan shall be at the developer's expense.

3.4. Roadway Plans

3.4.1. Horizontal Plan

Horizontal plan elements shall include the following in addition to those items required on the cover sheet when a cover sheet is not required. The horizontal plan shall be drawn at the scale range of 1" = 20' to 1" = 40'. Details for clarification may be shown on a more convenient scale.

- Street alignments with 100-foot stationing, preferably increasing to the north or east and reading from left to right, and stationing at points of curve, tangent, and intersection, with ties to section or quarter corners or other established survey control points at the intersection of the proposed street or streets and the existing City street. All lettering shall be right reading.
- Bearings on street centerline.
- Curve data including radius, delta, and arc length for all horizontal alignments.
- Typical street way cross-section(s) of proposed street.

3.4.2. Roadway Plan/Profile Sheets

Off-site and on-site plans shall be on separate sheets.

On-site plans are generally only prepared on plan sheets. When cross-sections for grading plans or profiles for sanitary sewer lines are required, the profile shall be drawn on the plan/profile sheets.

Off-site plans shall be on plan/profile sheets. Each sheet shall have the corresponding plan/profiles on the same sheet with aligned stationing.

Plan/profile elements shall include the following:

- Vertical scale of 1" = 5'. Clarifying details may be done to a more convenient scale.
- Original ground line at 100-foot stations and at significant ground breaks and topographic features, with accuracy to within 0.2 feet on unpaved surface and 0.02 feet on paved surface.
- Survey control shall be in accordance with Section 1.6 of this manual. Established USC&GS control or City bench marks shall be used when they are located within one-half mile of the project.
- Street names.
- Right-of-way and width; lot/subdivision lines and street addresses.
- Right-of-way radii.

- Curb-to-curb pavement width.
- When streets end at a property line, continue the existing ground profile for a minimum of 200 feet to show that the proposed vertical alignment is reasonable.
- Center line bearings.
- Center line/baseline stationing.
- Center line elevations at 50-foot intervals, except as otherwise stated.
- Street grade and vertical curve data; street to be measured at centerline.
- Horizontal curve datum at center line.
- Centerline grade shall be in percentage (%).
- When intersecting profile grades have a difference of 1% or less, a vertical curve is not required. All other vertical grade intersections will require a vertical curve.
- Include gutter line elevations at 25-foot intervals, and the beginning, end, and other critical locations throughout the project limits.
- Accurate locations of monuments at all center line intersections, cul-de-sacs, and other geometric reference points.
- Identification of horizontal or vertical utility conflicts.
- Final street and storm drain profile with stationing the same as the horizontal plan, preferably reading from left to right, to show stationing of points of curve, tangent, and intersection of vertical curves, with elevations to 0.01 feet for each street in the project.
- Length, type, and location of curb and gutter.
- Intersection gutter line elevations at ¼ points and right-of-way curve.
- Intersection elevation datum at ¼ points of radii.
- Location, length, width of sidewalks, and driveways.
- Wheelchair ramp locations.
- Mailbox design and/or placement/replacement.
- Street landscaping and irrigation.
- Height and profile of existing or proposed retaining structures.
- Measures for protection of trees and/or landscaping required to be retained.

3.4.3. Roadway Plan Notes

The following notes shall be shown in the plans.

ROADWAY NOTES:

1. All work in City right-of-way requires a Right-of-Way permit from the City of Lakewood. Prior to any work commencing, the general contractor shall arrange for a preconstruction

meeting to be attended by all major contractors, representatives of involved utilities, and the City of Lakewood. Contact the City of Lakewood Public Works Engineering Department to schedule the meeting. The contractor is responsible to have their set of plans at the meeting.

2. For work in City right-of-way inspections are required at the following construction stages:

   Inspection No. 1: Clearing and grubbing, embankment and excavation, underground drainage, when trenching and placement of pipe are complete but prior to cover or temporary water detention/retention and siltation control

   Inspection No. 2: General roadway, when the drainage system, underground utilities, and grading to suitable subgrade are complete, including gravel ballast if required

   Inspection No. 3: General roadway, when the crushed gravel surfacing has been placed

   Inspection No. 4: General roadway, while the paving is in progress

   Inspection No. 5: Overall roadway, after paving, cleaning of drainage system and all necessary cleanup, striping, buttoning, monuments, and all delineation work

3. Monuments shall be installed at all street intersections, at angle points, and points of curvature in each street. All boundary monuments must be installed according to the Washington State Subdivision laws.
4. Signage and traffic control devices are safety items and shall be installed prior to issuance of any certificate of occupancy. All signage shall be in accordance with the MUTCD.
5. Sidewalks, driveways, and other improvements identified in the preliminary plat approval shall be installed prior to final plat approval unless a financial guarantee has been granted for the installation of said improvements.
6. Prior to any sign or striping installation or removal the Contractor shall contact the City to arrange for an on-site meeting to discuss placement and uniformity.
7. New or revised stop signs, yield signs, and traffic signals shall be advance-warned using the procedure outlined in the MUTCD. Advance warning signs and flags shall be maintained by installer for 30 days and then removed.

3.5. Stormwater Plans

3.5.1. Stormwater Plan and Detail Sheets

The following information shall be included in stormwater plans:

- Two cross-sections of each retention/detention pond or infiltration system showing original ground, property lines, slope catch points, and all other pertinent information to adequately construct the facilities.
- Existing and proposed drainage features, indicating direction of flow, size, and kind of each drainage channel, pipe, and structure. The status of existing drainage structures must be clarified as either "existing-retain," "existing-abandon," or "existing-remove."
- Retention/detention systems including:

- Volume of storage provided
- Storage elevation
- Storage/ponding limits
- Overflow elevation and location
- Discharge control orifice size
- Roof drain connections
- Bypass area
- Stabilization/erosion control
- Water quality features

- Storm pipe including locations, lengths, materials, slopes, depths, and sizes
- Manholes and catch basins including location, types, and rim and invert elevations
- All new and existing manholes and catch basins shall be numbered consecutively.
- Typical ditch cross-sections shall be shown on the plans.
- Public utility easement and private easement widths and locations
- Identify any possible utility conflicts.
- Roof drains
- The distance from the center line of pipes to any building structure
- An all-weather maintenance access to all structures, ditches, ponds, etc., including typical cross-section of said access road
- Natural drainage ways

3.5.2. Stormwater Plan Notes

The following applicable notes shall be shown on the plans.

STORMWATER NOTES:

1. During construction and until final site stabilization, all existing and newly installed drainage structures shall be protected from sediments.
2. All drain pipes shall be laid on a properly prepared foundation in accordance with WSDOT Standard Specifications, Section 7-08. This shall include necessary leveling of the trench bottom or the top of foundation material as well as placement and compaction of required bedding material to uniform grade so that the entire length of pipe will be supported on a dense unyielding base. If native material in the trench bottom meets requirements for WSDOT "Gravel Backfill for Pipe Bedding", then the first lift of pipe bedding may be omitted provided the trench bottom material is loosened, regraded and compacted to form a dense unyielding base.

3. All paved areas shall drain to catch basins. Run grade in straight line/plane between spot elevations shown on the plans. Make adjustments in grade to avoid standing water. Take special care at catch basins to avoid "bird baths" in surrounding pavement.
4. All catch basin grates shall be adjusted to final grades upon completion of paving.
5. All storm drain mains shall be television inspected prior to final acceptance by the City. A copy of the inspection data shall be provided to the City.

