CHAPTER 2
DRAINAGE PLAN SUBMITTAL

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CHAPTER 2
DRAINAGE PLAN SUBMITTAL

This chapter details the drainage related submittal requirements for engineering design plans as part of a permit application to the Kent Public Works Department. The intent of these requirements is to present consistent formats for design plans and the technical support data required to develop the plans. These conventions are necessary to review engineering designs for compliance with Kent ordinances and regulations, and to ensure the intent of the plan is easily understood and implemented in the field. Properly drafted design plans and supporting information also facilitate the construction, operation, and maintenance of the proposed system long after its review and approval. When plans comply with the formats and specifications contained herein, they facilitate review and approval with a minimum of time-consuming corrections and resubmittals.

Note that this chapter primarily describes how to submit drainage plans for review—what must be submitted, in what formats, at what times, and to what offices. The basic drainage requirements that these plans must address are contained in Chapter 1, “Drainage Review and Requirements.” The specific design methods and criteria to be used are contained in Chapters 3, 4, 5, and 6.

Several key forms used in the plan review process are reproduced in Reference Section 8, “Plan Review Forms and Worksheets” accompanying Chapter 5 of the Kent Construction Standards.

Chapter Organization
The information presented in this chapter is organized into four main sections as follows:
- Section 2.1, “Plans for Permits and Drainage Review”
- Section 2.2, “Plans Required with Initial Permit Application”
- Section 2.3, “Plans Required for Drainage Review”
- Section 2.4, “Plans Required After Drainage Review”

These sections begin on odd pages so that tabs can be inserted by the user if desired for quicker reference.
2.1 PLANS FOR PERMITS AND DRAINAGE REVIEW

The Kent Public Works Department is responsible for the review of all engineering aspects of private development proposals. Drainage review is a primary concern of engineering design. This section provides an overview of the types of engineered drainage plans required for engineering review at various permit review stages. Detailed requirements are presented in Sections 2.2 and 2.3.

☐ PLANS REQUIRED FOR INITIAL PERMIT SUBMITTAL

Most projects require some degree of drainage plans or analysis to be submitted with the initial permit application (see Table 2.2.1.A). At the City of Kent, subdivisions and short plats are reviewed in three stages: tentative, preliminary, and final. Subdivisions and short plats will require a "Tentative Plat/Short Plat Drainage Package" with the initial permit application. The package will provide general information on the proposal, including location of environmentally sensitive areas, road alignments and right-of-way, site topography, building locations, land use information, and lot dimensions. It will be used to determine the appropriate drainage conditions and requirements to be applied to the proposal during the drainage review process.

Single-family residential building permits require only a site plan with the initial permit application. Commercial permits require full engineering plans (see below). Other permits may have project specific drainage requirements determined by the Kent Public Works Department.

☐ PLANS REQUIRED FOR DRAINAGE REVIEW

For drainage review purposes, engineering plans consist of the following:

1. Site improvement plans, which include all plans, profiles, details, notes, and specifications necessary to construct road, drainage, and off-street parking improvements (see Section 2.3.1.2).

2. A technical information report (TIR), which contains all the technical information and analysis necessary to develop the site improvement plan (see Section 2.3.1.0).

3. An erosion and sediment control (ESC) plan (see Section 2.3.1.3).

Note: A landscape management plan is also included if applicable (see Section 2.3.1.4).

Projects under Targeted Drainage Review usually require engineering plans, except that only certain sections of the technical information report are required to be completed and the site improvement plan may have a limited scope depending upon the characteristics of the proposed project. The scope of these plans should be confirmed during the project preapplication meeting with the Kent Public Works Department. For other permits, such as single-family residential permits, the scope of the targeted engineering analysis is usually determined during Kent Public Works Department engineering review.

Projects without major drainage improvements may be approved to submit a modified site improvement plan. Major drainage improvements usually include water quality or flow control facilities, conveyance systems, bridges, and road right-of-way improvements. For projects requiring engineering plans for road construction, a modified site improvement plan is not allowed. See Section 2.3.1.2 for further information.

Plants Required for Small Site Drainage Review

Small site drainage plans are a simplified form of site improvement and ESC plans (without a TIR), which can be prepared by a non-engineer from a set of pre-engineered design details. Small site drainage plans are only allowed for projects in Small Site Drainage Review.

For single-family residential permits, the level and scope of drainage plan requirements are determined by the Kent Public Works Department during drainage review. Some projects qualifying for Small Site Drainage Review may also require Targeted Drainage Review.
## Table 2.2.1.A DRAINAGE PLAN SUBMITTALS

<table>
<thead>
<tr>
<th>Type of Permit or Project</th>
<th>Plans Required with Initial Land Use Permit Application</th>
<th>Type of Drainage Review(\textsuperscript{6})</th>
<th>Plans Required for Building Permit Drainage Review</th>
</tr>
</thead>
</table>
| **SUBDIVISIONS AND SHORT PLATS\***        | Plat Map(\textsuperscript{1})                           | Full or Targeted Drainage Review(\textsuperscript{2}) | * Tentative Plat/Short Plat Drainage Package(\textsuperscript{1})  
* Engineering Plans(\textsuperscript{3}) |
|                                           | Tentative Plat/Short Plat Drainage Package:            |                                              |                                                  |
|                                           | - Conceptual Drainage Plan                             |                                              |                                                  |
|                                           | - Level 1 Downstream Analysis                          |                                              |                                                  |
|                                           | - Survey/Topographic Information                       |                                              |                                                  |
| **COMMERCIAL**                            | Engineering Plans(\textsuperscript{2}),(\textsuperscript{3}) | Full or Targeted Drainage Review            | Engineering Plans(\textsuperscript{3})           |
| **SINGLE-FAMILY RESIDENTIAL BUILDING PERMITS** | Conceptual Drainage Plan(\textsuperscript{1})            | Small Site Drainage Review OR              | Small Site Drainage Plans(\textsuperscript{4})    |
|                                           |                                                       | Small Site Drainage Review AND Targeted Drainage Review(\textsuperscript{2}) OR | * Small Site Drainage Plans(\textsuperscript{4})  
* Engineering Plans(\textsuperscript{3}) |
|                                           |                                                       | Full or Targeted Drainage Review(\textsuperscript{2}) | Engineering Plans(\textsuperscript{3})           |
| **OTHER PROJECTS OR PERMITS**             | Project-specific (contact the Kent Public Works Department) | Full or Targeted Drainage Review(\textsuperscript{2}) | Engineering Plans(\textsuperscript{3})           |

**Notes:**

(1) Submittal specifications for these plans are found in the application packages.
(2) Submittal specifications for Targeted Drainage Review are found in Section 2.3.2.
(3) Submittal specifications for engineering plans are detailed in Section 2.3.1.
(4) Specifications for submittal of small site drainage plans are found in Appendix C of the King County Manual, *Small Site Drainage Requirements* (detached).
(5) Refer to Chapter 1, Table 1.1.2.A for definitions of the different drainage review types.

* Short plats meeting the thresholds defining small sites may go through the small site drainage review process.
2.2 PLANS REQUIRED WITH INITIAL PERMIT SUBMITTAL

This section describes the submittal requirements for initial permit applications at the City of Kent. The timing for submittal of engineering plans will vary depending on permit type. For subdivisions and short plats, this submittal usually follows the City's approval of the Tentative Plat/Short Plat Drainage Package. For commercial building permits, engineering plans must be submitted as part of the initial permit application. For other permit types the drainage plan requirements are determined during the permit review process.

Note: If engineering plans are required to be submitted with the initial permit application, they must be accompanied by the appropriate supporting documents (e.g., required application forms, an environmental checklist, etc.). For more details, see Reference Section 8 accompanying Chapter 5 of the Kent Construction Standards.

Design Plan Certification

All tentative plat/short plat drainage packages and engineering plans must be stamped by a licensed civil engineer registered in the State of Washington.

All land boundary surveys and legal descriptions used for preliminary and engineering plans must be stamped by a professional land surveyor registered in the State of Washington. Topographic survey data and mapping prepared specifically for a proposed project may be performed by the licensed civil engineer stamping the engineering plans as allowed by the Washington State Board of Registration for Professional Engineers and Land Surveyors.

