

ACHD Section 8000 - Drainage and Stormwater Management



October 2015



SECTION 8000 – DRAINAGE AND STORMWATER MANAGEMENT

8000	DRAINAGE AND STORMWATER MANAGEMENT	6
8001	PURPOSE OF THIS POLICY	6
8002	ACHD STORMWATER DESIGN MANUAL AND APPROVED BMPS	6
8003	MODIFICATIONS AND ADDENDA	6
8004	DEFINITIONS	6
8004.1	BMPs.....	6
8004.2	Capital Project	6
8004.3	Design Manual	6
8004.4	Detention Facilities.....	6
8004.5	Development Project.....	7
8004.6	Discharge	7
8004.7	Discharger	7
8004.8	Green Stormwater Infrastructure (GSI)	7
8004.9	Hydraulic Conductivity	7
8004.10	HEC-14, HEC-22	7
8004.11	Home Owner’s Association (HOA)	7
8004.12	IDWR	8
8004.13	Idaho Licensed Design Professional.....	8
8004.14	Illicit Connection.....	8
8004.15	Illicit Discharge	8
8004.16	ISPMC	8
8004.17	Infiltration Facilities.....	8
8004.18	Inlet Protection	8
8004.19	NPDES	8
8004.20	Pollutants of Concern	8
8004.21	Policy	9
8004.22	Pre & Post-Development Discharge	9
8004.23	Pretreatment, Pretreatment Facilities.....	9
8004.24	Reclaimed Water.....	9
8004.25	Retention Facilities.....	9
8004.26	Retrofit Project.....	9
8004.27	Riprap	9
8004.28	Road Improvement Projects.....	9
8004.29	Runoff Reduction	10
8004.30	Treatment/Storage Facilities	10
8005	GENERAL STORMWATER MANAGEMENT INFORMATION	10
8005.1	How Local Conditions Affect Stormwater Management	10
8005.2	ACHD NPDES Individual Permits.....	10
8006	LEGAL AUTHORITY FOR STORMWATER MANAGEMENT	10
8006.1	State Requirements.....	10
8006.2	Clean Water Act	11

8006.2.1	NPDES Permits	11
8006.2.2	Total Maximum Daily Loads	12
8007	PERFORMANCE STANDARDS.....	12
8007.1	Peak Rate Control.....	12
8007.2	Runoff Reduction	12
8007.3	Volume Management.....	12
8007.4	Conveyance	13
8007.5	Runoff from Public Streets	13
8007.6	Operation and Maintenance	13
8008	IRRIGATION AND STORMWATER FACILITIES	13
8008.1	Ditch Abandonment, Ditch Perpetuation	14
8009	STORMWATER PLANNING AND PRELIMINARY BMP SELECTION.....	14
8009.1	Site Evaluation/Feasibility	14
8009.2	Geotechnical Investigation.....	14
8009.2.1	Soil Explorations	15
8009.2.2	Explorations with Multiple Facilities	15
8009.2.3	Exploration Reduction.....	15
8009.2.4	Soil Profile.....	15
8009.2.5	Depth to Bedrock Determination	15
8009.2.6	Professional Judgment	16
8009.2.7	Laboratory Testing.....	16
8009.2.8	Reports	16
8009.3	Infiltration Feasibility	16
8009.4	Groundwater	17
8009.5	Groundwater Mounding	17
8009.6	Observation Wells	18
8009.7	Boise River & Surface Water Influences	18
8009.8	Bedrock	18
8009.9	Pipe Storage.....	18
8010	INFILTRATION REQUIREMENTS	19
8010.1	Requirements for Infiltration Facilities.....	19
8010.1.1	Idaho Department of Water Resources/Central District Health Department Requirements	19
8010.1.2	Setbacks and Horizontal Separation Distances	19
8010.1.3	Subsurface Infiltration Facilities	20
8010.1.4	Infiltration Facilities	20
8010.1.5	Design & Construction Infiltration Rates.....	21
8010.2	Protection of Infiltration Facilities During Construction (Roads, utilities, structures).....	21
8010.2.1	Control of Site Runoff	21
8010.2.2	Suspension of Facility Construction	21
8010.2.3	Minimization of Compaction.....	22
8010.2.4	Site Protection	22
8010.2.5	Soil Scarification	22
8010.2.6	Professional Oversight.....	22
8011	STORMWATER DESIGN METHODS AND COMPUTATIONS	22

8011.1	Accuracy of Calculations.....	22
8011.2	Rational Method.....	22
	8011.2.1 Coefficients of Runoff	23
8011.3	Volume and Peak Flow Calculations	24
	8011.3.1 ACHD Stormwater Design Spreadsheet	24
	8011.3.2 Design Storm Runoff Volume	24
	8011.3.3 Flow Control (Peak Discharge) Calculations	25
	8011.3.4 Time of Concentration (Tc) Calculations	25
8011.4	Other Methods to Calculate Volume and Flow	25
8011.5	Conveyance	25
	8011.5.1 Catch Basins.....	25
	8011.5.2 Typical Inlet Spacing.....	26
	8011.5.3 Alternative Inlet Spacing.....	26
	8011.5.4 Manning's Roughness Coefficients for Concentrated Flows	27
	8011.5.5 Hydraulic Capacity and Pipe Size	27
	8011.5.6 Velocities	27
	8011.5.7 Energy Dissipaters.....	28
	8011.5.8 End Sections, Wingwalls/Headwalls/Cutoff Walls ...	28
	8011.5.9 Free-Draining System.....	28
	8011.5.10 Street Grades	28
	8011.5.11 Cross Drains	28
8012	STORMWATER PLAN SUBMITTALS	28
8012.1	Qualifications to Certify Design Plans & Related Submittals	29
8012.2	Certification of Compliance with Design Standards, Variance Approval Process	29
8012.3	Stormwater Concept Plans (Capital Projects).....	29
8012.4	Stormwater Concept & Master Plans (Development Projects).....	30
8012.5	Temporary Stormwater Storage Facilities	30
8012.6	Stormwater Preliminary Plan Submittal	30
8012.7	Final Plan Deliverables	31
8012.8	ACHD Acceptance of Final Plans, Reports & Associated Documents	31
8012.9	Plan Approval & Permitting by Other Regulatory Agencies	32
8012.10	Maintenance Access and Easements.....	32
	8012.10.1 Access	32
	8012.10.2 Easements.....	32
8012.11	Post-Construction Submissions.....	33
8012.12	Subdivisions, Multi-Lot Developments	33
8012.13	Single-Lot Improvements	34
	8012.13.1 Single-Family Residential	34
	8012.13.2 Commercial.....	34
	8012.13.3 Central Business District (CBD)	34
8012.14	Roof Downspouts/Drains.....	34
8012.15	Home Owner's Association & Maintenance Responsibilities.....	35
8012.16	Operation & Maintenance (O&M) Manual.....	35
8013	INSTALLATION OF POST CONSTRUCTION STORMWATER BMPS	36
8013.1	Inspection Procedures and Frequencies	36
8013.2	Enforcement, Violations, and Penalties	36
8014	MAINTENANCE CONSIDERATIONS	36
8014.1	Maintenance Access at Public Street Crossings	36

8014.2	Manholes	36
	8014.2.1 <i>Manhole Spacing</i>	37
	8014.2.2 <i>Pre-Cast Manhole Barrels, Cones, and Bases</i>	37
	8014.2.3 <i>Steps</i>	37
	8014.2.4 <i>Manholes Frames and Covers</i>	37
8014.3	Pipe	37
8014.4	Catch Basins, Frames & Grates	37
8015	STORMWATER BMP MAINTENANCE INSPECTION PROGRAM	37
8015.1	Inspection Procedures and Frequencies	37
8015.2	Violations, Enforcement and Penalties	38
	8015.2.1 <i>Illicit Discharge Prohibited</i>	38
	8015.2.2 <i>Illicit Connections Prohibited</i>	38
	8015.2.3 <i>Concealment</i>	38
	8015.2.4 <i>Continuing Violation</i>	38
	8015.2.5 <i>Notification</i>	39
	8015.2.6 <i>Enforcement</i>	39
8015.3	Nuisance Water Control	40

8000 DRAINAGE AND STORMWATER MANAGEMENT

As an integral part of the Ada County Highway District's (ACHD) stormwater program, this Policy applies to all ACHD roadway projects and private developments impacting public right-of-ways.