3.6. Grading, Erosion, and Sediment Control Plans

3.6.1. Grading, Erosion, and Sediment Control Plan Sheets

The following information shall be included in the grading, erosion, and sediment control plans:

- Drawings shall be to scale.
- The type and locations of fill material and compaction requirements.
- Limits of grading, clearing, filling, and excavation.
- The fill and/or excavation quantities in cubic yards.
- Existing and proposed contours at 2-foot intervals.
- A minimum of one cross-section.
- Construction entrance.
- Proposed sequence of construction that will provide the maximum drainage and erosion control during construction.
- Perimeter ditches to control water flow.
- Siltation control measures to protect adjacent properties.
- When silt fences are required, show the location with a typical fence detail. Silt fences will usually be required unless site work is lower than the surrounding property.
- Storm Retention/Detention features as follows:
    - How water quality and quantity will be controlled.
    - Ponding limits showing the high water elevations.
    - Existing and proposed storm pipes including locations, lengths, materials, slopes, depths, sizes, rims, and inverts.
    - The location, number, and type of manholes and catch basins.
    - Measures taken to prevent silt laden water from entering the public storm system.
    - Storm pipes and control structures that are temporary and not part of the final storm system.
    - The highest groundwater elevation.
- Critical areas and associated buffers.

- All existing trees that are proposed to be removed, or retained, as required in the Tree Retention Plan issued by the Community Development Department. The location, size and species of each tree shall be shown.

3.6.2. Grading, Erosion, and Sediment Control Plan Notes

The following applicable notes shall be shown on the grading, erosion, and sediment control plans.

GRADING, EROSION AND SEDIMENTATION CONTROL NOTES:

1. On-site inspections are required at the following construction stages:

   Inspection No. 1: Installation of erosion control facilities prior to clearing

   Inspection No. 2: Completion of clearing

   Inspection No. 3: Upon completion of excavation, filling, and earthwork

   Inspection No. 4: Completion of project

   Inspection No. 5: As needed to determine compliance with approved plans and/or specifications

2. All limits of clearing and areas of vegetation preservation as prescribed on the plans shall be clearly flagged in the field and observed during construction.
3. All temporary sedimentation and erosion control measures, and protective measures for critical areas and significant trees shall be installed prior to initiating any construction activities.
4. All required sedimentation and erosion control facilities must be constructed and in operation prior to any land clearing and/or other construction to ensure that sediment laden water does not enter any existing drainage system. The contractor shall schedule an inspection of the erosion control facilities PRIOR to any land clearing and/or other construction. All erosion and sediment facilities shall be maintained in a satisfactory condition as determined by the City, until such time that clearing and/or construction is completed and the potential for on-site erosion has passed. The implementation, maintenance, replacement, and additions to the erosion and sedimentation control systems shall be the responsibility of the permittee.
5. The erosion and sedimentation control system facilities depicted on these plans are intended to be minimum requirements to meet anticipated site conditions. As construction progresses and unexpected or seasonal conditions dictate, facilities will be necessary to ensure complete siltation control on the site. During the course of construction, it shall be the obligation and responsibility of the permittee to address any new conditions that may be created by their activities and to provide additional facilities, over and above the minimum requirements, as may be needed to protect adjacent properties, sensitive areas, natural water courses, and/or storm drainage systems.
6. Any disturbed area which has been stripped of vegetation and where no further work is anticipated for a period of 7 days or more during the dry season (May 1 – Sept 30) or 2 days or more in the wet season (Oct 1 – Apr 30), shall be immediately stabilized with mulching, grass planting, or other approved erosion control treatment applicable to the time of year in question. Grass seeding alone will be acceptable only during the months of May through

September inclusive. Seeding may proceed outside the specified time period whenever it is in the interest of the permittee but shall be augmented with mulching, netting, or other treatment approved by the City.

7. In case erosion or sedimentation occurs to adjacent properties, all construction work within the development that will further aggravate the situation must cease, and the owner/contractor shall immediately commence restoration methods. Restoration activity will continue until such time as the affected property owner is satisfied.
8. No temporary or permanent stockpiling of materials or equipment shall occur within critical areas or associated buffers, or the critical root zone for vegetation proposed for retention.

3.7. Utility Plans

3.7.1. Utility Plan Sheets

The following information shall be included in the utility plans:

- The plans shall be drawn at the scale range of 1” = 20’ to 1" = 40'. Details for clarification may be shown on a more convenient scale.
- Street alignments with 100-foot stationing, preferably increasing to the north or east and reading from left to right, and stationing at points of curve, tangent, and intersection, with ties to section or quarter corners or other established survey control points at the intersection of the proposed street or streets and the existing City street. All lettering shall be right reading.
- Street names.
- Utility locations with details and cross-sections.
- Identification of horizontal or vertical utility conflicts.

3.8. Channelization, Signage, and Illumination Plans

3.8.1. Channelization, Signage, and Illumination Plan Sheets

The following information shall be included in the channelization, signage, and illumination plans:

- The plans shall be drawn at the scale range of 1” = 20’ to 1" = 40'. Details for clarification may be shown on a more convenient scale.
- Street alignments with 100-foot stationing, preferably increasing to the north or east and reading from left to right, and stationing at points of curve, tangent, and intersection, with ties to section or quarter corners or other established survey control points at the intersection of the proposed street or streets and the existing City street. All lettering shall be right reading.
- Street names.
- Right-of-way and width.
- Curb-to-curb pavement width.

- Right-of-way radii.
- Channelization locations and details.
- Sign locations and details.
- Street light locations and details.
- Lighting calculations to be provided separate as required by the City Engineer.

3.9. Project Record Drawings

Certified record drawings (also known as "as-built drawings") shall be provided by a Washington State licensed professional civil engineer or surveyor and shall accurately reflect all field design revisions made during the construction process. Record drawings shall be in accordance with LMC Section 12.06.010. All required information shall be clearly shown on the original design drawings approved by the City of Lakewood. Each sheet of the record plans shall include the following statement along with the applicants' engineer's or surveyor's stamp, signed and dated, located at the bottom right-hand corner of the sheet when possible:

> "These plans are record drawings and the information shown accurately reflects existing field conditions as of this date: _____."

The record plans should include all existing or abandoned utilities that were encountered during construction that were not shown in the design plans. The following required information is intended to provide a minimum guide to the engineer of record and should be used along with good engineering practices as the type of project and situation warrants.

3.9.1. Public/Private Streets

- Center line elevations at 50-foot intervals
- Center line slopes and vertical curve data
- Gutter line elevations at 25-foot intervals
- Gutter line slopes and curve data
- Gutter line elevations at intersections and as applicable
- Driveways: Locations, lengths, and types
- Channelization: Locations and types
- Signing: Locations and types
- Illumination: Locations, types, heights, and wattages
- Service cabinets: Locations and types
- Junction boxes: Locations and types
- Conduits/Wire: Locations, types, sizes, and depths
- Controller cabinet: Locations and types
- Signalization: Locations, types, heights, and foundation depths and sizes

- Right-of-Way: Locations and widths
- Easements: Locations and widths
- Location, types, and sizes of gas, power, phone, and cable TV lines
- Center line monument locations (property monuments if a plat)
- Sidewalks/planter strip: Locations and width

3.9.2. Stormwater

- Manholes/catch basins: Locations, types, rim and invert elevations
- Storm lines: Locations, lengths, slopes, and sizes
- Public utility easements: Locations and widths
- Retention/detention systems:
    - Volume of storage provided
    - Storage elevation
    - Storage/ponding limits
    - Overflow elevation and location
    - Discharge control orifice size
    - Roof drain connections
    - Bypass area
    - Stabilization/erosion control
    - Water quality features
- All storm drainage systems shall include the following statement: "The storm drainage system has been constructed in conformance with the approved plans and is functioning as designed."
- Connections and/or points of discharge to critical areas

3.9.3. Water

- Water lines: Materials, lengths, sizes, and locations
- Water valves: Locations and types
- Fire hydrants: Locations and types
- Water meters: Sizes and locations
- Water services: Sizes, locations, and materials
- Public utility easements: Locations and widths

3.9.4. Sanitary Sewer:

- Manholes: Locations, types, rim/invert elevations

- Sewer line: Materials, locations, lengths, slopes, and sizes
- Side sewers: Materials, locations relative to property lines and sewer manholes in the street, lengths, slopes, sizes, depth below finish grade at property line, and inverts
- Public utility easements: Locations and widths

4.0 Roadway Standards

4.1. Street Classifications

The City of Lakewood has four street classifications: Principle Arterial, Minor Arterial, and Collector Arterial, and Local Access. Street classifications are further described in LMC Section 12.09.020. Streets not identified as arterials are Local Access streets. Street widths and right-of-way widths are described in the appendices.