2.2.1 SUBDIVISIONS AND SHORT PLATS

Applications for tentative subdivisions and short plats must include a tentative plat/short plat drainage package consisting of the following:

1. A Conceptual Drainage Plan prepared, stamped, and signed by a licensed civil engineer registered in the State of Washington. This plan must show the following:

   The level of detail of the plan should correspond to the complexity of the project.
   Plans submitted for review shall contain the following information at a minimum:
   a) A brief narrative describing existing and proposed site conditions, including inventoried or delineated wetlands, creeks, ponds, steep or unstable slopes, erosion hazard areas and landslide hazard areas. Include a description of the existing use of the site and the proposed use of the site after development.
   b) Two simple drainage plans are required for a Conceptual Drainage Plan: an existing condition drainage plan and post-development drainage plan.
   c) Both drainage plans must be drawn to an engineering scale (i.e. 1" = 20', or 1" = 30', for example, not 1/8" = 1'), and must contain a north arrow. NOTE: North arrows shall either point to the top of the page or to the right side of the page only!
   d) Include a vicinity map, which clearly shows the location of the development parcel with respect to public streets and other parcels and developments.
   e) Drainage plans will include property lines, including line lengths (bearings of property lines are preferred, but not required).
   f) All public and private roads, driveway accesses and road easements, with dimensions.
g) All manmade or natural features (streams, creeks, drainage ditches, railroad tracks, hills, depressions, structures of all kinds, steep slopes, lakes, etc.) and the existing direction of surface water flows shown by arrows pointing in the direction of flow.

h) Setback dimensions from all property lines and from sensitive areas such as wetlands, steep or unstable slopes, and Native Growth Protection Tracts.

i) Existing and proposed building and landscape locations.

j) Differentiate between developed portions of a parcel, and undeveloped / natural areas of a parcel, and areas set aside for future development.

k) Outside storage areas and types of surfaces for storage areas.

l) The post-development drainage plan shall include a proposed conveyance system layout, and the location of discharge points onto and off of the property; the total amount of impervious surface created (including rooftops); the approximate building and parking lot / storage yard footprints; and all proposed stormwater treatment, and proposed locations for stormwater management Best Management Practices (detention ponds, biofiltration swales, oil / water separators, etc.)

m) A legal description for the property and the Assessor's Tax Lot Number for the property.

n) The name, address, and telephone number of the person preparing the Site Plan.
   a) A vicinity map that clearly shows the project location
   b) The location and type of existing and proposed flow control facilities
   c) The location and type of existing and proposed water quality facilities
   d) The location and type of existing and proposed conveyance systems

2. A Level 1 Downstream Analysis as required in Core Requirement #2 and outlined under “TIR Section 3, Offsite Analysis.” The Level 1 Downstream Analysis is required for all short plats except those meeting the exemptions outlined in Section 1.2.2 or qualifying for Small Site Drainage Review for the entire project. This offsite analysis shall be submitted to assess potential offsite drainage impacts associated with development of the project, and to help propose appropriate mitigation of those impacts. A higher level of offsite analysis may be requested by the Kent Public Works Department prior to preliminary approval, or as a condition of engineering plan submittal. The offsite analysis must be prepared, stamped, and signed by a licensed civil engineer registered in the State of Washington.

3. Survey/topographic information. The submitted site plan and conceptual drainage plan shall include:
   a) Field topographic base map to accompany application (aerial topography allowed with Kent Public Works Department permission)
   b) Name and address of surveyor and surveyor's seal and signature
   c) Notation for field or aerial survey
   d) Datum and benchmark/location and basis of elevation
   e) Location of all streams, lakes, wetlands, closed depressions, or Hazard Areas¹ (include any corresponding King County or Kent designation number, or identify as undesignated)
Contour intervals per the following chart:

<table>
<thead>
<tr>
<th>Zoning Designation</th>
<th>Contour Intervals</th>
</tr>
</thead>
<tbody>
<tr>
<td>Densities of developed area of over 2 DU per acre</td>
<td>2 feet at less than 15% slope</td>
</tr>
<tr>
<td></td>
<td>5 feet at 15% slope or more</td>
</tr>
<tr>
<td>Densities of developed area of 2 DU or less per acre</td>
<td>5 feet</td>
</tr>
</tbody>
</table>

2.2.2 COMMERCIAL SITE DEVELOPMENT

Applications for commercial permits require that engineering plans be submitted as part of the initial permit application. Most commercial projects will go through Full Drainage Review and require complete engineering plans. Projects which may qualify for limited scope engineering design should request Targeted Drainage Review during the preapplication meeting with the Public Works Department.

2.2.3 SINGLE-FAMILY RESIDENTIAL

Applications for single-family residential permits require a non-engineered site plan to be submitted. Refer to the minimum requirements listed at the beginning of Section 2.2 (see detached Appendix C, Section C.5.3, note that erosion control, flow control not required).

2.2.4 OTHER PERMITS

Other permit applications will require project-specific information. Initial submittal requirements can be obtained by contacting the Kent Public Works Department.
2.3 PLANS REQUIRED FOR DRAINAGE REVIEW

This section presents the specifications and contents required of plans to facilitate drainage review. Most projects subject to Full Drainage Review will require engineering plans that include a technical information report (TIR), site improvement plans, and an erosion and sediment control (ESC) plan. In addition, a landscape management plan may also be required to comply with Core Requirement #8 (see Section 1.2.8). For more information on the types of projects subject to Full Drainage Review, see Section 1.1.2.3.

Small projects with specific drainage concerns that are subject to Targeted Drainage Review, also require engineering plans that include the same elements, except that the TIR may be of limited scope. The site improvement plans and ESC plans may also be of limited scope, but must meet all applicable specifications. For more information on the types of projects subject to Targeted Drainage Review, see Section 1.1.2.2.

Projects that qualify for Small Site Drainage Review may be required to submit small site drainage plans. These are simplified drainage and erosion control plans that can be prepared by a non-engineer from a set of pre-engineered design details, and do not require a TIR. The Small Site Drainage Requirements booklet available at the King County Department of Development and Environmental Services and appended to the King County Manual (detached Appendix C, Section C.5.3) contains the specifications for small site drainage plans and details on the Small Site Drainage Review process.

Note: Projects in Small Site Drainage Review may be required to submit engineering plans if they are also subject to Targeted Drainage Review as determined in Section 1.1.2.2 and Appendix C of the King County Manual. Also, short plats in Small Site Drainage Review will be required to submit engineering plans if roadway construction is a condition of preliminary approval.

Design Plan Certification

All tentative plat/short plat drainage packages and engineering plans must be stamped by a licensed civil engineer registered in the State of Washington.

All land boundary surveys and legal descriptions used for preliminary and engineering plans must be stamped by a professional land surveyor registered in the State of Washington. Topographic survey data and mapping prepared specifically for a proposed project may be performed by the licensed civil engineer stamping the engineering plans as allowed by the Washington State Board of Registration for Professional Engineers and Land Surveyors.

2.3.1 ENGINEERING PLAN SPECIFICATIONS

For drainage review purposes, engineering plans must consist of:

1. A technical information report (TIR) as detailed in Section 2.3.1.0, AND
2. Site improvement plans as detailed in Section 2.3.1.2, AND
3. An erosion and sediment control (ESC) plan as detailed in Section 2.3.1.3.

Also, if applicable per Section 1.2.8, a landscape management plan, as detailed in Section 2.3.1.4, must be included.

Projects in Targeted Drainage Review require a limited scope TIR with site improvement plans and an ESC plan, as detailed in Section 2.3.2. The Kent Public Works Department may allow a modified site improvement plan for some projects in Targeted Drainage Review (see Section 2.3.2) or where major improvements (e.g., detention facilities, conveyance systems, bridges, road right-of-way improvements, etc.) are not proposed.
2.3.1.1 TECHNICAL INFORMATION REPORT (TIR)

The full TIR should be a comprehensive supplemental report containing all technical information and analysis necessary to develop the site improvement plan. This report should contain all calculations, conceptual design analysis, reports, and studies required and used to construct a complete site improvement plan based on sound engineering practices and careful geotechnical and hydrological design. The TIR must be stamped and dated by a licensed civil engineer registered in the State of Washington.

The TIR shall contain the following ten sections, preceded by a table of contents:

1. Project Overview
2. Conditions and Requirements Summary
3. Offsite Analysis
4. Flow Control and Water Quality Facility Analysis and Design
5. Conveyance System Analysis and Design
6. Special Reports and Studies
7. Other Permits
8. ESC Analysis and Design
9. Bond Quantities, Facility Summaries, and Declaration of Covenant

Every TIR must contain each of these sections; however, if a section does not apply, the applicant may simply mark “N/A” with a brief explanation. This standardized format allows a quicker, more efficient review of information required to supplement the site improvement plan.