8001 PURPOSE OF THIS POLICY

This Policy defines the requirements of stormwater systems within the jurisdiction of the ACHD. This Policy and the ACHD Stormwater Design Manual and Approved Best Management Practices (BMPs), referred to as Design Manual hereafter seek to advance the management of stormwater in Ada County and to mitigate the impacts of urban stormwater runoff.

8002 ACHD STORMWATER DESIGN MANUAL AND APPROVED BMPS

The current edition of the Design Manual supplements this Policy. The Design Manual contains the standards and guidance to help the designer select and size permanent stormwater BMPs to meet the requirements of this Policy.

8003 MODIFICATIONS AND ADDENDA

The District may revise and update this Policy and the Design Manual as needed through approval by the ACHD Commission.

8004 DEFINITIONS

8004.1 BMPs

Best Management Practices.

8004.2 Capital Project

Capital Projects are initiated and administered by ACHD for design, right-of-way acquisition, and construction.

8004.3 Design Manual

ACHD Stormwater Design Manual and Approved BMPs, current edition

8004.4 Detention Facilities

Detention facilities collect and release stormwater runoff at a controlled rate to downstream waters. These facilities may be allowed in areas where a defined pre-development discharge existed and the post project discharges are permitted by downstream owners and operators. The maximum outflow rate should not exceed the calculated pre-development flows unless otherwise approved in writing by ACHD and the downstream owner/operator.

See Section 8008 of this Policy for requirements to discharge to irrigation facilities.

8004.5 Development Project

A Development Project is initiated and administered by a developer in conjunction with a development application and/or permit. The project is designed by an Idaho Licensed Design Professional hired by a developer and is constructed by a developer's hired contractor.

8004.6 Discharge

Any addition or introduction of any pollutant, stormwater, or any other substance whatsoever into the municipal storm sewer system (MS4), waters of the state, or into waters of the United States

8004.7 Discharger

Any person who causes, allows, permits, or is otherwise responsible for, a discharge, including without limitation, any operator of a construction site or industrial facility.

8004.8 Green Stormwater Infrastructure (GSI)

Runoff management approaches and technologies that utilize, enhance and/or mimic the natural hydrologic cycle processes of infiltration, evapotranspiration and reuse.

8004.9 Hydraulic Conductivity

Hydraulic conductivity is a measure of a material's capacity to transmit water. Coefficient of permeability is another term for hydraulic conductivity.

8004.10 HEC-14, HEC-22

Hydraulic Engineering Circular

- No. 14, Hydraulic Design of Energy Dissipaters for Culverts and Channels, Federal Highway Administration, current edition.
- No. 22, Urban Drainage Design Manual, Federal Highway Administration, current edition.

8004.11 Home Owner's Association (HOA)

The Home Owner's Association hereafter referred to as HOA owns and manages the common areas in a subdivision which include stormwater facilities (such as ponds and swales). The term HOA shall also refer to a Property Owner's Association or similar organization for commercial subdivisions.

8004.12 IDWR

Idaho Department of Water Resources

8004.13 Idaho Licensed Design Professional

Idaho Licensed Design Professional refers to someone whose services has traditionally been considered “professional” activities, require licensing or registration by the state, or otherwise require the knowledge and application of design principles appropriate to the planned improvement, hereafter referred to as Design Professional.

8004.14 Illicit Connection

Any physical connection to a publicly maintained storm drain system composed of non-stormwater which has not been permitted by the public entity responsible for the operation and maintenance of the system.

8004.15 Illicit Discharge

Any discharge to a stormwater facility that is not composed entirely of storm water except discharges allowed pursuant to a NPDES permit.

8004.16 ISPWC

Idaho Standards for Public Works Construction, current edition and ACHD approved supplementals.

8004.17 Infiltration Facilities

Infiltration facilities are designed to collect and discharge stormwater by infiltrating it into soils. Examples of infiltration facilities include retention ponds, infiltration swales, and seepage beds.

8004.18 Inlet Protection

Temporary BMPs that capture sediment at the inlet

8004.19 NPDES

National Pollutant Discharge Elimination System (NPDES)

8004.20 Pollutants of Concern

Sediment, total phosphorus, temperature, and *E. coli* (bacteria)

8004.21 Policy

This ACHD Stormwater Policy, current edition.

8004.22 Pre & Post-Development Discharge

Pre-development discharge is the calculated stormwater discharge rate of runoff immediately prior to land disturbing activities.

Post-development discharge is the calculated discharge rate after the project is completed.

8004.23 Pretreatment, Pretreatment Facilities

Pretreatment facilities include an ACHD approved BMP such as vegetative filters, a forebay, grass swales, and/or a manufactured treatment device that provides pollutant removal based on the design flow rate and at the median concentration for the pollutants of concern (POC): sediment, phosphorous, temperature, and *E. coli*.

8004.24 Reclaimed Water

Water produced in any part through the treatment of wastewater.

8004.25 Retention Facilities

Retention facilities are designed to store stormwater on-site without releasing it to downstream waters.

8004.26 Retrofit Project

Retrofit projects provide pollutant reduction in areas that is untreated by any BMP or inadequately treated by an existing BMP. It can also include conversion, enhancements or restoration of older BMPs to improve their performance.

8004.27 Riprap

Riprap is a permanent, erosion-resistant layer made of angular stones of a specified dimension. Riprap is placed at the end of a pipe to dissipate flow energy and protect from scour. Geotextile fabric is used to help stabilize the soil.

8004.28 Road Improvement Projects

Road Improvement Projects are improvements to existing roadways. When runoff from a road improvement project flows to existing stormwater facilities, those facilities shall be brought up to current standards if they are deficient, as determined by ACHD. This may include installing pretreatment BMPs and/or increasing the size of existing storage or conveyance facilities.

8004.29 Runoff Reduction

Onsite retention and management of the runoff generated from the first 0.6 inches of rainfall from a 24-hour event. Runoff volume reduction can be achieved by bioretention, evapotranspiration, engineered infiltration, extended filtration, and/or any combination of such practices that will capture the first 0.6 inches of rainfall.

8004.30 Treatment/Storage Facilities

Treatment and storage facilities provide treatment by allowing sediment and pollutants to settle out over time, through vegetation, and/or a sand filter. Approved treatment and storage BMPs are listed in Section 8200.

8005 GENERAL STORMWATER MANAGEMENT INFORMATION

8005.1 How Local Conditions Affect Stormwater Management

In general, stormwater runoff from roadway projects should be retained within the project limits and not released downstream. The relatively flat terrain of Ada County limits options to discharge stormwater to existing waterways. In addition, some irrigation and drainage district owner/operators do not accept stormwater discharges. These constraints require planners and designers to always look for other ways to manage and treat stormwater near the source.

8005.2 ACHD NPDES Individual Permits

The ACHD Phase I and Phase II NPDES Individual Municipal Separate Storm Sewer System (MS4) Permits can be viewed at:
<http://yosemite.epa.gov/r10/water.nsf/NPDES+Permits/Current+ID1319>.

8006 LEGAL AUTHORITY FOR STORMWATER MANAGEMENT

The District has the responsibility and the authority to manage stormwater in Ada County that is associated with roads under its jurisdiction based on Title 40 of Idaho Code. Title 40 gives the District exclusive and general supervision and jurisdiction over all highways within Ada County except for private streets and state highways owned and operated by the Idaho Transportation Department.

The District has authority to control all stormwater or other discharges into the public right-of-way or into any stormwater facilities within the public right-of-way through its jurisdiction.

8006.1 State Requirements

Idaho Code, Section 40-1415(1) (d), gives ACHD authority over drainage, where necessary, for motorist safety and right-of-way maintenance.

Section 40-1415(6) of Idaho Code requires all subdivision plats to be submitted to the District for acceptance and approval of drainage provisions and construction standards.

Idaho Administrative Procedures Act (IDAPA) 58.01.11, 2009, provides standards that prohibit discharge of contaminants into the environment in a manner that causes a groundwater standard to be exceeded, or is not in accordance with a permit or generally accepted management practice.

IDAPA 58.01.11, Stormwater discharges to groundwater must comply with Idaho Groundwater Quality rules that state:

“The implementation of water quality programs shall ensure that the quality of ground water that discharges to surface water does not impair the identified beneficial uses of the surface water and that surface water infiltration does not impair beneficial uses of ground water.”