4.2. Location of Streets

The location of all streets shall conform to the Lakewood Six-Year Transportation Improvement Program, Comprehensive Plan and other adopted plans and policies. All proposed street systems shall extend existing streets at the same or greater width, but in no case less than the required minimum width.

4.3. Cross-sections

Streets shall be constructed in accordance with the Public Works Code and Engineering Standards Manual. When an existing road is to be widened, upon approval from the City Engineer, the transverse slope of the new portion of roadway may vary ±1% from the existing road slope. The new transverse slope shall not to be less than 1% or more than 4%. If the transverse slope cannot be maintained within the 1% to 4% limits, the existing roadway shall be removed and replaced to City standards or overlaid with a minimum of 1 ½ inches HMA Cl. ½" PG 64-22 pavement.

4.4. Intersections

4.4.1. Intersections of Streets and Arterials

Streets intersecting with existing or proposed public highways and principal or minor arterials shall be minimized and are subject to review and approval by the City Engineer.

4.4.2. Intersection Spacing

Intersections should be located as follows:

- Spacing between principal arterials shall be approximately one mile.
- Spacing between principal arterials and minor arterials shall be approximately one-half mile.
- Spacing between principal/minor arterials and collectors shall be approximately one-quarter mile.
- Street intersection offsets or jogs with centerline offsets of less than 125 feet shall not be allowed.

- Streets are to intersect at 90 degrees (preferred) ± 20 degrees measured at centerline intersects.

4.4.3. Intersection Geometry

The geometric design at intersections to achieve drainage shall meet the following requirements:

- At the intersection of different classifications of streets (e.g., a minor arterial with a collector), the center line slope and typical cross-section should be carried through the intersection of the higher classified street with the lower classified street matching in a manner which will not interfere with the slope or cross-section of the higher classified street.
- Where the same class of streets intersect (e.g., residential with residential), the center line and slopes should be matched at the center line of the intersection with cross slopes varying through the intersection to allow drainage, unless directed otherwise by the City Engineer.

4.5. Cul-De-Sacs

Cul-de-sacs shall not exceed 500 feet in length measured from the edge of the intersecting roadway to the opposite limits of the cul-de-sac. The radius to face of curb shall be no less than 45 feet. The right-of-way radius shall be no less than 50.5 feet.

4.6. Temporary Turn-Around and Street Ends

Where, in the opinion of the City Engineer, it is desirable to provide for street access to adjoining property, proposed streets shall be extended by dedication to the boundary of such property. Such cul-de-sac streets shall be provided with a paved temporary turn-around having a roadway radius of at least 35 feet on a temporary easement. Such temporary easement shall be automatically released upon the extension and construction of said street beyond the boundary of the original subdivision. These streets shall have a type III barricade installed across the entire width of the roadway at the end of the driving surface with adequate signage provided.

4.7. Dead End Streets/No Outlet Signs

Dead end streets shall be signed with a “Dead End” sign at the entrance to the street. Dead end streets that are planned to be extended in the future shall have a type III barricade installed across the entire width of the roadway at the end of the driving surface with adequate signage provided.

A street network which has only one point of ingress/egress shall have a “No Outlet” sign located at the entrance.

4.8. Alleys

Alleys may be provided as a secondary means of vehicular or pedestrian access to abutting property. Alley right-of-way width shall be at least twenty feet wide.

4.9. Change in Roadway Width

When an existing road is required to be widened a taper of length (L), not less than that calculated using the equations below, shall be provided at the transition point where the direction

of traffic goes from the wider roadway to the narrower roadway. Where the direction of travel goes from narrower to wider a taper rate of 5:1 shall be used. Applicable channelization and signage shall be provided in accordance with the MUTCD.

$L = S \times W$ for speeds of 45 mph or more
$L = WS^2/60$ for speeds of 40 mph or less

Where:
L = Minimum length of taper in feet
S = Posted speed limit in mph
W = Width of offset in feet

4.10. Access Easements and Tracts

An access easement may be used to serve up to four lots. Private access roads in tracts may serve any number of lots. The standards in this section apply to access easements and tracts.

The proposed development shall be reviewed for adequate ingress and egress to all proposed lots. Extension of streets or access rights from property line to property line of the short subdivision land may be required in order that such street access may be extended in the future.

If there is other reasonable access available, the City Engineer may limit the location of direct access to City arterials or other City streets. A right-of-way that is proposed to be dedicated to the City shall meet City standards.

When an adjoining landowner will be obligated to construct or maintain a future road, a note to this effect shall be stated on the face of the recording document.

Existing legal easements less than the required width may be allowed to remain. However, additional lots shall not be served with such existing easement unless widened to the minimum required width.

The minimum easement and pavement widths are shown in the following table:

Number of Dwelling Units	Minimum Easement Width	Minimum Pavement Width	Minimum Pavement Setback From Property Line
1-2	20 feet	15 feet	2.5 feet
3-4	30 feet	20 feet	5 feet
5 or more	Must be built to local road standards.		
Non-Residential	24	24	0

Note: Easement and pavement widths are also subject to emergency vehicle access requirements.

4.11. Road Reserved Areas

Where a City street or arterial may be, or is being planned for the short subdivision land area, the City Engineer may require that a right-of-way area be dedicated for a future street.

4.12. Flag Lot Access

A flag lot may be permitted with stem access, provided the stem shall have a minimum easement width of 20 feet and a maximum length of 200 feet, and shall serve no more than one lot.

5.0 Curb, Gutter and Sidewalk Standards

5.1. Curb and Gutter

Concrete curb and gutter shall be constructed in accordance with the Lakewood Public Works Code and Engineering Standards Manual. Curb cuts may be allowed to accommodate low impact development best management practices.

5.2. Driveways and Driveway Approaches

Driveways shall be constructed in accordance with the Lakewood Public Works Code and Engineering Standards Manual. Type of driveway to be constructed shall be the same as other driveways within the project area as determined by the City Engineer. Grading and restoration of the private street or driveway beyond the end of the street approach shall be done to provide a smooth, passable, and safe transition to the existing or proposed facility.

5.3. Sidewalks

Sidewalks shall be provided on public and private streets in accordance with the Lakewood Public Works Code and Engineering Standards Manual. After the removal of the forms, the sidewalk shall be backfilled and the right-of-way restored to the satisfaction of the City.

5.4. Curb Ramps

All curb ramps shall conform to ADA requirements. The ramp centerline shall be perpendicular to or radial to curb returns unless otherwise approved by the City Engineer. When ramps are constructed on one side of a street, ramps shall be constructed at corresponding sidewalk locations on opposite sides of the street.

All curb ramps on public streets shall include truncated domes. All truncated domes shall be pre-cast concrete and shall be mortared in place. Truncated domes shall be red in color at controlled intersections; and yellow in color at uncontrolled intersections. No plastic truncated domes are allowed. Retrofitted curb ramps adding truncated domes may use pre-cast concrete or surface applied liquid plastic (Vanguard or equivalent).