The table of contents should include a list of the ten section headings and their respective page numbers, a list of tables with page numbers, and a list of numbered references, attachments, and appendices.

When the TIR package requires revisions, the revisions must be submitted in a complete TIR package.

☐ TIR SECTION 1
PROJECT OVERVIEW

The project overview must provide a general description of the proposal, predeveloped and developed conditions of the site, site area and size of the improvements, and the disposition of stormwater runoff before and after development. The overview shall identify and discuss difficult site parameters, the natural drainage system, and drainage to and from adjacent property, including bypass flows.

The following figures are required:

Figure 1. TIR Worksheet
Include a copy of the TIR Worksheet (see Reference Section 8-A accompanying Chapter 5 of the Kent Construction Standards).

Figure 2. Site Location
Provide a map that shows the general location of the site. Identify all roads that border the site and all significant geographic features including all streams, lakes, wetlands, closed depressions, and Hazard Areas.
Figure 3. Drainage Basins, Subbasins, and Site Characteristics

This figure shall display:

1. Acreage of all subbasins
2. All site characteristics
3. Existing discharge points to and from the site
4. Routes of existing, construction, and future flows at all discharge points and downstream hydraulic structures
5. A minimum City of Kent Storm Sewer Facility Map, 1” = 300’ as a base for the figure (available at the Kent Permit Center)
6. The length of travel (also cite) from the farthest upstream end of a proposed storm system in the development to any proposed flow control facility

Figure 4. Soils

Show the soils within the following areas:

1. The project site
2. The area draining to the site
3. The drainage system downstream of the site for the distance of the downstream analysis (see Section 1.2.2)

Copies of King County Soil Survey maps may be used; however, if the maps do not accurately represent the soils for a proposed project (including offsite areas of concern), it is the design engineer's responsibility to ensure that the actual soil types are properly mapped. Soil classification symbols that conform to the SCS Soil Survey for King County shall be used, and the equivalent KCRTS soil type (till, outwash, or wetlands) shall be indicated (see Table 3.2.2.B).

All urban plats and short plats (creating lots less than 22,000 square feet) must evaluate onsite soils for suitability for roof downspout infiltration as detailed in Section 5.1.1. This soils report, as well as geotechnical investigations necessary for proposed infiltration facilities, should be referenced in the TIR Overview and submitted under Special Reports and Studies, TIR Section VI. A figure in the required geotechnical report that meets the above requirements may be referenced to satisfy 1, 2, and 3 above.

☐ TIR SECTION 2
CONDITIONS AND REQUIREMENTS SUMMARY

The intent of this section is to ensure all preliminary approval conditions and applicable requirements pertaining to site engineering issues have been addressed in the site improvement plan. All conditions and requirements for the proposed project should be included.

In addition to the core requirements of this manual, adopted basin plans and other plans as listed in Special Requirement #1 should be reviewed and applicable requirements noted. Sensitive area requirements, conditions of plat approval, and conditions associated with development requirements (e.g., conditional use permits, rezones, variances and adjustments, SEPA mitigations, etc.) should also be included.

☐ TIR SECTION 3
OFFSITE ANALYSIS

All projects in engineering review shall complete, at a minimum, an Offsite Analysis, except for projects meeting the exemptions outlined in Section 1.2.2. The Offsite Analysis is usually completed as part of the

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Any specific regulations related to floodplains, streams, lakes, wetlands, closed depressions, or geologic hazard areas.
initial permit application and review process, and is to be included in the TIR. Note: If offsite conditions have been altered since the initial submittal, a new offsite analysis may be required.

The primary component of the offsite analysis is the downstream analysis described in detail below. Upstream areas are included in this component to the extent they are expected to be affected by backwater effects from the proposed project. Other components of the offsite analysis could include, but are not limited to, evaluation of impacts to fish habitat, groundwater levels, groundwater quality, or other environmental features expected to be significantly affected by the proposed project due to its size or proximity to such features.

Levels of Analysis

The offsite analysis report requirements vary depending on the specific site and downstream conditions. Each project submittal shall include at least a Level 1 downstream analysis. Upon review of the Level 1 analysis, the Kent Public Works Department may require a Level 2 or Level 3 analysis. If conditions warrant, additional, more detailed analysis may be required. Note: Potential impacts upstream of the proposal shall also be evaluated.

Level 1 Analysis

The Level 1 analysis is a qualitative survey of each downstream system leaving a site. This analysis is required for all proposed projects and shall be submitted with the initial permit application. Depending on the findings of the Level 1 analysis, a Level 2 or 3 analysis may need to be completed or additional information may be required. If further analysis is required, the applicant may schedule a meeting with Kent Public Works Department staff.

Level 2 or 3 Analysis

If problems are identified in the Level 1 analysis, a Level 2 (rough quantitative) analysis or a Level 3 (more precise quantitative) analysis may be required to further evaluate proposed mitigation for the problem. Kent Public Works Department staff will determine whether a Level 2 or 3 analysis is required based on the evidence of existing or potential problems identified in the Level 1 analysis and on the proposed design of onsite drainage facilities. The Level 3 analysis is required when results need to be as accurate as possible: for example, if the site is flat; if the system is affected by downstream controls; if minor changes in the drainage system could flood roads or buildings; or if the proposed project will contribute more than 15 percent of the total peak flow to the drainage problem location. The Level 2 or 3 analysis may not be required if the Kent Public Works Department determines from the Level 1 analysis that adequate mitigation can be developed.

Additional Analysis

Additional, more detailed hydrologic analysis may be required if the Kent Public Works Department determines that the downstream analysis has not been sufficient to accurately determine the impacts of a proposed project on an existing or potential drainage problem. This more detailed analysis may include a point of compliance analysis as detailed in Section 3.3.6.

Scope of Analysis

Regardless of the level of downstream analysis required, the applicant shall define and map the study area (Task 1), review resources (Task 2), inspect the study area (Task 3), describe the drainage system and problems (Task 4), and propose mitigation measures (Task 5) as described below.

Task 1. Study Area Definition and Maps

For the purposes of Task 2 below, the study area shall extend downstream one mile (minimum flow path distance) from the proposed project discharge location and shall extend upstream as necessary to encompass the offsite drainage area tributary to the proposed project site. For the purposes of Tasks 3, 4, and 5, the study area shall extend downstream to a point on the drainage system where the proposed project site constitutes a minimum of 15 percent of the total tributary drainage area, but not
SECTION 2.3 PLANS REQUIRED FOR DRAINAGE REVIEW

less than one-quarter mile (minimum flow path distance). The study area shall also extend upstream of the project site a distance sufficient to preclude any back water effects from the proposed project.

The offsite analysis shall include: (1) a site map showing property lines, and (2) the best available topographical map (e.g. at a minimum use the 1" = 300' City of Kent Storm Sewer Facility Maps available at the Kent Permit Center) with the study area boundaries, site boundaries, downstream flow path, and potential/existing problems (Task 4) shown. Other maps, diagrams, and photographs such as aerial photographs may be helpful in describing the study area.

Task 2. Resource Review

To assist the design engineer in preparing an offsite analysis, Kent has gathered information regarding existing and potential flooding and erosion problems. For all levels of analysis, all of the resources described below shall be reviewed for existing/potential problems in the study area (upstream and one mile downstream of the project site):

- Adopted basin plans (available at the Kent Public Works Department, King County Department of Development and Environmental Services, King County Department of Natural Resources and the library)
- Finalized drainage studies (available at the Kent Public Works Department)
- Basin Reconnaissance Summary Reports and 1"=400' scale problem summary maps (available at King County Department of Development and Environmental Services, King County Department of Natural Resources and the library)
- Floodplain/floodway (FEMA) maps (available at the Kent Public Works Department and the library)
- Other offsite analysis reports in the same subbasin, if available (check with the Kent Public Works Department records staff)
- Sensitive Areas Folio (available at King County Department of Development and Environmental Services—must be used to document the distance downstream from proposed project to nearest stream wetland or lake identified in the folio)
- U.S. Department of Agriculture, King County Soils Survey (available at King County Department of Development and Environmental Services and the library)
- Wetlands Inventory maps (City-wide map included with this manual, detailed maps available at the Kent Public Works Department)
- City of Kent Erosion Hazard Area Map and Landslide Hazard Area Maps (City-wide map included with this manual, detailed maps available at the Kent Public Works Department)

Potential/existing problems identified in the above documents shall be documented in the Drainage System Table (see Reference Section 8-B accompanying Chapter 5 of the Kent Construction Standards) and described in the text of the Level 1 Downstream Analysis Report. If a document is not available for the site, note in the report that the information was not available as of a particular date. If necessary, additional resources are available from Kent, King County, the Washington State Department of Fisheries and Wildlife (WDFW), the State Department of Ecology (Ecology), the United States Army Corps of Engineers (Corps), and the public works departments of other municipalities in the vicinity of the proposed project site.