8006.2 Clean Water Act

8006.2.1 NPDES Permits

The Clean Water Act (CWA) of 1972, as amended in 1987, prohibits the discharge of pollutants into waters of the United States unless the discharge complies with the National Pollutant Discharge Elimination System (NPDES) permit.

In 1990, the EPA enacted NPDES Phase I regulations for stormwater discharges from large and medium municipalities, Municipal Separate Storm Sewer Systems (MS4s), as defined by the EPA. These regulations, which apply within the city limits of Boise City and Garden City, require control of pollutants in urban stormwater discharges to surface waters and mandate an extensive permitting process for municipal stormwater systems. Phase II regulations covering smaller MS4s and construction activities of one acre or more, unless part of a common development, were signed into law in 1999. Designated Phase II communities are required to meet requirements similar to Phase I with a less extensive permitting process.

ACHD is subject to a NPDES Phase I Permit (IDS-027561) for the MS4 in Boise City and Garden City. ACHD implements the Phase I Permit with co-permittees Boise City, Garden City, Ada County Drainage District #3, Idaho Transportation Department District #3 and Boise State University. ACHD is also subject to a NPDES Phase II Permit (IDS-028185) for the MS4 in Meridian, Eagle and urbanized unincorporated-Ada County. ACHD is the sole permittee for the Phase II Permit. These permits require implementation of Stormwater Management Programs (SWMP) designed to limit the discharge of pollutants to the Maximum Extent Practicable (MEP). The permits do not authorize discharge of stormwater “...that will cause, or have the reasonable potential to cause or contribute to, an excursion above Idaho water quality standards”.

Within this regulatory context, ACHD implements development requirements designed to improve surface and ground water quality and reduce the pollutants of concern: sediment, phosphorus, temperature, and *E. coli* bacteria (IDS-027561). ACHD construction site requirements to address water quality are included in ACHD Policy Section 8300 (Construction Site Discharge Control Program).

8006.2.2 Total Maximum Daily Loads

Section 303 of the CWA requires the development of Total Maximum Daily Loads (TMDLs) for impaired water bodies listed on the 303(d) list. Portions of the lower Boise River and its tributaries have been designated as impaired by the Idaho Department of Environmental Quality and TMDLs have been developed, are under development or will be developed. For completed TMDLs, an implementation plan is developed that outlines the strategies to limit the impairment-causing pollutant. Current TMDLs and associated implementation plans are located at <http://www.deq.idaho.gov/water-quality/surface-water/tmdls/table-of-sbas-tmdls/boise-river-lower-subbasin.aspx>

8007 PERFORMANCE STANDARDS

Projects subject to these performance standards shall pass historic flows from upstream land by providing adequate conveyance facilities through the project site. The following stormwater management policies shall also apply.

8007.1 Peak Rate Control

The peak rate of discharge shall be determined for use in designing individual components of the drainage system and to compare pre and post-development peak flows in order to mitigate the post-development peak runoff rates to no greater than pre-development peak runoff rates for the 2-, 5-, 10-, and 25-year storm events. In addition to peak rate attenuation for the 2-, 5-, 10-, and 25-year storms, the peak flow rate and maximum water surface elevations must be calculated for the 100-year storm event.

8007.2 Runoff Reduction

All new development and redevelopment projects that result in land disturbance of 5,000 square feet or more shall manage onsite the runoff generated from the first 0.6 inches of rainfall from a 24-hour storm event.

8007.3 Volume Management

Stormwater storage facilities of the drainage system shall be sized for the 100-year, 1-hour design storm. Storage facilities may be designed to a 25-year, 1-hour storm event if it can be demonstrated that downstream facilities can safely accommodate flows in excess of the 25-year storm. Foothill areas

with slopes greater than 15% shall be design to a 100-year, 1-hour storm event regardless of downstream conditions.

8007.4 Conveyance

The overflow route shall direct the 100-year post-developed flow safely towards the downstream conveyance system. Facilities that do not have an adequate overflow location or bypass path for the 100-year storm event must be sized to fully infiltrate/detain the 100-year storm. The streets can be used to convey or store stormwater runoff with limits on the street carrying capacity based on the classification of the street related to emergency usage during flood events. (See Section 8011.5.2.)

8007.5 Runoff from Public Streets

Sheet flow from urban and rural streets shall be collected, conveyed and stored within the right-of-way and/or stormwater easement areas. Street rebuild and widening projects shall be designed such that sheet flow from the public street does not adversely impact private property. Stormwater from public streets in new developments shall be retained within the development unless provisions are made and written approval granted to discharge offsite.

8007.6 Operation and Maintenance

A plan for operation, maintenance, and repair of stormwater facilities (O&M plan) shall be prepared and submitted to the District for approval for all stormwater facilities maintained by a HOA. O&M plans shall be made available to those who maintain the stormwater facility. For Development Projects, the O&M Plan shall be recorded with the CC&Rs. Standard plans may be used but must be reviewed and approved by ACHD for each specific project. O&M plan templates are included in the Design Manual.

8008 IRRIGATION AND STORMWATER FACILITIES

Unless approved by ACHD, stormwater conveyance and storage facilities shall be separate and distinct from non-storm systems such as irrigation and irrigation return flows. Existing non-storm systems rerouted or piped through a project shall not be located in the public right-of-way except at approved street crossings. Where pressurized irrigation pipes cross the public right-of-way, the pressurized pipe shall be sleeved in accordance with Section 6000 and include valves on each side of the street.

When proposing to drain stormwater into facilities owned by irrigation or drainage districts, existing pipe connections shall be used whenever possible. All new discharges and new pipe connections (or changes to existing pipe connections) must receive the express written consent of the irrigation or drainage district. In general, post-project stormwater flows should not exceed the pre-development flows for the 25-, 50-, and 100-year storm events unless otherwise approved in writing by ACHD and the owner/operator.

8008.1 Ditch Abandonment, Ditch Perpetuation

Ditches are often proposed to be abandoned in urban areas after the land is no longer flood irrigated. For a ditch to be abandoned, the Design Professional shall demonstrate that no historic discharges upstream must be conveyed through the project site and that no water rights exist downstream.

Provisions must be made for a ditch's continued operation and serviceability (perpetuation) for it to be used as an outfall for urban stormwater. This requires dedication of an easement to ACHD within the project limits for stormwater flows, maintenance and access.

The ability to enter property to maintain a ditch is protected by Idaho State Statute. Idaho State Statute Title 42-Irrigation and Drainage, Section 1204-Maintenance and Repair of Ditches, Prevention of Damage to Others, allows ditch owners and users to enter a property to maintain a ditch for drainage. Idaho Statute 40-1415(1)(d) gives ACHD authority to maintain culverts for street drainage.

8009 STORMWATER PLANNING AND PRELIMINARY BMP SELECTION

8009.1 Site Evaluation/Feasibility

The general characteristics of a site, such as soil type and slope, are major factors in selecting appropriate stormwater controls. The following factors shall be considered when evaluating the site:

1. Soil types and hydraulic conductivity
2. Depth to groundwater
3. Depth to bedrock
4. Slope and geology of the site
5. Proposed drainage area and geometry. Right-of-way locations and pervious/impervious areas.
6. Proximity to surface water, groundwater and public drinking water supplies
7. Potential surface water discharge points
8. Site-specific factors such as previous and proposed land use

With this information, the technical aspects of storage, discharge control, and water quality management can be assessed.

8009.2 Geotechnical Investigation

A geotechnical investigation shall be done to verify site suitability by an Idaho registered geologist, professional engineer, or professional soil scientist with experience in hydrogeologic investigations. The geotechnical investigation will include the evaluation of the suitability of the site for infiltration, determination of the infiltration rate for design, and evaluation of slope stability, and other geotechnical design information needed to determine constructability of the facility. Depth to seasonal high groundwater, low

permeability stratum or other infiltration-limiting factors shall be identified. The number of test pits or soil borings varies depending on site conditions and the proposed development plan.

General requirements are as follows:

8009.2.1 Soil Explorations

For BMPs with footprint surface areas up to 5,000 square feet, a minimum of two (2) explorations are required to determine the suitability and distribution of soil types present. Explorations will be done at, or within thirty feet (30') of the proposed BMP location and having the same NRCS Soil Survey map unit. One (1) soil exploration shall be conducted for each additional 5,000 square feet or fraction thereof of the footprint surface area.