6.0 Pavement Standards

6.1. Hot-Mix Asphalt (HMA) Pavement

The design of flexible (Hot-Mix Asphalt (HMA)) pavements shall be based on the latest AASHTO Guide for Design of Pavement Structures. The following criteria shall be used:

a) Traffic requirements based on acceptable engineering procedures starting with recent traffic counts. Type of traffic loadings shall be based on anticipated loadings paying close attention to number and types of trucks and bus loadings. Growth rate shall be 2.0% unless otherwise approved by the City Engineer. A 50/50 split in the direction of traffic shall be assumed. One hundred percent (100%) of the 50/50 split must be assumed in the design lane.

b) Design life for flexible pavements shall be twenty (20) years.

c) The soil support capacity by Resilient Modulus (Mr), Resistance R-value or California Bearing Ratio (CBR) shall be determined from actual soils analysis. Soils tests shall consist of one sample per each 500 LF centerline with three minimum per project representative of the roadway subgrade to determine a statistical representation of the existing soil condition. An engineering firm specializing in soils analysis shall perform the tests and the soils report shall accompany the pavement design.

d) The reliability factor, R and overall standard deviation, So will be as follows:

    a. For principal, minor, and collector arterials: R = 85% and So = 0.45

    b. For local access roads: R = 80% and So = 0.45

e) All vehicle loadings, including automobiles shall be converted to 18-KIP equivalent single axle loads (ESALs). Show load factors in calculations.

f) Terminal Serviceability Index shall be 2.5. Initial Serviceability Index shall be 4.2.

g) Structural coefficients shall be according to AASHTO recommendations, local conditions, and approved by the City of Lakewood.

6.2. Portland Cement Concrete (PCC) Pavement

The design of Portland Cement Concrete (PCC) pavement shall be based on latest AASHTO Guide for Design of Pavement Structures. The following criteria shall be used:

a) Traffic requirements based on acceptable engineering procedures starting with recent traffic counts. Type of traffic loadings shall be based on anticipated loadings paying close attention to number and types of trucks and bus loadings. Growth rate shall be 2.0% unless otherwise approved by the City Engineer. A 50/50 split in the direction of traffic shall be assumed. One hundred percent (100%) of the 50/50 split must be assumed in the design lane.

b) Design life for rigid pavements shall be fifty (50) years.

c) The soil support capacity by Resilient Modulus (Mr), Resistance R-value or California Bearing Ratio (CBR) shall be determined from actual soils analysis. Soils tests shall consist of one sample per each 500 LF centerline with three minimum per project representative of the roadway subgrade to determine a statistical representation of the existing soil condition. An engineering firm specializing in soils analysis shall perform the tests and the soils report shall accompany the pavement design.

d) The reliability factor, R and overall standard deviation, So will be as follows:

    a. For principal, minor, and collector arterials: R = 85% and So = 0.45

    b. For local access roads: R = 80% and So = 0.45

e) All vehicle loadings, including automobiles shall be converted to 18-KIP equivalent single axle loads (ESALs). Show load factors in calculations.

f) Terminal Serviceability Index shall be 2.5. Initial Serviceability Index shall be 4.5.

g) Structural coefficients shall be according to AASHTO recommendations, local conditions, and approved by the City of Lakewood.

h) All transverse joints shall be doweled

6.3. Minimum Pavement Sections

The following minimum pavement sections shall be utilized.

Minimum Pavement Sections

	Principal and Minor Arterials	Collector Arterials	Local Access
HMA Pavement	6.0 inches HMA 4.0 inches crushed surfacing base course	4.0 inches HMA 4.0 inches crushed surfacing base course	3.0 inches HMA 4.0 inches crushed surfacing base course
PCC Pavement	10.0 inches PCC	10.0 inches PCC	N/A

6.4. Pavement Materials

a) HMA pavements shall be HMA ½" PG 64-22. All HMA shall be a WSDOT approved mix design. Certified mix designs shall be submitted to the City of Lakewood prior to commencing paving.
b) Recycled materials for roadway sections will only be allowed if approved by the City Engineer.
c) Permeable pavement will be allowed where practicable.

6.5. Roadway Widening

a) Existing HMA shoulders shall not be used as new driving lanes for roadway widening unless subsurface investigations confirm there is an existing pavement section that is better or equal to the required HMA design. Substandard shoulder pavement sections shall be removed and replaced.
b) Roadway widening shall be accomplished so that no longitudinal joint is within any wheel path.
c) Additional pavement restoration may be required per Section 6.8 of these Pavement Standards.

6.6. Pavement Construction

All pavement construction shall be in accordance with the WSDOT Standard Specifications except as modified herein.

a) Compaction tests shall be performed by an approved geotechnical or testing firm under the direction of a professional engineer registered in the State of Washington. Copies of the reports shall be furnished to the City of Lakewood inspector within 24 hours of testing.
b) Compaction tests shall be performed for every 400 tons of HMA and no less than 2 locations per lift of HMA. Compaction tests shall be performed on subgrade at 150 foot intervals. Compaction tests shall be performed on top course at 150 foot intervals.
c) HMA shall be compacted in lifts not to exceed 0.25' except that the final lift shall not exceed 0.17' unless approved by the City Engineer. The minimum compacted depth of HMA shall be 0.125'.

d) Base course (crushed surfacing) shall be compacted in depths not to exceed 0.50' except the top course shall be 0.17' unless otherwise directed. Density shall be 95% of ASTM D1557.

e) The prepared subgrade shall be compacted in the top 0.50' to 95% of ASTM D 1557. If the underlying subgrade is too soft to permit compaction of the upper 6" layer, the contractor shall over excavate and remove, and compact the subgrade until the top layer can meet compaction requirements. Fill sections shall be prepared in accordance with the Standard Specifications Section 2-03.3(14)C, Method B except ASTM D1557 shall determine the maximum density.

f) Where HMA is placed in lifts, tack coat in accordance with the Standard Specifications shall be used unless the lifts are placed on the same day and approved by the Director.

g) In areas where soft subgrades require stabilization, approved geotextile may be used and/or soil stabilization may be used. Stabilization designs shall be provided by a professional engineer licensed in the State of Washington and are subject to approval by the City of Lakewood.

h) Adjustment of utilities shall be per City of Lakewood Standard Plans. Developers are required to coordinate with effected utilities on utility adjustments and shall replace utility-provided castings as required by the affected utility.

6.7. Trench Restoration

a) Trenches shall be constructed and restored according to the Standard Specifications and City of Lakewood Standard Plans.

b) Where cuts have been made in either HMA, or in Bituminous Surface Treatment (BST) (aka. Oil mats), the contractor shall reconstruct the trench areas with a minimum three (3) inch HMA pavement placed on six (6) inches of crushed surfacing top course (CSTC). In all cases, the pavement section shall meet or exceed the existing pavement section.

c) Additional pavement restoration may be required per Section 6.8 of these Pavement Standards.

d) Pavement Cutting – All pavements shall be neatly saw cut or edge ground prior to pavement restoration.

e) Compaction tests shall be performed on all trench lines, four (4) feet below sub-grade and at sub-grade every 150 feet.

6.8. Pavement Restoration

a) Introduction. Trench cuts in roadways greatly degrade the condition of the pavement, as well as reduce the design life. The most significant damage can be seen in newer pavements. A restored trench cut in a newly paved road lowers the Pavement Management System (PMS) rating up to 30 points (on a scale of 0 to 100).

b) Pavement Cuts. Trench and pavement cuts are subject to a Pavement Degradation Fee.