Task 3. Field Inspection

The design engineer shall physically inspect the existing onsite and offsite drainage systems of the study area for each discharge location. Specifically, he/she shall investigate any evidence of the following existing or potential problems and drainage features:

Level 1 Inspection:

1. Investigate any problems reported or observed during the resource review.
2. Locate all existing/potential constrictions or lack of capacity in the existing drainage system.
3. Identify all existing/potential flooding or nuisance problems as defined in Section 1.2.2.1.
4. Identify existing/potential overtopping, scouring, bank sloughing, or sedimentation.
5. Identify significant destruction of aquatic habitat or organisms (e.g., severe siltation, bank erosion, or incision in a stream).
6. Collect qualitative data on features such as land use, impervious surfaces, topography, and soil types.
7. Collect information on pipe sizes, channel characteristics, drainage structures, wetlands, streams, lakes, closed depressions, and Hazard Areas.
9. Contact neighboring property owners or residents in the area about past or existing drainage problems, and describe these in the report (optional).
10. Note the date and weather conditions at the time of the inspection.

Level 2 or 3 Inspection:

1. Perform a Level 1 Inspection.
2. Document existing site conditions (approved drainage systems or pre-1978 aerial photographs) as defined in Core Requirement #3.
3. Collect quantitative field data. For Level 2, collect non-survey field data using hand tapes, hand reel, and rods; for Level 3, collect field survey profile and cross-section topographic data prepared by an experienced surveyor.

Task 4. Drainage System Description and Problem Descriptions

Each drainage system component and problem shall be addressed in the offsite analysis report in three places: on a map (Task 1), in the narrative (Task 4), and in the Offsite Analysis Drainage System Table (see Reference Section 8-B).

Drainage System Descriptions: The following information about drainage system components such as pipes, culverts, bridges, outfalls, ponds, tanks, and vaults shall be included in the report:

1. Location (corresponding map label and distance downstream/upstream from site discharge)
2. Physical description (type, size, length, slope, vegetation, and land cover)
3. Problems
4. Field observations

Problem Descriptions: All existing or potential problems (e.g., ponding water, high/low flows, siltation, erosion, etc.) identified in the resource review or field inspection shall be described in the offsite analysis. These descriptions will help in determining if such problems are one of three defined problem types that require special attention per Core Requirement #2 (see Section 1.2.2.1). Special attention may include more analysis, additional flow control, or other onsite or offsite mitigation measures as specified by the problem-specific mitigation requirements set forth in Section 1.2.2.2.

The following information shall be provided for each existing or potential problem:

1. Description of the problem (ponding water, high or low flows, siltation, erosion, slides, etc.).
2. Magnitude of or damage caused by the problem (siltation of ponds, dried-up ornamental ponds, road inundation, flooded property, flooded building, flooded septic system, significant destruction of aquatic habitat or organisms).
3. General frequency and duration of problem (dates and times the problem occurred, if available).

4. Return frequency of storm or flow (cfs) of the water when the problem occurs (optional for Level 1 and required for Levels 2 and 3). Note: A Level 2 or 3 analysis may be required to accurately identify the return frequency of a particular downstream problem; see Section 3.3.3.

5. Water surface elevation when the problem occurs (e.g., elevation of building foundation, crest of roadway, elevation of septic drainfields, or wetland/stream high water mark).

6. Names and concerns of involved parties (optional for all levels of analysis).


8. Possible cause of the problem.

9. Whether the proposed project is likely to aggravate (increase the frequency or severity of) the existing problem or create a new one based on the above information. See Section 1.2.3.1 for more details on the effectiveness of flow control standards in addressing downstream problems.

Task 5. Mitigation of Existing or Potential Problems

For any existing or potential offsite drainage problem determined to be one of the three defined problem types in Section 1.2.2.1, the design engineer must demonstrate that the proposed project neither aggravates (if existing) nor creates the problem as specified in the problem-specific mitigation requirements set forth in Section 1.2.2.2. To meet these requirements, the proposed project may need to provide additional onsite flow control as specified in Table 1.2.3.A (see also Section 3.3.5), or other onsite or offsite mitigation measures as described in Section 3.3.5.

☐ TIR SECTION 4
FLOW CONTROL AND WATER QUALITY FACILITY ANALYSIS AND DESIGN

Existing Site Hydrology (Part A)

This section of the TIR should include a discussion of assumptions and site parameters used in analyzing the existing site hydrology. The definition of "existing site conditions" presented in Section 1.1 shall be applied for this section.

The acreage, soil types, and land covers used to determine existing flow characteristics, along with basin maps, graphics, and exhibits for each subbasin affected by the development, should be included.

The following information must be provided on a topographical map:

1. delineation and acreage of areas contributing runoff to the site
2. flow control facility location
3. outfall location and description
4. overflow route

The scale of the map and the contour intervals must be sufficient to determine the basin and subbasin boundaries accurately. The direction of flow, the acreage of areas contributing drainage, and the limits of development should all be indicated on the map.

Each subbasin contained within or flowing through the site should be individually labeled and KCRTS parameters referenced to that subbasin.

All natural streams and drainage features, including wetlands and depressions, must be shown. Rivers, closed depressions, streams, lakes, and wetlands must have the 100-year floodplain (and floodway where applicable) delineated as required in Special Requirement #2 (see Section 1.3.2) and by applicable
Developed Site Hydrology (Part B)

This section should provide narrative, mathematical, and graphical presentations of parameters selected and values used for the developed site conditions, including acreage, soil types, land covers, roadway layouts, and all constructed drainage facilities.

Developed subbasin areas and flows should be clearly depicted on a map and cross-referenced to computer printouts or calculation sheets. Relevant portions of the calculations should be highlighted and tabulated in a listing of all developed subbasin flows.

All maps, exhibits, graphics, and references used to determine developed site hydrology must be included, maintaining the same subbasin labeling as used for the existing site hydrology whenever possible. If the boundaries of the subbasin have been modified under the developed condition, the labeling should be modified accordingly (e.g., Subbasin “Am” is a modified version of existing Subbasin “A”).

Performance Standards (Part C)

The design engineer shall include brief discussions of the following:

- The area-specific flow control standard determined from the Flow Control Applications Map per Section 1.2.3 and any modifications to the standard to address onsite or offsite drainage conditions; and

- The applicable conveyance system capacity standards per Section 1.2.4.

Flow Control System (Part D)

This section requires an illustrative sketch of the flow control facility and its appurtenances. This sketch must show basic measurements necessary to calculate the storage volumes available from zero to the maximum head, all orifice/restricter sizes and head relationships, and control structure/restricter orientation to the facility.

The applicant should include all computer printouts, calculations, equations, references, storage/volume tables, graphs, and any other aids necessary to clearly show results and methodology used to determine the storage facility volumes. KCRTS facility documentation files, “Compare Flow Durations” files, peaks files, return frequency or duration curves, etc., should be included to verify the facility meets the performance standards indicated in Part C.

Water Quality System (Part E)

This section provides an illustrative sketch of the proposed water quality facility (or facilities), source controls, oil controls, and appurtenances. This sketch (or sketches) should show overall measurements and dimensions, orientation on the site, location of inflow, bypass, and discharge systems, etc.

The applicant should include all computer printouts, calculations, equations, references, and graphs necessary to show the facility was designed and sized in accordance with the specifications and requirements in Chapter 6.

▲ TIR SECTION 5
CONVEYANCE SYSTEM ANALYSIS AND DESIGN

This section should present a detailed analysis of any existing conveyance systems, and the analysis and design of the proposed stormwater collection and conveyance system for the development. This information should be presented in a clear, concise manner that can be easily followed, checked, and verified. All pipes, culverts, catch basins, channels, swales, and other stormwater conveyance appurtenances must be clearly labeled and correspond directly to the engineering plans.