8009.2.2 Explorations with Multiple Facilities

For sites with multiple infiltration BMPs, each with footprint surface areas less than 1,000 square feet, a minimum of one (1) exploration is required for each BMP. The number of required explorations may be reduced, with ACHD approval, for large projects with multiple small facilities.

8009.2.3 Exploration Reduction

The number of required explorations may be reduced, with ACHD approval; at infiltration site where satisfactory data from adjacent areas is available that demonstrates a hydraulic conductivity greater than eight inches per hour (8"/hr). A recommendation to reduce testing requirements shall be submitted in a report which includes supporting data that is stamped and signed by an Idaho registered geologist, professional engineer, or professional soil scientist with experience in hydrogeologic investigations.

8009.2.4 Soil Profile

A soil profile shall be developed using the United States Department of Agriculture (USDA) or Unified Soil Classification (USC) systems. The profile shall extend five (5) feet below the proposed bottom of the facility. The soil description shall include all soil horizons. The location and properties of low hydraulic conductivity layers shall be identified. The important factors controlling soil hydraulic conductivity are texture, structure, bulk-density percent coarse fragments, and clay mineralogy.

8009.2.5 Depth to Bedrock Determination

The depth to bedrock or impermeable layer e.g. hardpan or caliche shall be determined (if within five feet (5') of proposed facility bottom).

8009.2.6 Borings or Test Pits

The depth and number of borings or test pits, and samples should be increased, if in the judgment of the licensed professional conducting the investigation, the conditions are highly variable and such increases are necessary to accurately estimate the performance of the infiltration system. In addition, if the licensed professional determines that deeper layers will influence the rate of infiltration for the facility, soil layers at greater depths must be considered when assessing the site's hydraulic conductivity characteristics.

8009.2.7 Laboratory Testing

Grain size sieve analysis and hydrometer tests may be used to determine USDA soils classification and textural analysis. Visual field inspection by a qualified professional may also be used, provided it is documented. The use of lab testing to establish hydraulic conductivity is prohibited.

8009.2.8 Reports

Reports shall comment on the general weather conditions to identify drought, normal conditions, or above average rainfall. The influence of irrigation facilities, streams, and the Boise River shall also be addressed.

8009.3 Infiltration Feasibility

Infiltration feasibility testing shall be conducted at the concept design stage. Initial testing involves digging multiple test pits or bore holes on the site to establish the initial soil profile, infiltration rate, water table, and/or depth to bedrock.

If the results of initial feasibility testing, as determined by a qualified professional, show that an infiltration rate of greater than 0.5-inch/hour is probable, then at least one infiltration test should be completed at each proposed infiltration facility. The number of required tests may be reduced, with ACHD approval, for large projects with multiple small facilities or where satisfactory data from adjacent areas is available that demonstrates a hydraulic conductivity greater than eight inches per hour (8"/hr). A recommendation for forgoing infiltration testing shall be submitted in a report which includes supporting data that is stamped and signed by an Idaho registered geologist, professional engineer, or professional soil scientist with experience in hydrogeologic investigations.

Following are requirements for infiltration facilities:

1. Bedrock, groundwater or impervious soils shall be greater than 3-feet below the bottom of the infiltration facility.
2. The infiltration system shall not be located in fill unless the fill is clean sand or gravel and the geotechnical report specifically addresses slope stability pertaining to fill soils.

3. Infiltration facilities are not permitted if the surface and underlying soil are SCS Hydrologic Group C or D, or the saturated infiltration rate is less than 0.5 inches per hour.
4. The design infiltration rate shall not exceed 8-inches per hour.
5. Infiltration basins should not be constructed in highly erodible soils, on slopes greater than 10-percent, or within fill soils unless these are specifically addressed in the geotechnical report and mitigated for in the design by the Design Professional of Record and approved in writing by ACHD.

8009.4 Groundwater

The elevation of the seasonal high groundwater table shall be determined to assess site suitability for stormwater infiltration. Groundwater shall be separated a minimum of 3-feet vertically from the bottom of the stormwater storage medium. Monitoring is required, unless substantial equivalent site historical data regarding groundwater levels is available and was collected during the prior two years within 2,000 feet of the proposed infiltration site and on the same landform feature. Biweekly monitoring of groundwater levels shall continue throughout or past the expected seasonal high groundwater monitoring period until it is determined that the seasonal high peaks have occurred. The expected monitoring period will coincide with seasonal runoff and spring rain events (February 15 through June 30) when the proposed development is located on the Boise River floodplain. All other areas shall be monitored during the irrigation season (April 15 through Oct. 31) to determine the influence of streams and/or irrigation facilities on groundwater.

Reports shall comment on the general weather conditions to identify drought, normal conditions, or above average rainfall. The influence of irrigation facilities, streams, and the Boise River should also be addressed.

The groundwater elevation shall be shown on the design plans and referenced to a benchmark within the project.

If groundwater is encountered during construction of the facility at an elevation higher than that shown on the design plans, construction of the facility shall cease and the Design Professional of Record shall be contacted immediately to redesign the facility to account for the higher elevation.

8009.5 Groundwater Mounding

The geotechnical investigation will include an evaluation of the potential for groundwater mounding where there are risk factors which include:

1. Depth to seasonally high groundwater is less than ten feet (10')
2. Relatively little groundwater gradient
3. Complex geology with impermeable lenses, potential faults or other barriers to vertical or lateral dissipation
4. Larger footprint BMPs

ACHD may request additional studies and mitigation measures for sites with elevated risk such as:

1. More detailed investigation of groundwater depths and gradients to refine qualitative classification of the potential for mounding.
2. Computational analysis of groundwater mounding or large scale pilot infiltration testing to assess capacity of subsurface geology to safely infiltrate water.
3. Use of BMPs that are more distributed (smaller footprint area per unit) or are more linear in nature to help reduce mounding potential.

8009.6 Observation Wells

Observation wells are required at all stormwater storage facilities. Wells shall be installed during design and construction to verify the required 3-foot separation from storage media to groundwater is met. The location of the wells shall be shown on the design plans. When practical, observation wells shall be installed within the concrete sidewalk to help protect the well. Wells shall be constructed in accordance with the standard drawings for Observation Wells.

8009.7 Boise River & Surface Water Influences

Project sites close to the Boise River or other surface water shall be evaluated to consider the influence that changes in surface water flow rates and depths have on the storm system. The Design Professional shall demonstrate that the storm system is free draining (no surcharge of pipes); including systems influenced by the Boise River, for river flow rates up to and including 7000 cfs.

8009.8 Bedrock

Bedrock must be separated a minimum of 3-feet from the bottom of the stormwater storage medium.

If bedrock or other impermeable layer is encountered during construction of the facility at an elevation higher than that shown on the design plans, construction of the facility shall cease and the Design Professional of Record shall be contacted immediately to redesign the facility to account for the higher elevation. An infiltration test shall be performed to verify the design infiltration rate is met.

8009.9 Pipe Storage

Potential pond sites or other infiltration alternatives shall be considered if land is available instead of pipe storage. Pipe storage does not provide the same water quality benefits as a retention or detention facility. BMPs listed in the Design Manual should be considered as alternatives or used in conjunction with pipe storage to improve water quality treatment. In addition, large diameter pipes and associated manhole structures may interfere with sewer,

water or other utilities and require special consideration during design. See Section 8012 for information on pipe sizing.

ACHD Maintenance and Stormwater Section representatives should be involved early during the concept design phase to examine how the system can be cleaned and dirty water transported for disposal if pipe storage is proposed. If pipe storage is approved, the storage system shall be oversized by 15% to account for sediment.

8010 INFILTRATION REQUIREMENTS

8010.1 Requirements for Infiltration Facilities

The following standards apply for infiltration facility design.

8010.1.1 Idaho Department of Water Resources/Central District Health Department Requirements

Stormwater infiltration facilities shall conform to Title 42, Chapter 39, Idaho Code, and to the IDWR Rules for Waste Disposal and Injection Wells. Waste disposal systems less than 18-feet deep may be administered by Central District Health Department in cooperation with IDWR.

The Design Professional shall be required to provide notification to IDWR and/or Central District Health Department using the Shallow Injection Well-Notice of Construction inventory form (SIW-NOC), or such other notification as IDWR may require. A copy of the completed SIW-NOC form shall be submitted to ACHD.