1. Pavement Degradation Fee. To recover loss in pavement serviceability and improve the City's capacity to handle future repair and/or reconstruction costs of streets with pavement cuts, a Pavement Degradation Fee shall be applied to all excavations in the

public ROW by utilities companies or any other persons or agencies that are permitted to install, replace, or repair approved underground equipment, services, or structures.

i. Pavement Degradation Fees shall apply to the pavement excavation area plus the area three (3) feet around the excavation edges, pursuant to the established rate per square yard.
ii. For all streets with a PCI 50 or above, the City shall charge a Pavement Degradation Fee equal to the total material and labor costs of repairing the pavement patch plus the area three (3) feet around the excavation edges, pursuant to the established rate per square yard found in the City of Lakewood Fee Schedule.
iii. Moratorium. Pavement cuts are not allowed for five years after any of the following: new construction, reconstruction, and overlays. When pavement cuts are unavoidable in moratorium, the City shall, in addition to requiring restoration of the pavement, charge a Pavement Degradation Fee equal to the total material and labor costs of repairing the pavement patch plus the area three (3) feet around the excavation edges, pursuant to the established moratorium rate per square yard in the City of Lakewood Fee Schedule, regardless of PCI. Restoration of pavement cuts shall done in accordance with the table in Section 6.8(d).
iv. For projects which meet the definition of Large Projects in this manual, the Pavement Degradation Fee will apply only to the seam length abutting any non-reconstructed roadway and applied to a three (3) foot width centered on the seam. These projects may be granted an exemption from the Pavement Degradation Fee if the pre-existing pavement seam is removed and replaced as part of the lane-width reconstruction process at the request of the permittee and after verification by the City Public Works Engineering staff at the discretion of the City Engineer.
v. Potholing and small pavement patches are not exempt from Pavement Degradation Fees as pavement cuts of any size degrade the condition of the roadway. A minimum fee will be applied for one square yard should the measured impact be less than this size.
vi. Pavement Degradation Fees shall be determined pursuant to the adopted City of Lakewood Fee Schedule.
vii. Pavement cuts within roadways deemed to be built up over time from a dirt road overlaid with repeating layers of chip seal applications may be granted an additional 50% reduction of the assessed Pavement Degradation Fee for that portion of the project within that type of roadway at the request of the permittee and after verification by City Public Works Engineering staff at the discretion of the City Engineer.

c) Lane width restoration requirements. For longitudinal utility trench cuts in pavements over five years old, a minimum 2-inch overlay or full-depth pavement reconstruction is required for the following widths:
    1. One-lane overlay or reconstruction: when trench cut or patch is within one travel lane.

2. Two-lane overlay or reconstruction: when trench cut or patch is within two travel lanes.
3. Additional overlay or reconstruction: when the remaining pavement area to the edge of existing pavement on either side is less than one travel lane or pavement is less than five years old. No longitudinal joints will be allowed in the wheel path.

d) Pavement Restoration Requirements. The following table describes pavement restoration requirements for various size projects and various existing pavement conditions.

Pavement Restoration Requirements

Project Type	New Pavement < 5 years old	Pavement > 5 years Old	Pavement Identified by the City to be Reconstructed within 2 years
Large Projects Consists of projects requiring a longitudinal trench cut through paved roadway surface, 50 linear feet or greater, or four or more transverse trench cuts per 300 linear feet of roadway.	Complete reconstruction, grind/inlay, or overlay of entire paved surface (all lanes).	Grind / inlay, reconstruct, or overlay. Width per lane requirements in Section 6.8 of these Pavement Standards.	Depending on intended reconstruction strategy, could utilize lesser pavement restoration. Minimum restoration is patch per Standard Plans.
Small Projects Consists of projects requiring a longitudinal trench cut through the paved roadway surface less than 50 linear feet or less than four transverse trench cuts per 300 linear feet of roadway.	Patch per Standard Plans, plus the following conditions: for transverse cuts, the project proponent shall grind 2" deep, 30 feet longitudinally for the entire length of the trench, and inlay with HMA; for longitudinal cuts, the proponent shall grind 2" deep, one lane wide, for at least the trench length, and inlay with HMA.	Patch per Standard Plans	Depending on intended reconstruction strategy, could utilize lesser pavement restoration. Minimum restoration is patch per Standard Plans.
Emergency Projects Unforeseen projects requiring immediate attention for the preservation of life or property.	Grind/inlay, reconstruct, overlay, or patch (dependent on project size – see above). Width per Section 6.8 of the Pavement Standards.	Grind/inlay, reconstruct, overlay, or patch (dependent on project size – see above). Width per Section 6.8 of the Pavement Standards.	Depending on intended reconstruction strategy, could utilize lesser pavement restoration. Minimum restoration is patch per Standard Plans.

e) Transverse Utility Crossings. Transverse utility crossings must be bored or completed by another trenchless method unless no alternatives exist and is approved by the City Engineer. Bore pits must be restored pursuant to these *Pavement Standards*.

f) Trench Cuts in New Pavements. Trench cuts are not permitted in pavements that have been constructed or rehabilitated within five years. Rehabilitation includes all asphalt overlays. If there is no other option but to cut into a new pavement, the pavement must be restored pursuant to requirements in the table in Section 6.8(d).

g) Exemption from Pavement Restoration Requirements and Financial Penalties. Utilities can appeal in writing directly to the City Engineer for exemption from pavement restoration requirements and Pavement Degradation Fees.

h) Utilities may be exempt from Pavement Degradation Fees if there is no other viable alternative and under any of the following conditions:
   1. If the City failed to give six months' notice of an upcoming roadway rehabilitation project either because of:
      (a) A change in property ownership, or
      (b) A change in the City's Capital Facilities Plan.
   2. If the Pavement Condition Index score of the roadway to be cut is less than 50.
   3. If the City Engineer determines that the roadway to be cut is fully budgeted, without contingent funds needed, for a grind and overlay or complete rebuild.
   4. If deemed to be in the best interest of the City and adopted by City Council Motion.
   5. If a Large Project meets the exemption criteria listed in 6.8(b)(1)(iv).

i) Warranty Requirement.
   1. The Grantee is responsible for the maintenance of all work completed by them as well as any work completed by a Grantee-retained contractor for a warranty period of one year. All warranties shall start over if rehabilitation work is performed within the patched area within the first year. Upon the receipt of written notice required corrective work, the Grantee shall pursue vigorously, diligently, and without unauthorized interruption of the City Facilities, the work necessary to correct the items listed. Warranty covered defects include but are not limited to:
      i. Sunken pavement patches greater than or equal to one-quarter inch measured with a ten-foot straight edge.
      ii. Poor workmanship.
      iii. Inadequate compaction per City standards.
      iv. Sunken or damaged curb, sidewalk or structures in excavation work area.
      v. Sunken or damaged catch basins or other drainage structures in excavation work area.
      vi. Cracks within patched area.

   2. All warranties will become void if the road receives a qualifying pavement treatment within the patching limits. Qualifying pavement treatments include the following but are not limited to: mill and overlay, removal and replacement, thin lift overlay, large area patches half a block in length, and half a lane in width or full street

reconstruction. Slurry seals, chip seals, and fog seals are not considered pavement treatments; they are considered a maintenance treatment.

6.9. Gravel Shoulder Design or Restoration

New gravel shoulders constructed as part of a project or existing gravel shoulders disturbed during project activities shall be graded to drain as necessary and shall be constructed as a minimum 3 inches crushed surfacing top course over 95% compacted subgrade per Section 6.6.

7.0 Stormwater Standards

7.1. Stormwater Manual

The Stormwater Management Manual for Western Washington, published by the Washington State Department of Ecology (Ecology Manual) (including Appendix 1 of the Western Washington Phase II Municipal Stormwater Permit), as modified by the City of Lakewood, or an approved equivalent, shall be used for storm drainage design.

For development sites 1 acre or smaller in size the following table may be used in lieu of infiltration rate design methods found in the Ecology Manual:

RECOMMENDED SOIL INFILTRATION RATES

Soil Texture Class (Hydrologic Soil Group)	Infiltration Rate (in/hr)
1. Gravel, course sand (A)	60
2. Medium sand (A)	12
3. Fine sand, loamy sand (A)	4
4. Sandy loam, loam (B)	2
5. Loam, porous silt loam (C)	1

Note: For design purposes the above infiltration rates shall be divided by a factor of safety of 2.

7.2. Erosion and Sediment Control

All engineering plans for projects that propose land disturbing activities shall include an approved temporary “Erosion and Sedimentation Control” (ESC) Plan to prevent sediment-laden runoff from leaving the site during construction. The plans shall be designed in accordance with the Ecology Manual, the WSDOT Highway Runoff Manual, the Pierce County Stormwater Management and Site Development Manual, or an approved equivalent.