The minimum information included shall be pipe flow tables, flow profile computation tables, nomographs, charts, graphs, detail drawings, and other tabular or graphic aids used to design and confirm
performance of the conveyance system.

Verification of capacity and performance must be provided for each element of the conveyance system. The analysis must show design velocities and flows for all drainage facilities within the development, as well as those offsite, which are affected by the development. If the final design results are on a computer printout, a separate summary tabulation of conveyance system performance should also be provided.

☐ TIR SECTION 6
SPECIAL REPORTS AND STUDIES

Some site characteristics, such as creeks, closed depressions, lakes, wetlands, or Hazard Areas, pose unique road and drainage design problems that are particularly sensitive to stormwater runoff. As a result, Kent may require the preparation of special reports and studies to address further the site characteristics, the potential for impacts associated with the development, and the measures that would be implemented to mitigate impacts. Special reports shall be prepared by people with expertise in the particular area of analysis. Topics of special reports may include any of the following:

- Geotechnical/soils
- Wetlands
- Floodplains
- Slope protection/stability
- Groundwater
- Fluvial geomorphology
- Erosion and deposition
- Anadromous fisheries impacts
- Structural design
- Geology/Geologic Hazard Areas
- Hydrology
- Water quality
- Structural fill

☐ TIR SECTION 7
OTHER PERMITS

Construction of road and drainage facilities may require additional permits from other agencies for some projects. These additional permits may contain more restrictive drainage plan requirements. This section of the TIR should provide the titles of any other permits, the agencies requiring the other permits, and the permit requirements that affect the drainage plan. Examples of other permits are listed in Section 1.1.3.

☐ TIR SECTION 8
ESC ANALYSIS AND DESIGN

This section must include all hydrologic and hydraulic information used to analyze and design the erosion and sediment control (ESC) facilities, including final site stabilization measures. The TIR shall explain how proposed ESC measures comply with the Erosion and Sediment Control Standards (Appendix D of the King County Manual) and show compliance with the implementation requirements of Core Requirement #5, Section 1.2.5.

The following information must be included:

1. **Provide sufficient information to justify the overall ESC plan and the choice of individual erosion control measures.** At a minimum, there shall be a discussion of each measure specified in
Section 2.3 Plans Required for Drainage Review

Section 1.2.5 and its applicability to the proposed project.

2. Include all hydrologic and hydraulic information used to analyze and size the ESC facilities shown in the engineering plans. Describe the methodology, and attach any graphics or sketches used to size the facilities.

3. Identify areas with a particularly high susceptibility to erosion because of slopes or soils. Discuss any special measures taken to protect these areas as well as any special measures proposed to protect water resources on or near the site.

4. Identify any ESC recommendations in any of the special reports prepared for the project. If these recommendations are not included in the ESC plan, provide justification.

5. If proposing exceptions or modifications to the standards detailed in the Erosion and Sediment Control Standards (Appendix D of the King County Manual), clearly present the rationale. If proposing techniques or products different from those detailed in the ESC Standards, provide supporting documentation so the City can determine if the proposed alternatives provide similar protection.

TIR SECTION 9
BOND QUANTITIES, FACILITY SUMMARIES, AND DECLARATION OF COVENANT

Bond Quantities Worksheet

Each plan submittal requires a construction quantity summary to establish appropriate bond amounts. Using the Bond Quantities Worksheet (Contact the City of Kent Public Works Department), the design engineer shall separate existing right-of-way and erosion control quantities from other onsite improvements. In addition, the engineer shall total the amounts based on the unit prices listed on the form.

Drainage facilities for single-family residential building permits, which are normally not bonded, shall be constructed and approved prior to granting the certificate of occupancy.

Flow Control and Water Quality Facility Summary Sheet and Sketch

Following approval of the plans, a Flow Control and Water Quality Facility Summary Sheet and Sketch (see Reference 8-C) shall be submitted along with an 8 1/2" x 11" plan sketch for each facility proposed for construction. The plan shall show a north arrow, the tract, the facility access road, the extent of the facility, and the control structure location. The approximate street address shall be noted.

Declaration of Covenant
(Privately Maintained Flow Control and WQ Facilities Only)

A declaration of covenant (see Reference 8-F) must be signed and recorded with the City of Kent before any permit with privately maintained flow control or water quality facilities is approved.

TIR SECTION 10
OPERATIONS AND MAINTENANCE MANUAL

For each flow control and water quality facility that is to be privately maintained, and for those that have special nonstandard features, the design engineer shall prepare an operations and maintenance manual. The manual should be simply written and should contain a brief description of the facility, what it does, and how it works. In addition, the manual shall include a copy of the Stormwater Facility Maintenance Guide (see Appendix D of the Kent Construction Standards) and provide an outline of maintenance tasks and the recommended frequency each task should be performed. This is especially important for water quality facilities where proper maintenance is critical to facility performance. For this reason, most of the water facility designs in Chapter 6 include "maintenance considerations" important to the performance of each facility.
2.3.1.2 SITE IMPROVEMENT PLAN

Site improvement plans shall portray design concepts in a clear and concise manner. The plans must present all the information necessary for persons trained in engineering to review the plans, as well as those persons skilled in construction work to build the project according to the design engineer's intent. Supporting documentation for the site improvement plans must also be presented in an orderly and concise format that can be systematically reviewed and understood by others.

The vertical datum on which all engineering plans, plats, binding site plans, and short plats are to be based must be NGVD, USGS and USC and GS 1947 (adjusted to the 1929 datum), and the datum must be tied to at least one City of Kent Survey Control Network benchmark. The benchmark(s) shall be shown or referenced on the plans. Datum correlations can be found in Table 4.4.2.C of the King County Manual.

Horizontal control for all plats, binding site plans, and short plats shall reference the North American Datum of 1927 as the coordinate base and basis of bearings. All horizontal control for these projects must be referenced to a minimum of two City of Kent Survey Horizontal Control monuments. If two horizontal control monuments do not exist within one mile of the project, an assumed or alternate coordinate base and basis of bearings may be used. Horizontal control monument and benchmark information is available from the Kent Public Works Department.

The site improvement plans consist of all the plans, profiles, details, notes, and specifications necessary to construct road, drainage structure, and off-street parking improvements. Site improvement plans include the following:

- A base map (described in Table 2.3.1.A), and
- Site plan and profiles (see Section 2.3.1.1).

Note: Site improvement plans must also include grading plans if onsite grading extends beyond the roadway.

Modified Site Improvement Plan

The Kent Public Works Department may allow a modified site improvement plan for some projects in Targeted Drainage Review (see Section 2.3.2) or where major improvements (e.g., detention facilities, conveyance systems, bridges, road right-of-way improvements, etc.) are not proposed. The modified site improvement plan must:

1. Be drawn on a 11" x 17" or larger sheet,
2. Accurately locate structure(s) and access, showing observance of the setback requirements given in this manual, or other applicable documents, and
3. Provide enough information (datum, topography, details, notes, etc.) to address issues as determined by the Kent Public Works Department.

☐ GENERAL PLAN FORMAT

Site improvement plans should use APWA Standard Map Symbols as appropriate, and must include Standard Plan Notes (see Appendix A of the Kent Construction Standards). Each plan must follow the general format detailed below:

1. Plan sheets and profile sheets, or combined plan and profile sheets, specifications, and detail sheets as required shall be on 22 inch by 34 inch sheets. Right-of-way improvements must be on 22 inch by 34 inch. Original sheets shall be archive quality reproducibles, mylar or equal.

2. Drafting details shall generally conform to APWA Standard Map Symbols with lettering size (before reduction) no smaller than Leroy 80 (Leroy 100 is preferred). Existing features shall be shown with dashed lines or as half-toned (screened) to clearly distinguish existing features from proposed improvements.
3. Each submittal shall contain a project information/cover sheet with the following:
   a) Title: Project name and Kent Public Works Department file number
   b) Table of contents (if more than three pages)
   c) Vicinity map
   d) Name and phone number of utility field contacts (e.g., water, sanitary sewer, gas, power, telephone, and TV) and the One-Call number (1-800-424-5555)
   e) Kent's preconstruction/inspection notification requirements
   f) Name and phone number of the erosion control supervisor
   g) Name and phone number of the surveyor
   h) Name and phone number of the owner/agent
   i) Name and phone number of the applicant
   j) Legal description
   k) Plan approval signature block for the Kent Public Works Department
   l) Name and phone number of the engineering firm preparing the plans (company logos acceptable)
   m) Fire Marshal's approval stamp (if required)
   n) Statement that mailbox locations have been designated or approved by the U.S. Postal Service (where required)
   o) List of conditions of preliminary approval on all site improvements.