8010.1.2 Setbacks and Horizontal Separation Distances

The following separation distances shall be maintained between stormwater infiltration facilities, measured near edge to near edge:

1. 100-feet from public or private drinking water wells
2. 50-feet from perennial and irrigation surface waters
3. 25-feet from basements
4. 10-feet from home foundations (without basement)

Exemptions may be allowed with ACHD staff approval. Stormwater pipe mains and infiltration facilities shall have a minimum 10-foot horizontal separation from potable water mains. Facilities not meeting the separation requirement will require mitigation measures to prevent potential hydrocarbons in stormwater from coming into contact with PVC potable water pipe. Mitigation measures shall be approved by ACHD and the owner of the potable water facilities. These measures may include, but are not limited to, impervious barriers between PVC water mains and storm mains, impervious barriers at infiltration facilities, and alternate non-PVC pipes.

A minimum vertical separation of 1.5-feet is required for potable water mains and stormwater crossings if the stormwater line is constructed with a water class pipe. Crossings having less than 1.5-feet of vertical separation shall be constructed in accordance with IDAPA 58.01.08 and IDAPA 58.01.16.

The bottom of the infiltration facility shall be separated by at least 3-feet vertically from the bedrock layer, the seasonal high water table and impervious soil layers, as indicated by on-site geotechnical test results.

8010.1.3 Subsurface Infiltration Facilities

Subsurface infiltration facilities shall be located outside the roadway prism within a common lot encumbered by an ACHD stormwater easement. If a common lot is not available, it may be located in a planter strip or under the sidewalk. Infiltration facilities can only be installed under the roadway pavement section if approved in writing by ACHD.

Subsurface infiltration facilities without a manhole access at each end longitudinally require an ACHD Storm Drain Marker, per Detail 1 in the Design Manual.

8010.1.4 Infiltration Facilities

Acceptable soil types are those that have an infiltration rate of 0.5-inches per hour or greater, as initially determined from NRCS Soil Textural Classification and subsequently, confirmed by field geotechnical tests. The maximum design soil infiltration rate shall not exceed 8-inches per hour (8"/hr).

Infiltration Rate Table			
SCS Group and Type		Infiltration Rate (in/hr)	
A	Sand	8	Good
A	Loamy Sand	2	
B	Sandy Loam	1	
B	Loam	0.5	
C	Silt Loam	0.25	Not Allowed
C	Sandy Clay Loam	0.15	
D	Clay Loam & Silty Clay Loam	<0.09	
D	Clays	<0.05	

An infiltration test to verify the facility specific infiltration rate at the design depth is required.

Infiltration facilities shall be designed to infiltrate at least 90 percent of the design storm volume within 48-hours.

8010.1.5 Design & Construction Infiltration Rates

An infiltration test to verify the infiltration rate at the design depth is required and shall be conducted prior to the installation of utilities. Design infiltration rates shall be based on in-situ tests that measure infiltration using an established and accepted method. Appendix C in Section 8200 of the Design Manual describes allowable methods. A design infiltration rate for a project shall be provided by the Design Professional licensed in the State of Idaho. A non-licensed but qualified individual working in the field of geosciences can provide a design infiltration rate under the seal of the Design Professional. A minimum Factor of Safety (FOS) of two (2) shall be applied to infiltration testing results when the measured hydraulic conductivity is less than eight inches per hour (8"/hr). A FOS of 2 shall also be applied when the location of the infiltration test is greater than 50 feet from the proposed facility location. A larger FOS shall be used by the designer if warranted by site conditions with a maximum design rate of eight inches per hour (8"/hr).

The geotechnical report shall include the following backup information to help establish the design infiltration rate:

1. The test method used to measure hydraulic conductivity
2. The measured hydraulic conductivity (inches per hour)
3. The design infiltration rate (inches per hour) after applying the appropriate FOS

During construction, an infiltration test may be required at each infiltration facility once excavation is complete prior to backfilling. The ACHD Inspector will observe the infiltration test and provide a general acceptance of the design infiltration rate for the drainage facility.

8010.2 Protection of Infiltration Facilities During Construction (Roads, utilities, structures)

The area selected for the infiltration system shall be visibly marked and secured to prevent compaction of the underlying soils before and during construction from heavy equipment.

8010.2.1 Control of Site Runoff

Construction site runoff from disturbed areas shall not be allowed to enter the infiltration facility. Runoff from disturbed areas shall be diverted from the stormwater facility until the site has undergone final stabilization.

8010.2.2 Suspension of Facility Construction

Stormwater infiltration facility construction shall be suspended during periods of rainfall or snowmelt. Construction shall remain suspended if ponded water is present or if residual soil moisture contributes significantly to the potential for soil smearing, clumping or other forms of compaction.

8010.2.3 Minimization of Compaction

Compaction and smearing of the soils beneath the floor and side slopes of the infiltration facility, and compaction of the soils used for backfill in infiltration facilities with soil planting areas shall be minimized.

8010.2.4 Site Protection

During site development, the area dedicated to the infiltration facility shall be cordoned off and clearly delineated to prevent access by heavy equipment.

8010.2.5 Soil Scarification

If compaction occurs at the base of the infiltration facility, the soil shall be scarified to a depth of at least twelve inches (12"). If smearing occurs, the smeared areas of the interface shall be corrected by raking or roto-tilling.

8010.2.6 Professional Oversight

The Design Professional shall be in responsible charge of observation of the construction of permeable pavement, swales and bioretention facilities. Observations done under the Design Professional shall endeavor to confirm that the construction is in general compliance with the Contract Documents. After construction, the Design Professional shall prepare and seal record drawings based on information provided by the contractor and/or field observations that show documented material changes to the design plans, and shall submit those record drawings to ACHD.

8011 STORMWATER DESIGN METHODS AND COMPUTATIONS

8011.1 Accuracy of Calculations

The peak discharge rates determined by any method of calculation are approximations. Rarely will drainage works operate at the design discharge. Flow will always be more or less in actual practice as it rises and falls during a storm event. Thus, the Design Professional should not overemphasize the detailed accuracy of computed discharges but should emphasize the design of practical and hydraulically balanced works based on sound logic and engineering, as well as dependable hydrology. The use of more than three significant figures for estimating the flood magnitudes conveys a false sense of accuracy and should be avoided.

8011.2 Rational Method

ACHD has adopted the Rational Method as the preferred method for calculating both design storm runoff volume and flow controls (peak discharge). This policy includes a structured process to calculate volume and peak discharge so drainage calculations are prepared in a consistent manner.

The Rational Method is defined as follows:

$$Q = CiA \text{ where:}$$

Q = Discharge rate (cfs)
 C = Coefficient of Runoff (dimensionless)
 i = Rainfall intensity (in/hr) for a duration equal to the time of concentration (T_c) over the contributing area and for the design frequency.
 A = Site area (acres)
 T_c = Time of concentration

The steps for finding these values are described below. Design storm runoff volume and peak flows can be calculated once these values are determined:

1. Calculate the contributing basin area (A) in acres. Use USGS topographic maps, field investigations, final grading contours, or other available data. The size of the drainage area shall include both on-site and off-site lands that contribute runoff to the measurement point
2. Determine the runoff coefficient (C). Typical "C" values are listed in this section. For subdivisions, the drainage contribution area shall include the areas that flow to the storm drain including the portions of the lot graded to the street or one-half of each lot area, whichever is greater.
3. Calculate the time of concentration (T_c) for post project conditions (also pre-development conditions for detention facilities). The time of concentration is defined as the time required for runoff to travel from the most hydraulically distant point in the basin to the point of measurement. The T_c calculation shall include sheet flow, shallow concentrated flow, and open channel flow.
4. Determine the rainfall intensity from the intensity-duration-frequency curves provided in the ACHD Design Tools and Approved BMPs for the calculated T_c . At a minimum, the time of concentration shall be 10 minutes.

8011.2.1 Coefficients of Runoff

Following are coefficients of runoff for various surfaces and soil types.