Clearing and grading shall be designed in accordance with the following standards:

- Clearing and grading design required for project site development should be done in conjunction with proposed site development construction plans.
- Cross-sections of fill/grading shall be shown on the plans through all properties and at least 10 feet beyond the property lines.
- The fill/grading plan shall be designed so as not to affect any public right-of-way or adjacent properties.

- All side slopes shall be stabilized with approved erosion control treatment.
- No fill or cut side slopes shall be steeper than 2H: 1V unless a geotechnical report dictates otherwise.
- A minimum setback of 5 feet shall be provided between the toe of any fill placement and the top of the bank of any defined drainage channel or critical area or associated buffer boundary.
- When filling a site, particular care should be taken to prevent the impediment of existing upstream surface drainage flow.
- Any material to be exported shall not be deposited within the City Limits unless previously approved by the City Engineer. The quantity of both the fill and the cut shall be noted on the plans.
- No clearing, filling, grading, or other alteration shall occur within any critical areas or associated buffer areas unless authorized by the City.
- Construction recommendations from a soils report shall be followed during all construction activities.

8.0 Survey Monuments, Pavement Markings, and Signs

8.1. Monuments

All existing survey control monuments which are disturbed, lost, or destroyed during construction shall be replaced by a licensed surveyor pursuant to WAC 332-120.

Survey control monuments shall be placed by a licensed land surveyor as shown on the approved construction plans or City of Lakewood Standard Plans in accordance with recognized good practice in land surveying, and in conformance with the approved details for survey monuments.

Survey monuments shall be required at all intersections, PCs, PTs, centers of cul-de-sacs, and other appropriate locations as determined by the City Engineer. Monuments at PCs and PTs may be eliminated and replaced with a monument at the PI if the PI falls within the paved street surface.

For formal recorded documents containing a surveyor's certificate, monuments and staking shall be placed in accordance with the certificate and the Survey Recording Act by the responsible surveyor.

8.2. Channelization and Signage

Channelization and signage shall be in accordance with the latest edition of the City of Lakewood standards, the Manual on Design Guidelines and Specifications for Road and Bridge Construction in Pierce County, and the MUTCD, as amended by the City of Lakewood.

The developer is responsible for paying for signs required for development and shall coordinate work with the City.

All symbols, crosswalks, lettering, stop bars, etc., shall be plastic type D – liquid cold applied methyl methacrylate (MMA) per WSDOT Standard Specifications for Road, Bridge, and Municipal Construction.

8.3. Stop Signs and Stop Bars

Stop signs shall be installed at locations determined by the City prior to the street under construction being open to vehicular use. Placement of stop signs shall be by right-of-way permit and in accordance with approved street construction plans.

All stop-sign controlled intersections with a painted crosswalk shall be per City of Lakewood Standard Plans.

Traffic studies for signs and signals shall satisfy a warrant study as identified in the most recent edition of the MUTCD.

If the intersection warrants a traffic signal, no stop signs shall be placed. All intersections with a traffic signal shall have stop bars on all approaching lanes, regardless if there is a painted crosswalk or not.

8.3.1. Stop Signs at Intersections with Principal/Minor Arterials

Stop signs with stop bars shall be used on all local access/collector streets intersecting with principal/minor arterials. The exception shall be if the street intersecting the arterial is an alley. In this case, a traffic study may be performed to determine if a stop bar is warranted.

8.3.2. Stop Signs at Local Access Streets Intersecting with a Collector

Stop signs shall be placed on all residential streets that intersect a collector. Existing intersections of local access and collectors shall be investigated as requested by the City Engineer to determine if a stop bar is warranted.

8.3.3. Stop Signs where Local Access Streets Intersect Local Access Streets

Residential streets intersecting residential streets do not require stop or yield signs unless a traffic study determines that a stop or yield sign is warranted.

9.0 Illumination and Signals

The design and installation of street lights and traffic signals requires coordination with the City of Lakewood and the electrical service provider.

9.1. Street Lighting Specifications

Street lighting shall be required on all interior streets of a subdivision and on all street frontages abutting a proposed development. Street lighting design shall conform to current IES standards. The contractor is to verify that detail specifications and equipment locations meet the serving utility's requirements as well as City of Lakewood requirements. For projects with multiple lights, lighting calculations shall be required as determined by the City Engineer.

The design plans shall be stamped and signed by a professional engineer hired by the developer. Safe Wiring labels required by the Washington State Department of Labor and Industries and National Electrical Code (NEC) shall apply.

Street light standards shall be either aluminum or concrete as directed by the City Engineer and are specified as follows:

Street Light Standards and Arms – ALUMINUM

1. Street light poles shall be round tapered aluminum, satin finish, and standard base per USS Manufacturing, HAPCO or approved equivalent.
2. Arterial street mounting height shall be 35 feet. Mounting height may be reduced with City Engineer's approval to match existing conditions or provide required vertical utility clearance.
3. Residential street mounting height shall be 30 feet. Mounting height may be reduced with City Engineer's approval to match existing conditions or provide required vertical utility clearance.
4. Each lighting pole shall contain an internal grounding lug with 3/8" diameter hole for the purpose of attaching a grounding connector.
5. Slip bases are not required when clear zone requirements are met.
6. Street light arms shall be aluminum tapered bracket arm per USS Manufacturing TER Series or approved equivalent. Arm length shall be 10 feet unless otherwise approved by the City Engineer.

Street Light Standards and Arms – CONCRETE

1. Street light poles shall be anchored-based, octagonal, pre-stressed concrete, Ameron™ MBO, Stresscrete Group, Union Metal Corporation or approved equivalent with natural exposed buff colored finish.
2. Arterial roadway mounting height shall be 35 feet. Mounting height may be reduced with engineer's approval to 33 feet or 30 feet to match existing conditions or provide required vertical utility clearance.
3. Residential roadway mounting height shall be 30 feet. Mounting height may be reduced with engineer's approval to 25 feet to match existing conditions or provide required vertical utility clearance.
4. Each lighting pole shall contain an internal grounding lug with 3/8" diameter hole for the purpose of attaching a grounding connector.
5. Each lighting pole shall contain a ground wire for base of pole to top of pole to luminaire arm and luminaire.
6. Slip bases are not required when clear zone requirements are met.
7. Street light arms shall be aluminum davit tapered, Ameron™ MO-AD. Arm length shall be 10 feet unless otherwise approved by the City Engineer.

Luminaires for LED Fixtures:

Each luminaire shall have fuses and fuse holders for each power conductor above ground potential. Fuses shall be 1.0 cm × 1.8 cm (13/31" × 1.5"). Fuses shall be slow blow type (carry 100%, open at 135% within 1 hour, carry 200% for minimum of 10 seconds). Luminaires 50 watt (100-150 watt HPS) and below shall have 5 amp fuses. Luminaires 95 watt (200-250 watt HPS) and above shall have 10 amp fuses.

Electrical components shall be accessed without tools and are mounted on power door. Conductors from power supply to terminal block and LED board must be spliced with quick style electrical disconnects. Photocontrol receptacle is standard and shall be rotatable without tools. Housing finish shall be gray. House or street side shields shall be provided when required by the City Engineer.

LED Fixture Options:

Arterial streets, 200-250 watt HPS equivalent:

1. AEL Autobahn Series ATBM-P20-MVOLT-R3-4B-3K-MP-NL-P7
2. Cree Lighting RSW Series RSWL-A-HT-3ME-14L-30K7-UL-GY-N-4BLT
3. Leotek GreenCobra GCM H-Series GCM2-40H-MV-WW-3R-GY-850-PCR7-WL

Residential streets, 100-150 watt HPS equivalent:

1. AEL Autobahn Series ATBS-P10-MVOLT-R3-3K-MP-NL-P7
2. Cree Lighting RSW Series RSWS-A-HT-3ME-5L-27K8-UL-GY-N
3. Leotek GreenCobra GCJ H-Series GCJ1-20H-MV-WW-3-GY-700-PCR7-WL

Photoelectric Controls for LED Fixtures:
Assembled photocontrols and each of their individual components shall be designed and constructed to have a nominal life of 20 years.