4. An overall site plan shall be included if more than three plan sheets are used. The overall plan shall be indexed to the detail plan sheets and include the following:
   a) The complete property area development
   b) Right-of-way information
   c) Street names and road classification
   d) All project phasing and proposed division boundaries
   e) All natural and proposed drainage collection and conveyance systems with catch basin numbers shown

5. Each sheet of the plan set shall be stamped, signed, and dated by a licensed civil engineer registered in the State of Washington. At least one sheet showing all boundary survey information must be provided and stamped by a professional land surveyor licensed in the State of Washington.

6. Detail sheets shall provide sufficient information to construct complex elements of the plan. Details may be provided on plan and profile sheets if space allows.

7. A title block shall be provided on each plan sheet. At a minimum, the title block shall list the following:
   a) Development title
   b) Name, address, and phone number of the firm or individual preparing the plan
   c) A revision block
   d) Page (of pages) numbering
   e) Sheet title (e.g., road and drainage, grading, erosion and sediment control)
8. The location and label for each section or other detail shall be provided.
9. Buffers and setbacks required for wetlands, streams, lakes, and hazard areas shall be designated as required by Kent City Code.
10. All match lines with matched sheet number shall be provided.
11. All division or phase lines and the proposed limits of construction under the permit application shall be indicated.
12. Reference all identified wetlands (sequentially if more than one).
13. The standard plan notes that apply to the project shall be provided on the plans (see Appendix A of the Kent Construction Standards).
14. Commercial building permit applications shall include the designated zoning for all properties adjacent to the development site(s).

**BASE MAP**

A site improvement plan base map provides a common base and reference in the development and design of any project. A base map helps ensure that the engineering plans, grading plans, and ESC plans are all developed from the same background information. This base map shall include the information listed in Table 2.3.1.A.
<table>
<thead>
<tr>
<th>Feature</th>
<th>Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ground Surface Topography</td>
<td>Provide topography within the site and extending beyond the property lines. Contour lines must be shown as described in “Plan View: Site Plan and Roadway Elements” (see Section 2.3.1.2).</td>
</tr>
<tr>
<td>Surface Water Discharge</td>
<td>Provide ground surface elevations for a reasonable “fan” around points of discharge extending at least 50 feet downstream of all point discharge outlets.</td>
</tr>
<tr>
<td>Hydrologic Features</td>
<td>Provide spot elevations in addition to contour lines to aid in delineating the boundaries and depth of all existing floodplains, wetlands, channels, swales, streams, storm drainage systems, roads (low spots), closed depressions, springs, seeps, swales, ditches, pipes, groundwater, and seasonal standing water.</td>
</tr>
<tr>
<td>Other Natural Features</td>
<td>Show the location and relative sizes of other natural features such as rock outcroppings, existing vegetation, and trees 12 inches in diameter and greater that could be disturbed by the project improvements and construction activities (within tree canopy), noting species.</td>
</tr>
<tr>
<td>Flows</td>
<td>Provide arrows that indicate the direction of surface flow on all public and private property and for all existing conveyance systems.</td>
</tr>
<tr>
<td>Floodplains/ Floodways</td>
<td>Show the floodplain/floodways as depicted on City of Kent maps or otherwise required by the City of Kent.</td>
</tr>
<tr>
<td>General Background Information</td>
<td>Show the location and limits of all existing:</td>
</tr>
<tr>
<td></td>
<td>• Property boundaries</td>
</tr>
<tr>
<td></td>
<td>• Structures</td>
</tr>
<tr>
<td></td>
<td>• Easements (including dimensions)</td>
</tr>
<tr>
<td></td>
<td>• Total property (including dimensions)</td>
</tr>
<tr>
<td></td>
<td>• Roads and right-of-way</td>
</tr>
<tr>
<td></td>
<td>• Sanitary sewers and water utilities</td>
</tr>
<tr>
<td></td>
<td>• Common open space</td>
</tr>
<tr>
<td></td>
<td>• Public dedications</td>
</tr>
<tr>
<td></td>
<td>• Other manmade features affecting existing topography/proposed improvements.</td>
</tr>
<tr>
<td>Development Limitations</td>
<td>Delineate limitations to the development that may occur as identified on the TIR worksheet, Part 8 (see Reference 8-A).</td>
</tr>
</tbody>
</table>
SITE PLAN AND PROFILES

The design engineer shall provide plans and profiles for all construction, including but not limited to the following information.

Plan View: Site Plan and Roadway Elements

1. Provide property lines, right-of-way lines, and widths for proposed roads and intersecting roads.

2. Provide all existing and proposed roadway features, such as centerlines, edges of pavement and shoulders, ditches, curbs, and sidewalks. In addition, show points of access to abutting properties and roadway continuations.

3. Show existing and proposed topography contours at 2-foot intervals (5-foot intervals for slopes greater than 15 percent, 10-foot intervals for slopes greater than 40 percent). Contours may be extrapolated from USGS mapping, aerial photographs, or other topography map resources. However, contours shall be field verified for roadway and stream centerlines, steep slopes, floodplains, drainage tracts easements, and conveyance systems. Contours shall extend 50 feet beyond property lines to resolve questions of setback, cut and fill slopes, drainage swales, ditches, and access or drainage to adjacent property.

4. Show the location of all existing utilities and proposed utilities (except those designed by the utility and not currently available) to the extent that these will be affected by the proposed project. Clearly identify all existing utility poles.

5. Identify all roads and adjoining subdivisions.

6. Show right-of-way for all proposed roadways, using sufficient dimensioning to clearly show exact locations on all sections of existing and proposed dedicated public roadway.

7. Clearly differentiate areas of existing pavement and areas of new pavement.

8. For subdivision projects, use drawing scales of 1"=50'. For commercial, multi-family, or other projects, use scales of 1"=20'. Show details for clarification, including those for intersections and existing driveways, on a larger scale.

9. Identify all section, township and range information for the project area.

Plan View: Drainage Conveyance

1. Sequentially number all catch basins and curb inlets starting with the structure farthest downstream.

2. Represent existing storm drainage facilities in dashed lines and label with “Existing.”

3. Clearly label existing storm drainage facilities to be removed with “Existing to be removed.”

4. Show the length, diameter, and material for all pipes, culverts, and stub-outs. Include the slope if not provided on the profile view. Material may be noted in the plan notes.

5. Clearly label catch basins as to size and type (or indicate in the plan notes).

6. Clearly label downspout and footing drain stub-out locations for those lots intending to connect to the storm drainage flow control system. Locate all stub-outs to allow gravity flow from the lowest corner of the lot to the connecting catch basin.

7. Show datum, benchmark locations, and elevations on each plan sheet.

8. Clearly label all stub-out locations for any future pipe connections.

9. Clearly show on the plans all drainage easements, tracts, access easements, Native Growth Retention Areas, Sensitive Area Tracts, Sensitive Area Setback Areas, and building setback lines. Show dimensions, type of restriction, and use.

10. Using arrows, indicate drainage direction of hydraulic conveyance systems.
Plan View: Other

1. Show the location, identification, and dimensions of all buildings, property lines, streets, alleys, and easements.
2. Verify the condition of all public right-of-way and the rights to use them as proposed.
3. Show the locations of structures on abutting properties within 50 feet of the proposed project site.
4. Show the location of all proposed drainage facility fencing, together with a typical section view of each fencing type.
5. Provide section details of all retaining walls and rockeries, including sections through critical portions of the rockeries or retaining walls.
6. Show all existing and proposed buildings with projections and overhangs.
7. Show the location of all wells on site and within 100 feet of the site. Note wells to be abandoned.
8. Show structural BMPs required by the King County Stormwater Pollution Control Manual and any subsequent revisions.