Estimated Runoff Coefficients for Various Surfaces	
Type of Surface	Runoff Coefficients "C"
Business	
Downtown areas	0.70-0.95
Urban neighborhoods	0.50-0.70
Residential	
Single Family	0.35-0.50
Multi-family	0.60-0.75
Residential (rural)	0.25-0.40
Apartment Dwelling Areas	0.70
Industrial and Commercial	
Light areas	0.80
Heavy areas	0.90
Parks, Cemeteries	0.10-0.25
Playgrounds	0.20-0.35
Railroad yard areas	0.20-0.40

Unimproved areas	0.10-0.30			
Streets				
Asphalt	0.95			
Concrete	0.95			
Brick	0.95			
Roofs	0.95			
Gravel	0.75			
Fields: Sandy soil	Soil Type			
Slope	A	B	C	D
Flat: 0-2%	0.04	0.07	0.11	0.15
Average: 2-6%	0.09	0.12	0.15	0.20
Steep:>6%	0.13	0.18	0.23	0.28
Adapted from ASCE				

8011.3 Volume and Peak Flow Calculations

Q flow rates for peak flows for conveyance are not used for finding volume. The Q for volume is based on a Time of Concentration (Tc) of 1-hour while Qpeak flows are a higher intensity storm based on the calculated Tc.

8011.3.1 ACHD Stormwater Design Spreadsheet

The ACHD Stormwater Design Spreadsheet shall be used to establish the minimum sizing requirements for conveyance and storage facilities.

8011.3.2 Design Storm Runoff Volume

The design storm runoff volume shall be calculated for sizing the storage component of the drainage system. A 100-year Intensity shall be used. A 25-year storm may be used for stormwater storage requirements if it can be demonstrated that downstream facilities can safely accommodate flows in excess of a 25-year storm. For projects in foothill areas with slopes greater than 15%, stormwater facilities shall be designed to the 100-year storm event, regardless of downstream conditions.

For detention facilities, the volume of outflow is also deducted from the required storage volume.

Design storm runoff volumes shall be calculated as $V=CiAx3600 - V_{pre-development}$

C	=	Coefficient of Runoff
i	=	Appropriate Intensity with Tc=60 from IDF Curve
A	=	Total area (acres)
3600	=	constant: 60 min x 60 sec/min
$V_{pre-dev}$	=	Volume Released by Detention (if discharge is approved)

Design storm runoff volumes shall be included on the design plans.

8011.3.3 Flow Control (Peak Discharge) Calculations

The peak rate of discharge shall be determined for use in designing individual components of the drainage system and to examine pre and post-development peak flows.

Peak flow shall be calculated as $Q_{Peak}=CiA$.

C = Coefficient of Runoff
i = Appropriate Intensity based on calculated Tc from IDF Curve, See Section 8202.
A = Total area (acres)

Peak discharge rates for Q100 and Q25 shall be included on the design plans at each inlet with the total Q100 cumulative flow shown in the profile for conveyance pipes. For pressure flow, the plans shall also show the Hydraulic Grade Line (HGL) in the profile or on a separate plan submittal if the HGL conflicts with other items in the profile view.

8011.3.4 Time of Concentration (Tc) Calculations

The time of concentration used to determine rainfall intensity for peak flows can be calculated using TR-55, NRCS method or HEC-22. A minimum Tc of 10 minutes shall be used for peak flows.

8011.4 Other Methods to Calculate Volume and Flow

With pre-approval from the District, other methods of determining volume and peak discharge such as the Natural Resources Conservation Service (NRCS) Technical Release Number 55 (TR-55) for a 24-hour storm or other pre-approved methods based on sound engineering principles and with proven results may be acceptable upon written approval by ACHD.

8011.5 Conveyance

The primary conveyance system consists of catch basins, drop inlets, street gutters and pipe systems. The primary conveyance system should convey the design storm to the storage facilities with the maximum treatment and the minimum impact or inconvenience to the public.

The primary conveyance system shall be designed to accommodate the peak discharge of the 25-year storm event. Minor street flooding is allowed in accordance with Section 8012.6.2. Secondary conveyance shall safely pass or detain the 100-year design storm in the right-of-way or stormwater easement without flooding the sidewalk and impacting private property.

8011.5.1 Catch Basins

Catch basin inlets shall be placed to accommodate the 25-year design flow with spread in conformance with this section.

8011.5.2 Typical Inlet Spacing

Street Classification	Depth of Ponding	Inlet Spacing
Local	No Curb Overtopping, ≤2" Depth at Crown	Max. 1,250-feet or calculate based on spread
Collector	No Curb Overtopping, min. one 10-ft lane dry	Max. 1,000-feet or calculate based on spread
Arterial	No Curb Overtopping, min. two 12-ft lanes dry	Max. 750-feet or calculate based on spread

If no curb exists, a borrow ditch sized to accommodate the 100-year design storm is required to convey runoff to a discharge point or infiltrate runoff within the ditch when no discharge point exists.

8011.5.3 Alternative Inlet Spacing

The Design Professional may space inlets farther apart than the distances listed in the previous section if the topography, size of the contributing basin, and calculations support the spacing with allowable spread.

The following simplified equation assumes a conventional gutter pan with uniform cross slope as provided in Hydraulic Engineering Circular No. 22 (HEC-22).

$$T = [(Qn) / (K_u S_x^{1.67} S_L^{0.5})]^{0.375}$$

where:

K_u = 0.56 in English units

n = Manning's coefficient

Q = Flow rate (ft³/s)

T = Width of flow (spread) (ft)

S_x = Cross slope (ft/ft)

S_L = Longitudinal slope (ft/ft)

Equations for a composite gutter pan section may also be used to calculate the spread.

8011.5.4 Manning's Roughness Coefficients for Concentrated Flows

Typical Range of Manning's Coefficient (n) for Channels and Pipes.	
Conduit Material	Manning's n*
Closed Conduits	
Concrete pipe	0.010 - 0.015
CMP	0.011 - 0.037
Plastic pipe (smooth)	0.009 - 0.015
Plastic pipe (corrugated)	0.018 - 0.025
Pavement/gutter sections	0.012 - 0.016
Small Open Channels	
Concrete	0.011 - 0.015
Rubble or riprap	0.020 - 0.035
Vegetation	0.020 - 0.150
Bare Soil	0.016 - 0.025
Rock Cut	0.025 - 0.045
Natural channels (minor streams, top width at flood stage <30 m (100 ft))	
Fairly regular section	0.025 - 0.050
Irregular section with pools	0.040 - 0.150
*Lower values are usually for well-constructed and maintained (smoother) pipes and channels	

8011.5.5 Hydraulic Capacity and Pipe Size

Hydraulic capacity may be calculated by various acceptable methods for open channels and closed conduits, such as the Hazen-Williams Formula, Darcy-Weisbach Equation, and Manning Equation.

Pipe size shall be dictated by peak flow and hydraulic capacity. No pipe in the stormwater collection system shall be less than 12-inches or greater than 48-inches in diameter.

8011.5.6 Velocities

Velocities in open channels designed for conveyance at design shall be at least 2-feet per second (fps) and not greater than the velocity, determined from channel conditions, to erode or scour the channel lining; generally, 5-fps for an unlined channel. Super-critical velocities should be avoided.

Velocities in closed conduits at design flow shall be at least 3-fps and shall not exceed 15-fps.

8011.5.7 Energy Dissipaters

An energy dissipater shall be provided at stormwater pipe outfalls.

Inlet pipes to stormwater ponds shall have an Inlet Protection Apron and Flow Spreader per Detail 2 in the Design Manual.

Other outfalls shall have riprap or other treatment designed in accordance with HEC-14. If a different end treatment or energy dissipater is required by the owner/operator of a receiving facility, the more restrictive shall apply.

8011.5.8 End Sections, Wingwalls/Headwalls/Cutoff Walls

All pipe outfalls shall have a concrete or metal end section. Safety grates with bars spaced to pass a maximum size 4-inch sphere are required for stormwater pipe discharges.

Wingwalls, headwalls and cutoff walls are required for pipe diameters 30-inches and greater.

8011.5.9 Free-Draining System

All conveyance pipes shall be free draining unless a variance is specifically approved in writing. Siphons shall not be used for stormwater systems.

8011.5.10 Street Grades

Street gutters will provide stormwater conveyance up to their hydraulic capacity. Beyond that limit, subsurface piping or flow routing will be required to facilitate proper drainage. The minimum longitudinal gutter grade for new streets shall be 0.4 percent. For retrofit projects, ACHD may allow 0.3 percent longitudinal grade. The maximum longitudinal gutter grade is 10 percent.