Photocontrol circuit boards shall be constructed of glass epoxy material. Circuit board components shall be protected from the environment with a thin, transparent coating that does not promote heat buildup. Each photocontrol shall be provided with a means to conveniently and permanently record date of installation and date of removal. Each photocontrol shall be provided with an internal, 160 joule minimum, metal-oxide varistor (MOV) type surge arrester. Photocontrols shall be provided with a means of sealing according to the requirements of ANSI C136.10, Section 4.3. Photocontrol base gasket shall be fabricated from a neoprene blend.

Photocontrols shall be tested according to the requirements of ANSI C136.10. Test results shall be provided upon request. Each individual photocontrol shall be marked with the manufacturer's name, model number, voltage rating, load rating, north orientation, and rotation of installation/removal.

Plug type: Twist locking type, three-pole, three-wire
Photosensor type: Silicon
Operating voltage range, Volts, AC: 105-305

Load rating, LED, minimum watts: 1000
Operating temperature range, ambient, degrees C: -40 to +70
Turn on response time range, seconds: 0.5 to 5.0
Turn off response time range, seconds: 0.5 to 5.0
Turn on light level, fc: 2.8 +/- 0.6
Turn off light level, maximum, fc: 5.1
Turn-off/turn-on ratio, nominal: 1.5
Fail mode, nominal: Fail-On

Utility owned and maintained wood poles may be used as determined by the City Engineer

9.2. Electrical Service Cabinet

Electrical service cabinets shall be required when two or more street lights are installed.

Electrical service cabinet and foundation shall be installed per City of Lakewood Standard Plans.

Electrical service cabinet shall be TESCO 27-000 service pedestal meeting USERC requirements.

Service cabinet shall be furnished with the following equipment:
Meter Base: 200 AMP utility purveyor approved meter base.
100 AMP utility purveyor approved meter base may be permitted with City Engineer approval.
Branch Breakers:
One (1) 20 amp 1P LL&P or 2P PSE and TPU street lighting circuit for each circuit used
Four (1) 20 amp 1P LL&P or 2P PSE and TPU spare circuit breakers
One (1) 20 amp 1P utility circuit with ground fault receptacle
One (1) 15 amp 1P thermostat circuit
One (1) 15 amp 1P strip heater circuit
Ground fault receptacle: 20 amp, 120 VAC, duplex
Thermostat: 22 amp, 120 VAC, SPST, 40 degrees F “ON”, adjustable
Strip Heater: 125 VAC, 100 watt, with guard

The electrical service panel must receive satisfactory inspection approval from electrical inspection authority. Contractor shall notify City of inspection request and results within 3 working days**.**

A copy of the wiring diagram shall be provided in a plastic holder mounted conveniently inside the electrical service cabinet.

9.3. Street Lighting Operations

It shall be the developer’s responsibility to coordinate the installation of the street light system with all utilities, private and public, to avoid schedule and location conflicts. On public streets it shall be the developer’s responsibility to obtain all permits associated with installation and energizing of new street light installations.

Street lighting will be energized when a home is occupied adjacent to the street light or immediately across the street. At the developer's request, any or all of the street lights may be energized prior to the occupancy. The developer shall notify the City when the light is ready to be energized. Street lights are not intended to light private property nor provide home security.

For street lighting on private streets, the developer shall be responsible to install adequate lighting to meet IES standards for the street. The developer shall coordinate power needs and installation with the serving utility.

The developer shall surrender to the City of Lakewood any guarantee or warranty acquired as a normal trade practice in connection with the purchase of any materials or items used in the construction of the illumination on public streets.

9.4. Location

In general, street lights shall be located on the highest corner of the intersection. One street light shall be placed at all new intersections and at the end of all cul-de-sacs. All new signal poles shall be equipped with a luminaire arm.

If a street changes direction at sufficient angle and is a substantial distance from another light location, another light may be added at the discretion of the City Engineer.

For projects with multiple lights, lighting calculations shall be required as directed by the City Engineer. Maximum streetlight spacing is shown in the following table:

	Maximum Streetlight Spacing	
	Commercial/Industrial	Residential
Principal Arterial	150 feet	150 feet
Minor Arterial	150 feet	300 feet
Collector Arterial	150 feet	300 feet
Local Access Street	300 feet	300 feet

Table Notes:
1. Distances are measured along roadway centerline typical. Pole placement is staggered, alternating sides of the roadway if possible.
2. Where roads divide two land use classifications, the commercial/industrial classification shall take precedence, unless otherwise approved by the City Engineer.

9.5. Traffic Signals

Traffic signal design requirements and specifications will be provided by the City Engineer upon request.

10.0 Traffic Control

Traffic control plans shall be prepared in accordance with the latest edition of the WSDOT Work Zone Traffic Control Guidelines for Maintenance Operations and the MUTCD.

Appendix 1 Definitions

Access Easement: An easement that creates a legal source of access from a public street to an existing or proposed lot, lots of record, or project, across other parcels of property

ADA: Americans with Disabilities Act

ADT: Average Daily Traffic

Applicant: Any person who makes an application to the City of Lakewood for a development permit

City Engineer: The City Engineer of the City of Lakewood or his/her designee

City: The City of Lakewood

Clear Zone: The roadside area defined by a calculated Control Zone distance where the placement of utility objects is controlled or prohibited (ref. WSDOT Design Manual)

Contractor: The individual responsible for the construction of a project

Developer: The individual responsible for the construction plans of a project

Engineer: A professional civil engineer licensed by the State of Washington

HMA: Hot Mix Asphalt

IES: Illuminating Engineers Society

Mitigation Plan: A plan approved by the Community Development Department that includes actions that, to some degree, softens the impact of development on critical or sensitive areas

MUTCD: Manual on Uniform Traffic Control Devices, published by the Federal Highways Administration

NPDES: National Pollutant Discharge Elimination System, a federal permit program (administered by the Washington State Department of Ecology) that requires all point sources discharging pollutants into waters of the United States to obtain a permit

Owner: The individual with legal title to a property

PC: Point of curvature

PG: Performance Grade binder

PI: Point of intersection

Private Street: A street that is owned, controlled, and maintained by one or more private property owner

PT: Point of tangent

Record Drawings: Drawings that reflect changes made during the construction process, recording differences between the original design and the completed project

Red Line Drawings: Markings on approved construction plans that reflect changes made during the construction process, recording differences between the original design and the completed project

Right-of-way: The area of land dedicated for public road uses including all road appurtenances, secured by the City for the public for the purposes of public traffic, drainage, and/or franchised utilities

ROW: Right-of-way

Surveyor: A professional land surveyor licensed by the State of Washington

Traffic Study: An analysis prepared by a transportation engineer that identifies traffic impacts, safety concerns, and potential actions to mitigate traffic impacts and safety concerns