Profiles: Roadway and Drainage

1. Provide existing centerline ground profile at 50-foot stations and at significant ground breaks and topographic features, with average accuracy to within 0.1 feet on unpaved surface and 0.02 feet on paved surface.
2. For publicly maintained roadways, provide final road and storm drain profile with the same stationing as the horizontal plan, reading from left to right, to show stationing of points of curve, tangent, and intersection of vertical curves, with elevation of 0.01 feet. Include tie-in with intersecting pipe runs.
3. On a grid of numbered lines, provide a continuous plot of vertical positioning against horizontal.
4. Show finished road grade and vertical curve data (road data measured at centerline or edge of pavement). Include stopping sight distance.
5. Show all roadway drainage, including drainage facilities, that are within the right-of-way or easement.
6. On the profile, show slope, length, size, and type (in plan notes or on a detail sheet) for all pipes and detention tanks in public right-of-way.
7. Indicate the inverts of all pipes and culverts and the elevations of catch basin grates or lids. It is also desirable, but not required, to show invert elevations and grate elevations on plan sheets.
8. For pipes that are proposed to be within 2.0 feet of finished grade, indicate the minimum cover dimensions.
9. Indicate roadway stationing and offset for all catch basins.
10. Indicate vertical and horizontal scale.
11. Clearly label all profiles with respective street names and plan sheet reference numbers, and indicate all profile sheet reference numbers on plan sheets, if drawn on separate sheets.
12. Locate match points with existing pavements, and show elevations.
13. Show all property boundaries.
14. Label all match line locations.
15. Provide profiles for all 12-inch and larger pipes and for channels (that are not roadside ditches).
16. Show the location of all existing and proposed (if available or critical for clearance) gas, water, and sanitary sewer crossings.
17. Show energy dissipater locations.
18. Identify datum used and all benchmarks (may be shown on plan view instead). Datum and
   benchmarks must refer to established control when available.

19. Use a vertical scale of $1''=5'$'. As an exception, vertical scale shall be $1''=10'$' if the optional $1''=100'$
   horizontal scale is used on projects with lots one acre or larger. Clarifying details, including those for
   intersections and existing driveways, should use a larger scale.

20. Split sheets, with the profile aligned underneath the plan view, are preferred but not required.

DETAILS

The design engineer shall provide details for all construction, including but not limited to the following.

Flow Control, Water Quality, and Infiltration Facility Details

1. Provide a scaled drawing of each detention pond or vault and water quality facility, including the tract
   boundaries.

2. Show predeveloped and finished grade contours at 2-foot intervals. Show and label maximum design
   water elevation.

3. Dimension all berm widths.

4. Show and label at least two cross sections through a pond or water quality facility. One cross section
   must include the restrictor.

5. Specify soils and compaction requirements for pond construction.

6. Show the location and detail of emergency overflows, spillways, and bypasses.

7. Specify rock protection/energy dissipation requirements and details.

8. Provide inverts of all pipes, grates, inlets, tanks, and vaults, and spot elevations of the pond bottom.

9. Show the location of access roads to control manholes and pond/forebay bottoms.

10. Provide plan and section views of all energy dissipaters, including rock splash pads. Specify the size
    of rock and thickness.

11. Show bollard locations on plans. Typically, bollards are located at the entrance to drainage facility
    access roads.

12. On the pond or water quality facility detail, show the size, type (or in plan notes), slope, and length of
    all pipes.

13. Show to scale the section and plan view of restrictor and control structures. The plan view must show
    the location and orientation of all inlet pipes, outlet pipes, and flow restrictors.

14. Draw details at one of the following scales: $1''=1'$', $1''=2'$', $1''=4'$', $1''=5'$', $1''=10'$', or $1''=20'$'. Select a
    scale that clearly shows required information.

Structural Plan Details

Any submittal that proposes a structure (e.g., bridge crossing, reinforced concrete footings, walls, or
vaults) shall include plan sheets that include complete working drawings showing dimensions, steel
placement, and specifications for construction. Structures may require a design prepared and stamped by
a professional structural engineer licensed in the State of Washington, and an application for a separate
commercial building permit.
2.3.1.3 EROSION AND SEDIMENT CONTROL (ESC) PLAN

This section details the specifications and contents for ESC plans. Note that the ESC plan may be simplified by the use of the symbols and codes provided for each ESC measure in the Erosion and Sediment Control Standards (detached Appendix D of the King County Manual). In general, the ESC plan shall be submitted as a separate plan sheet(s). However, there may be some relatively simple projects where providing separate grading and ESC plans is unnecessary.

General Specifications

The site improvement plan shall be used as the base of the ESC plan. Certain detailed information that is not relevant (e.g., pipe/catch basin size, stub-out locations, etc.) may be omitted to make the ESC plan easier to read. At a minimum, the ESC plan shall include all of the information required for the base map (see Table 2.3.1.A), as well as existing and proposed roads, driveways, parking areas, buildings, drainage facilities, utility corridors not associated with roadways, all streams, lakes, wetlands, closed depressions, Hazard Areas and associated buffers, and proposed final topography. A smaller scale may be used to provide better comprehension and understanding.

The ESC plan shall generally be designed for proposed topography, not existing topography, since rough grading is usually the first step in site disturbance. The ESC plan shall address all phases of construction (e.g., clearing, grading, installation of utilities, surfacing, and final stabilization). If construction is being phased, separate ESC plans may need to be prepared to address the specific needs for each construction phase.

The ESC plan shall be consistent with the information provided in Section 8 of the TIR and shall show the following:

1. Identify areas with a high susceptibility to erosion.
2. Provide all details necessary to clearly illustrate the intent of the ESC design.
3. Include ESC measures for all on- and offsite utility construction included in the project.
4. Specify the construction sequence. The construction sequence shall be specifically written for the proposed project. An example construction sequence is provided in Appendix D of the King County Manual.
5. Include ESC Standard Plan Notes (see Appendix A-9 of the Kent Construction Standards).

Clearing Limits

1. Delineate clearing limits.
2. Provide details sufficient to install and maintain the clearing limits.

Cover Measures

1. Specify the type and location of temporary cover measures to be used onsite.
2. If more than one type of cover is to be used onsite, indicate the areas where the different measures will be used, including steep cut and fill slopes.
3. If the type of cover measures to be used will vary depending on the time of year, soil type, gradient, or some other factor, specify the conditions that control the use of the different measures.
4. Specify the nature and location of permanent cover measures. If a landscaping plan is prepared, this may not be necessary.
5. Specify the approximate amount of cover measures necessary to cover all disturbed areas.
6. If netting or blankets are specified, provide typical detail sufficient for installation and maintenance.
7. Specify the seed mixes, fertilizers, and soil amendments to be used, as well as the application rate for each item.

Perimeter Protection
1. Specify the location and type of perimeter protection to be used.
2. Provide typical details sufficient to install and maintain the perimeter protection.
3. If silt fence is to be used, specify the type of fabric to be used.

Traffic Area Stabilization
1. Locate the construction entrance(s).
2. Provide typical details sufficient to install and maintain the construction entrance.
3. Locate the construction roads and parking areas.
4. Specify the measure(s) that will be used to create stabilized construction roads and parking areas. Provide sufficient detail to install and maintain.

Sediment Retention
1. Show the locations of all sediment ponds and traps.
2. Dimension pond berm widths and all inside and outside pond slopes.
3. Indicate the trap/pond storage required and the depth, length, and width dimensions.
4. Provide typical section views through pond and outlet structures.
5. Provide typical details of the control structure and dewatering mechanism.
6. Detail stabilization techniques for outlet/inlet.
7. Provide details sufficient to install cell dividers.
8. Specify mulch or recommended cover of berms and slopes.
9. Specify the 1-foot marker indicating when sediment removal is required.
10. Indicate catch basins that are to be protected.
11. Provide details of the catch basin protection sufficient to install and maintain.

Surface Water Control
1. Locate all pipes, ditches, interceptor ditches, and swales that will be used to convey stormwater.
2. Provide details sufficient to install and maintain all conveyances.
3. Indicate locations of outlet protection, and provide detail of protections.
4. Indicate locations and outlets of any possible dewatering systems.
5. Indicate the location of any level spreaders, and provide details sufficient to install and maintain.
6. Show all temporary pipe inverts.
7. Provide location and specifications for the interception of runoff from disturbed areas and the conveyance of the runoff to a non-erosive discharge point.
8. Provide location and details of rock check dams.
9. Provide front and side sections of typical rock check dams.

Wet Season Requirements
Provide a list of all applicable wet season requirements.
Sensitive Areas Restrictions

1. Specify the type, locations, and details of any measures necessary to comply with requirements to protect surface waters.
2. Specify the type, locations, and details of any measures necessary to comply with any additional protection required to protect Hazard Areas.