Water flowing down steep grades can be dangerous. Mean velocities in the gutter at peak flows shall not exceed 8-fps for new streets. Gutter velocity shall be controlled through diversion of runoff, catch basins, or redesign of the street.

8011.5.11 Cross Drains

Cross drain valley gutters are not allowed across collector and arterial streets.

8012 STORMWATER PLAN SUBMITTALS

This section provides the general requirements for stormwater plan reviews for all projects impacting existing and future ACHD facilities. Stormwater concept plan requirements differ between Capital Projects and Development Projects.

8012.1 Qualifications to Certify Design Plans & Related Submittals

All plans and related submittals shall be stamped and sealed by a qualified Idaho licensed Design Professional.

8012.2 Certification of Compliance with Design Standards, Variance Approval Process

The Design Professional shall comply with ACHD Policy Section 3100 - Certification of Compliance with Design Standards. The following standard note shall be inserted on the title sheet of all plans submitted for ACHD review and approval:

The Idaho Licensed Design Professional of Record certifies that the plans are prepared in substantial conformance with the ACHD Policy and standards in effect at the time of preparation. The Design Professional acknowledges that ACHD assumes no liability for errors or deficiencies in the design. All variances from ACHD Policy shall be approved in writing. The following variances, listed by date and short description, were approved for this project:
____ none ____

8012.3 Stormwater Concept Plans (Capital Projects)

Capital Projects ½-mile or longer designed by a consultant require a stormwater concept plan submittal. The concept submittal shall meet the following minimum requirements:

1. Stormwater concept plan. May submit one roll plot rather than segmenting the project into individual plan sheets.
2. Survey shall show:
 - Topographic map of existing contours at 2-ft intervals.
 - Existing surface water features like wetlands, intermittent and perennial streams, natural/manmade lakes, reservoirs, canals, drainage ditches, etc.
 - Existing stormwater and irrigation conveyance systems within the project limits and 200-feet beyond.
 - Groundwater elevation shall be shown on the plans and referenced to a nearby benchmark (within 100-feet).
3. Master Stormwater Management Plan
 - Shall identify the location and type of proposed stormwater facilities.
 - Shall show the phasing of the project and identify any temporary facilities.
 - BMP selection narrative to consider water quality benefits and maintenance costs. The narrative shall evaluate at least three stormwater treatment and storage alternatives including, but not limited to:
 - Identifying potential pond sites on undeveloped properties, preferably located away from major street intersections.

- Stormwater retention through infiltration. Retention is preferred over detention.
- Stormwater detention. Requires written approval for discharge from the owner/operator of the receiving facility.
- GSI options to reduce runoff volumes by “disconnecting” impervious surfaces directly connected to the stormwater system. Examples include eliminating or reducing hardscape in traffic islands, providing landscape buffers, storage/filtration in tree wells, or other approved methods.

The stormwater concept must be approved by ACHD in writing prior to continuing with the design process.

ACHD internal design projects do not require a formal concept submittal since Stormwater staff is involved throughout the design process.

8012.4 Stormwater Concept & Master Plans (Development Projects)

The above requirements for Stormwater Concept Plans are waived for Development Projects. The Design Professional should coordinate with the Development Review Section to discuss the design prior to submitting preliminary plans. This is encouraged to help ensure water quality and maintenance needs are addressed early in design.

A Master Stormwater Management Plan is required for developments over 10-acres and should be discussed with Development Review staff prior to submittal of review plans. Approval of a master plan is not blanket approval for future development phases because stormwater policies may change. The general routing, treatment and storage facility sizing are subject to change if policies become more stringent. However, ACHD will make reasonable efforts to continue with an approved master plan.

8012.5 Temporary Stormwater Storage Facilities

No temporary ponds or other temporary storage facilities are allowed within a future roadway alignment.

Gutter flow length to temporary storage facilities shall not exceed 100-ft. Permanent structures, pipes and storage facilities are required if gutter flow length exceeds 100-ft to temporary stormwater facilities.

8012.6 Stormwater Preliminary Plan Submittal

The Preliminary Plan Submittal shall include the following items:

1. Plan sheets and associated details.
Plans shall include a typical section for storage facilities that includes top and bottom design elevations for each material. The typical section shall also identify the seasonal high groundwater elevation, source of groundwater data, who prepared the geotechnical report and date of final

report. The design infiltration rate utilized by the Design Professional to determine the drainage calculations shall also be shown on the typical section.

2. Stormwater Report & Calculations:

- General description of site features, including all water-related features, (e.g. wetlands, drainage/irrigation ditches, natural waterways).
- Drainage basin area map using color and hatching to differentiate the subbasins. Sequentially number each basin and identify C factor.
- Pre and post-development peak flow rates and runoff volume calculations using the Rational Method.
- The basin area map shall show flood routing and identify depth of ponding of the 100-year storm if the primary system is designed for less than the 100-year storm. All flows must be contained in the right-of-way or storm drain easements without impacting private property.

3. Geotechnical Report:

- Boring logs and soils classification.
- Establishment of the seasonal high groundwater elevation through monitoring.
- The report shall show both the observed or measured hydraulic conductivity and the recommended design rate in inches/hour.

4. Draft Operation & Maintenance manuals for stormwater facilities for Development Projects. See Section 8012.16 for details regarding O&M Plans.

8012.7 Final Plan Deliverables

The following shall be included with the final plan submittal:

1. Final plan and detail sheets.
2. Final versions of all items listed in the Preliminary Plan Submittal Section.
3. Copies of associated permits and discharge agreements if applicable.

8012.8 ACHD Acceptance of Final Plans, Reports & Associated Documents

Review and approval by the ACHD does not constitute a full engineering review of project plans and calculations. The plan review is for the purpose of ensuring general conformance to District policies and requirements. The submitting Design Professional/Firm is solely responsible for the design. All stormwater plans and related submittals shall be stamped and signed by a qualified Design Professional registered in the State of Idaho. The Design Professional is responsible to ensure all systems are safe and that calculations, plans, specifications, construction, and record drawings comply with accepted engineering standards, this Policy, and other applicable local, state, and federal rules and regulations. Where any other law, ordinance, resolution, rule, or regulations of any kind also cover requirements in this document, the more restrictive shall govern.

8012.9 Plan Approval & Permitting by Other Regulatory Agencies

Other agencies may have review authority in addition to ACHD review and approval of project plans. It is the Design Professional's responsibility to determine what agencies have regulatory authority over the project. Potential stakeholders may include:

- Irrigation and Drainage Districts: discharge and crossing agreements
- City: Lead agency for development plans, Floodplain review, water & sewer
- County: Lead agency for development plans, Floodplain review
- State: Idaho Department of Water Resources Stream Alteration Permit, IDWR
- Federal: Army Corps of Engineers for placing fill in waters of the US and wetlands (404 Permit), NPDES Stormwater Pollution Prevention Plan (SWPPP) & filing a Notice of Intent (NOI) for construction disturbance greater than 1 acre.

This list is a guideline only and is not all inclusive.

8012.10 Maintenance Access and Easements

Plans and O&M manuals shall identify proposed maintenance access with associated easements.

8012.10.1 Access

Stormwater facilities shall be designed to allow heavy equipment access for maintenance and operation. Maintenance access roads shall be a minimum of 14-feet wide and have a minimum inside curve radius of 30-feet conforming to Detail 5 of the Design Manual, Access Roads and Turnarounds. Unless otherwise approved in writing, longitudinal slope shall not exceed 10% for access roads and 15% for ramps into ponds. At a minimum, 8-inches of compacted 3/4-inch Minus Crushed Aggregate shall be installed. The compacted subgrade shall be approved by the ACHD Inspector prior to placement of the gravel section.

Curb cut driveway approaches with min. 6-inch thick concrete per ISPWC standards shall be required for maintenance access on urban streets. A curb cut is required for both 3-inch rolled curb and 6-inch standard vertical curb.

8012.10.2 Easements

Stormwater easements shall be provided for access to stormwater facilities located on private property. The size of the easement shall be dictated by working needs. In general, the easement shall be 20-feet wide for pipes, offset 5-feet from center of the easement. Ponds and subsurface facilities require an easement over the area of the facility plus a minimum 10-foot perimeter. Easement areas shall remain free of all encroachments and

obstructions, including fences, trees, and other landscaping features unless otherwise approved in a License Agreement.