TWLTL: Two-way left turn lane

USC&GS: United States Coastal and Geodetic Survey

USGS: United States Geological Survey

WSDOT: Washington State Department of Transportation

Appendix 2 Table 1: Lakewood Service Providers Contact Information

Service Provider	Type of Service	Address	Phone
Comcast		410 Valley Avenue NW, Ste 9 Puyallup, WA 98391	(253) 864-4200
Lakeview Light & Power	Power	11509 Bridgeport Way S.W. P.O. Box 98979 Lakewood, WA 98498-0979	(253) 584-6060
Lakewood Community Development Dept.	Permitting	6000 Main Street SW Lakewood, WA 98499-5027	(253) 512-2261
West Pierce Fire & Rescue	Fire, Emergency Services	10928 Pacific Hwy SW Lakewood, WA 98499	(253) 582-4600
Lakewood Police Department	Police Services	9401 Lakewood Dr. SW Lakewood, WA 98499	(253) 830-5000
Lakewood Public Works Engineering Department	Engineering Review	6000 Main Street SW Lakewood, WA 98499-5027	(253) 589-2489
Lakewood Refuse	Solid Waste	3869 94th St. SW Lakewood, WA 98499	(253) 588-1705
Lakewood Water District	Water	11900 Gravelly Lake Drive SW PO Box 99729 Lakewood, WA 98498	(253) 588-4423
CenturyLink Engineering Department	Cable TV	2510 South 84th Street, STE 18 Lakewood, WA 98499	(253) 597-5090
Parkland Light & Water	Water	12918 Park Avenue Tacoma, WA 98444-0426	(253) 531-5666
Pierce County Utilities	Sewer	9850 64th Street West University Place, WA 98467	(253) 798-4050
Pierce Transit	Transit	3701 96th Street SW PO Box 99070 Lakewood, WA 98499-0070	(253) 581-8001
Puget Sound Energy	Power, Natural Gas	3130 S. 38th Street Tacoma, WA 98409	(253) 476-6315
Tacoma Public Utilities	Power	3628 So. 35th Street Tacoma, WA 98411-3711	(253) 502-8277
U.S. Post Office			800-275-8777
Washington State Department of Ecology	Environmental information, stormwater manual	www.ecy.wa.gov	(800) 917-0043 (permitting)
Washington State Department of Labor and Industries	Electrical service standards	www.lni.wa.gov	(800) 547-8367
Washington State Department of Transportation	Reference plans and documents	www.wsdot.wa.gov	(360) 705-7000

Appendix 2 Table 2: Roadway Design Criteria

Classification	Principal Arterial	Minor Arterial	Collector Arterial	Local Access
Function	Serve the longest trips and carry the principal portion of trips entering and leaving the overall area.	Connect principal arterials to collector arterials and small generators. Distribute traffic to smaller geographic areas than principal arterials.	Distribute trips from principal and minor arterials to and from local access streets or destinations. Serve high proportion of local traffic and a low proportion of overall area traffic.	Provides circulation within residential areas away from the arterial system. Through-traffic is discouraged.
Access	No direct residential lot access. Driveways, consolidated where practical, may serve commercial, industrial, and public facilities. Access may be allowed with City Engineer approval			Provides direct access to abutting properties. Requirement for consolidating access points at the discretion of the City Engineer.
ADT	5,000 – 30,000	2,500 – 15,000	2,500 – 15,000	Varies
Design Speed[1]	40	35	35	30
Travel way				
Through Lanes[2] (minimum width)	Multilane: 11 feet; Outside lane: 12 feet; Inside lane adjacent to raised median: 12 feet; Two-lane facility: 16 feet		Two Lane facility: 14 feet minimum to 16 feet wide maximum	Two lanes only, 12 feet minimum to 14 feet wide maximum
TWLTL[3]	12-foot minimum			Not allowed
Designated Left-Turn Lane	12-foot minimum			n/a
Right-Turn Lane	12-foot minimum			n/a
Channelization	Painted or curbed islands and traffic separation when warranted.			n/a
Traffic Control	Center stripe required. Lane line and channelization striping required when applicable. Pavement marking required when applicable. Signalization when warranted and required by City Engineer.			n/a
Roadside				
Drainage	Closed drainage required			
Curb and Gutter	Use of concrete vertical curb and gutter required unless approved otherwise by the City Engineer.			
Bike Lane	When required by City Engineer, shall consist of five-foot paved bike lane from edge of travel way to gutter line.			Optional. Five feet paved bike lane from edge of travel way to gutter line.

[1] Typical. Required design speed shall be determined by the City Engineer.
[2] Number of lanes is a function of traffic volume and level of service.
[3] Application is a function of turning movement volume, existing driveway spacing, and safety

Classification	Principal Arterial	Minor Arterial	Collector Arterial	Local Access
Shared Use Bikeway	Three-foot paved shoulder from edge of travel way to gutter line.			When required by the City Engineer, three feet additional pavement from edge of travel way to gutter line.
Sidewalk (requires vertical face curb and gutter)	Six feet wide[4]. Ten feet wide required at transit stops.		5 foot wide with buffer, 6 foot wide without buffer.[4]	Five feet wide[5], ten feet required at transit stops.[4]
Buffer (Optional)	Four feet minimum to eight feet maximum in width, from face of curb to edge of sidewalk. Maintenance agreement required.			Four feet minimum to six feet maximum in width, from face of curb to edge of sidewalk. Maintenance agreement required.
Bicycle Path	Optional. Eight feet minimum width.			
Transit Facilities	Requires 10-foot sidewalk where facilities required.			
Border				
Cut-Fill	Requires soils analysis. Function of safety and geometric requirements.			
Retaining Walls	Required when stabilization is necessary and ROW limits length of cut or fill.			
Median	Allowed in City ROW at the discretion of the City Engineer. Minimum 10-foot wide (curb face to curb face), maximum 16 feet. Use of concrete barrier curb only. Landscaping as approved by the City Engineer.			
Minimum ROW Width	80 feet	70 feet	60 feet	50 feet with underground utilities[6] 60 feet with surface utilities
Easement	n/a	n/a	Allowed only for public utilities. Private collector arterials only allowed at discretion of City Engineer.	Allowed beyond roadside for underground public utilities.

[4] In Central Business District (CBD) Zones all sidewalks shall be 8 feet wide unless otherwise approved by the City Engineer.
[5] Sidewalk widths may be reduced to minimum ADA standards to accommodate low impact development design.
[6] Right of way widths may be reduced to 40 feet to accommodate low impact development design.

Appendix 2 Table 3: Geometric Design Criteria

Design Speed	**40 mph**	**35 mph**	**30 mph**
Horizontal Curvature[7]			
• D Max (degrees)	9.1	13.6	17.1
• R Min (feet)	628	419	333
Maximum Superelevation (%)	4	4	2
Grade			
• Max (%)	10	10	12
• Min (%) (longitudinal)	0.7	0.7	0.7
• Min (%) (cross-section)	2	2	2
Posted Speed[8] (mph)	35	30	25
Entering Sight Distance[9] (feet)	415	355	295

[7] Table values based on maximum superelevation. Actual D Max and R Min is a function of the superelevation, maximum side friction, and design speed.
[8] Posted speed (and corresponding design speed) may vary as approved by the City Engineer.
[9] Entering site distance shall apply to all intersections and driveways unless otherwise approved by the City Engineer. Distances are based on an object height of 0.5 feet and a driver's eye height of 3.5 feet located 14 feet from the edge of traveled way.

Appendix 2 Table 4: Roadway Intersection Design Standards

Intersection Spacing	
Distance Between Major Arterials - 1 mile ±	
Distance from principal and minor arterials to collector arterials - ½ mile ±	
Spacing of intersection on arterials shall be 300 feet or more - ¼ mile ±	
Spacing of intersections on local access roads shall be 150 feet or more.	
The intent of spacing is to minimize the number of intersections on arterials/local road feeders.	
Minimum angle	90 degrees ± 20 degrees
Minimum curb radius	35 feet (arterial streets) 25 feet (local street)[10]
Minimum property line radius	25 feet (arterial streets) 20 feet (local streets)[10]
Maximum landing grade	Not to exceed 1 foot difference in elevation for a distance of 30 feet approaching an arterial of 20 feet approaching a local street, measured from the nearest ROW line (extended) of intersecting street
Driveway widths	Refer to standard details and the site development regulations
Entering sight distance	Refer to tables for geometric design criteria by posted speed limit

[10] Radii may be reduced to accommodate low impact development design.