2.3.1.4 LANDSCAPE MANAGEMENT PLANS (IF APPLICABLE)

Approved landscape management plans are allowed to be used as an alternative to the requirement to formally treat (with a facility) the runoff from pollution-generating pervious surfaces subject to Core Requirement #8 (see Section 1.2.8). A landscape management plan is a Kent approved plan for defining the layout and long-term maintenance of landscaping features to minimize the use of pesticides and fertilizers, and reduce the discharge of suspended solids and other pollutants. General guidance for preparing landscape management plans is provided in Reference Section 4-A.

If a landscape management plan is proposed, it must be submitted with the engineering plans for the proposed project. The elements listed below are required for evaluation of landscape management plans.

1. Provide a site vicinity map with topography.
2. Provide a site plan with topography. Indicate areas with saturated soils or high water tables.
3. Provide a plant list (provide both common and scientific names) that includes the following information:
   a) Indicate any drought-tolerant plants, disease resistant varieties, species for attracting beneficial insects (if any) and native plants.
   b) For shrubs and groundcovers, indicate the proposed spacing.
   c) For turf areas, indicate the grass mix or mixes planned. Indicate sun/shade tolerance, disease susceptibility, drought tolerance, and tolerance of wet soil conditions.
4. Provide a landscape plan. Indicate placement of landscape features, lawn areas, trees, and planting groups (forbs, herbs, groundcovers, etc.) on the site.
5. Include information on soil preparation and fertility requirements.
6. Provide information on the design of the irrigation method (installed sprinkler system, drip irrigation system, manual, etc.)
7. Provide a landscape maintenance plan, including the following:
   a) Physical care methods, such as thatch removal or aeration, and mowing height and frequency
   b) Type of fertilizer (including N-P-K strength) and fertilization schedule or criteria
   c) Type of chemicals to be used for common pests such as cranefly larvae, and the criteria or schedule for application
   d) Any biocontrol methods.
8. Provide information about the storage of pesticides or other chemicals, and disposal measures that will be used:
   a) If applicable, indicate how the chemicals will be stored on the site between applications to prevent contact with stormwater or spills into the storm drainage system.
   b) Indicate how excess quantities of fertilizers or chemicals will be handled for individual applications.
9. Provide an implementation plan (see Reference Section 4-A for guidance on preparing the implementation plan).

2.3.2 PROJECTS IN TARGETED DRAINAGE REVIEW

This section outlines the specifications and contents of limited scope engineering plans allowed for projects in Targeted Drainage Review. Table 2.3.2.A specifies the minimum required elements of the targeted technical information report based on the type of permit or project, and on the three categories of project characteristics subject to Targeted Drainage Review per Section 1.1.2.2.
TABLE 2.3.2.A MINIMUM ENGINEERING PLAN ELEMENTS
FOR PROJECTS IN TARGETED DRAINAGE REVIEW

<table>
<thead>
<tr>
<th>Type of Permit or Project</th>
<th>Drainage Review Type</th>
<th>Project Category 1(2)</th>
<th>Project Category 2(2)</th>
<th>Project Category 3(2)</th>
</tr>
</thead>
<tbody>
<tr>
<td>SINGLE-FAMILY RESIDENTIAL BUILDING PERMITS (SFRs) &amp; SHORT PLATS</td>
<td>Targeted Drainage Review ONLY</td>
<td>• TIR Sections 1, 2, and 6 (minimum)</td>
<td>• TIR Sections 1, 2, 3, 5, 6, 7, and 8 (minimum)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Small Site ESC Plan(3)</td>
<td>• Small Site ESC Plan(3)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Site Improvement Plan(5),</td>
<td>• ESC Plan(4) for conveyance work</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Site Improvement Plan(5)</td>
<td>N/A</td>
</tr>
<tr>
<td>OTHER PROJECTS OR PERMITS</td>
<td>Targeted Drainage Review ONLY</td>
<td>• TIR Sections 1, 2, 6, and 8 (minimum)</td>
<td>• TIR Sections 1, 2, 3, 5, 6, 7, and 8 (minimum)</td>
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</tr>
<tr>
<td></td>
<td></td>
<td>• ESC Plan(4) for any site disturbance work</td>
<td>• Small Site ESC Plan(3)</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Site Improvement Plan(5),</td>
<td>• ESC Plan(4) for any site disturbance work</td>
<td>N/A</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>• Site Improvement Plan(5)</td>
<td>N/A</td>
</tr>
</tbody>
</table>

Notes:
(1) The above plan elements are considered the recommended minimum for most development cases in Targeted Drainage Review. The Kent Public Works Department may add to these elements if deemed necessary for proper drainage review. Predesign meetings with the Kent Public Works Department are recommended to identify all required elements.
(2) For more detailed descriptions of project categories, see Section 1.1.2.2. If the proposed project has the characteristics of more than one category, the plan elements under each applicable category shall apply.
(3) Small site ESC plans are an element of the small site drainage plan as explained in the Small Site Drainage Requirements booklet (detached Appendix C).
(4) ESC plans shall meet the applicable specifications detailed in Section 2.3.1.3
(5) Site improvement plans shall meet the applicable specifications detailed in Section 2.3.1.2. The Kent Public Works Department may allow modified site improvement plans as described in Section 2.3.1.2.
2.4 PLANS REQUIRED AFTER DRAINAGE REVIEW

This section includes the specifications and contents required of those plans submitted at the end of the permit review process or after a permit has been issued.

2.4.1 PLAN CHANGES AFTER PERMIT ISSUANCE

If changes or revisions to the originally approved engineering plans require additional review, the revised plans shall be submitted to the Kent Public Works Department for approval prior to construction. The plan change submittals shall contain all of the following:

1. The appropriate Plan Change Order form(s).
2. One copy of the revised TIR or addendum.
3. Three sets of the engineering plans.
4. Other information needed for review.

2.4.2 FINAL CORRECTED PLAN SUBMITTAL

During the course of construction, changes to the approved engineering plans are often required to address unforeseen field conditions or design improvements. Once construction is completed, it is the applicant's responsibility to submit to the Kent Public Works Department a final corrected plan ("as-buils"), which is an engineering drawing that accurately represents the project as constructed. These corrected drawings must be professionally drafted revisions applied to the original approved plan and must include all changes made during the course of construction; the ESC plan, however, should not be included. The final corrected plan must be stamped, signed, and dated by a licensed civil engineer registered in the State of Washington. Specific requirements for "as-built" submittals are described in Appendix E of the Kent Construction Standards.

Disposition of Approved Engineering Plans for Subdivisions

Upon engineering plan approval of any subdivision, the Kent Public Works Department will make a set of reproducible mylars (cost to be paid by the applicant) and return the original set to the applicant's engineer. The Kent Public Works Department will retain this reproducible set, using it to make copies for public inspection, distribution, and base reference as required. At the time the development is accepted for maintenance by Kent, the Kent Public Works Department set of reproducibles shall be replaced by the corrected original set for permanent public records at the City of Kent.

2.4.3 FINAL PLAT, SHORT PLAT, AND BINDING SITE PLAN SUBMITTALS

Any subdivision to be finalized, thereby completing the subdivision process and legally forming new lots, requires a final submittal for approval and recording. Short plats also require a final submittal for approval and recording. Submittals shall be accompanied by appropriate fees as prescribed by ordinance. Final submittals will be allowed only after the approval of preliminary plans (for subdivisions only) and any required engineering plans, and after the construction of any required drainage facilities.

All final map sheets and pages shall be prepared by a professional land surveyor registered in the State of Washington and shall conform with all state and local statutes.

The final submittal for recording only applies to subdivisions (plats), and short plats. This plan is required by state and local statutes.
SECTION 2.4 PLANS REQUIRED AFTER DRAINAGE REVIEW

In addition to the requirements of the Kent Public Works Department, submittals for final recording of subdivisions, and short plats must include the following information:

1. Indicate dimensions of all easements, tracts, building setbacks, tops of slopes, wetland boundaries, and floodplains.

2. Include pertinent restrictions as they apply to easements, tracts, and building setback lines.

3. Include the dedication clause as provided in Reference Section 8-K accompanying Chapter 5 of the Kent Construction Standards.

4. State the maximum amount of added impervious surface and proposed clearing per lot as determined through engineering review. The maximum amount of impervious surface may be expressed in terms of percentage of lot coverage or square feet.

5. Specify roof downspout controls by lot based on the “Sizing Credits for Roof Downspout Controls” (see Section 1.2.3.2) as determined through engineering review and approval.

6. For a plat or short plat, record a note conditioning single-family residential permit approval on compliance with approved roof downspout controls (see notes in Section 5.1).