Civil plans shall identify all stormwater easements. The Surveyor shall provide metes & bounds descriptions, 8.5x11 plan sheets showing dimensioned easements and location, proof of ownership, name, address and title of signatory for ACHD to prepare easements for signature. ACHD shall record all stormwater easements not dedicated through recordation of a subdivision plat.

8012.11 Post-Construction Submissions

Record Drawing submittals shall include the following:

1. 11x17 Record Drawings.
2. One CD with a pdf of the final plans and CAD files showing the stormwater layer and street layout with survey control. Electronic files shall be submitted to the ACHD GIS Section to assist in mapping new stormwater facilities.

8012.12 Subdivisions, Multi-Lot Developments

Individual lot runoff in multi-lot developments can discharge to the public stormwater facilities located at the development site if the stormwater facilities are adequately sized for the flows with water quality and storage measures provided within the development.

Stormwater conveyance facilities for residential subdivisions shall be located in the public right-of-way or a common lot with a blanket stormwater easement.

Stormwater ponds shall be located in a common lot maintained by the developer or HOA in perpetuity. Public street stormwater facilities are not allowed on any privately owned residential lot.

Public street stormwater facilities for commercial subdivisions shall be located in the public right-of-way within the subdivision, in a common area with blanket stormwater easement maintained by the developer or HOA in perpetuity. Public street stormwater facilities may be located on a privately owned commercial lot within the subdivision if provisions are made to protect the facilities.

Unless specifically authorized by ACHD in writing, private street stormwater shall be retained within the confines of the development site and shall not co-mingle with public street stormwater and shall not be allowed to discharge to the public stormwater facilities.

8012.13 Single-Lot Improvements

In general, all site-generated stormwater and surface water shall be retained on-site unless otherwise approved (for example as allowed for the Central Business District (CBD)).

8012.13.1 Single-Family Residential

Site-generated runoff may be discharged into the public right-of-way if the existing system meets District standards, has proven capacity, and meets water quality and storage measures provided within the development. Capacity may be demonstrated by showing that the lot runoff was included in the overall stormwater design for the development or post-development flows do not exceed pre-development flows and system capacity is sufficient as determined by ACHD.

8012.13.2 Commercial

Public street stormwater storage facilities may be allowed on a privately owned commercial lot on a case-by-case basis. Assurances must be made to protect the stormwater system. Subsurface stormwater facilities should not be installed under parking lots or other hardscape. If allowed on a private commercial lot, a stormwater easement must be dedicated to ACHD.

8012.13.3 Central Business District (CBD)

Commercial developments within an established CBD must meet the runoff reduction requirement as defined in Section 8007.3 or provide off-site mitigation and may then discharge stormwater into the public stormwater system if there is sufficient capacity in the existing facilities. An approved pre-treatment facility with stormwater detention limiting discharge to pre-development flows shall be located on the development site, maintained by the development, and approved by the District.

8012.14 Roof Downspouts/Drains

In general, building downspouts should discharge through landscape areas and not directly onto impervious surfaces, such as driveways or sidewalks that drain to the public right-of-way.

In hillside terrain roof downspouts and foundation drains may discharge directly into an enclosed stormwater system if the system is designed to accommodate these flows. The connections to the street stormwater system shall be stubbed to properties when the street is constructed to avoid cutting new pavement. Discharges from downspouts into surface conveyances (i.e., gutters and ditches) are not permitted. Multiple lots shall collect and convey roof runoff in private facilities to connect to the public conveyance system at distinct points like a manhole or inlet structure.

8012.15 Home Owner's Association & Maintenance Responsibilities

Light maintenance of stormwater facilities shall be responsibility of the developer and/or HOA. Light maintenance is required on landscape based treatment/storage facilities like ponds and swales. ACHD maintains all catchment and conveyance facilities within the public right-of-way.

Light maintenance responsibilities of the HOA include:

1. Maintain infiltration facilities to ensure positive percolation of stormwater (defined as infiltrating 90% of the 25-year storm volume in 48-hours).
2. Keep landscaping well maintained and healthy.

Light Maintenance activities may include: controlling irrigation flows (not over-watering), litter control, vegetation maintenance, weed management and applying fertilizers, pesticide and insecticides according to Federal Insecticide, Fungicide and Rodenticide Act (FIFRA) standards.

Heavy Maintenance activities are the responsibility of ACHD and include: sediment removal and reconstruction of a stormwater facility if necessary, as determined by ACHD, after light maintenance duties have failed to correct a problem. A documented maintenance history is important to assess what action is needed to correct a failure.

The HOA shall maintain annual inspection records for stormwater facilities that shall be made available to ACHD upon request.

8012.16 Operation & Maintenance (O&M) Manual

A plan for operation, maintenance, and repair of stormwater facilities shall be prepared and submitted to the District for approval for all stormwater facilities located in common areas where light maintenance is performed by the HOA.

The manual shall include the design plans for the facility and a listing of periodic and post-rainfall maintenance activities. The plan shall describe the maintenance responsibilities of the HOA and property owners. The plan shall be provided to the parties responsible for maintenance and operation of the facility. The approved O&M manual shall be referenced on the project plans and recorded with the CC&Rs for subdivisions where applicable.

The CC&Rs and O&M Manual shall include wording that:

1. Requires a dues paying organization to be established if on-site facilities are in common areas.
2. Gives ACHD the right to inspect storm facilities, and if necessary, promptly perform any required maintenance
3. Requires ACHD concurrence with any proposed changes in the previously approved documents; and
4. Allows ACHD to assess the costs of any required maintenance to properties within the development

Once ACHD provides written acceptance of the stormwater system, the developer and/or HOA shall be responsible for light maintenance and ACHD shall be responsible for heavy maintenance. Maintenance activities shall be documented. Example checklists are provided in the Design Manual.

8013 INSTALLATION OF POST CONSTRUCTION STORMWATER BMPS

For street improvements to be accepted by ACHD, the stormwater system is owned and shall be maintained by the roadway contractor (for Capital Projects) until the Notice of Construction Completion Letter is sent triggering the start of the warranty period. For Development Projects, the stormwater system is owned and shall be maintained by the Developer until ACHD issues a written Acceptance for Maintenance Letter to trigger acceptance of the public street improvements and start of the warranty period.

8013.1 Inspection Procedures and Frequencies

ACHD shall inspect the construction of all stormwater facilities as needed in accordance with the ACHD Quality Control and Quality Assurance Manual for Inspection and Construction Services.

8013.2 Enforcement, Violations, and Penalties

Compliance with ACHD standards for the installation of stormwater structural BMPs is monitored through ACHD inspection and acceptance of the work. For ACHD capital construction projects, control is maintained through inspection and administration of the construction contract. For Development Projects a Temporary Highway Use Permit is required for all work in existing or future right-of-way and ACHD easements in accordance with Policy Section 6000. The terms of the permit, requirements for ACHD inspection, as well as bonding requirements to work in the right-of-way are means to ensure compliance with District Policies.

8014 MAINTENANCE CONSIDERATIONS

8014.1 Maintenance Access at Public Street Crossings

ACHD maintains all culvert and pipe crossings of the public right-of-way in accordance with Policy Section 9000. Open ditches piped at roadway crossings must have unobstructed maintenance access to the end of the pipe within 15-feet from face of curb or edge of shoulder.

A HS-25 traffic rated manhole is required on both sides of piped systems crossing the right-of-way. The center of structures shall offset no more than 15-feet from the face of curb or provide an approved access road. These structures shall be located in right-of-way or permanent easements.

8014.2 Manholes

Manholes shall be pre-cast or cast-in-place concrete and watertight.

8014.2.1 Manhole Spacing

Manholes shall be provided at all intersections of two or more pipes and at all locations where the pipe changes direction. Maximum manhole spacing shall be 400-feet.

8014.2.2 Pre-Cast Manhole Barrels, Cones, and Bases

Pre-cast manhole barrels, cones, and bases shall meet the requirements of the ISPWC, Section 600 Storm Drain.

8014.2.3 Steps

Steps mounted in the manhole sections are required when manhole height exceeds 4-feet.

8014.2.4 Manholes Frames and Covers

Manhole frames and covers shall meet the requirements of the ISPWC, Section 600 Storm Drain. They shall be suitable for HS-25 loading capacity. All stormwater manhole covers shall have the words "STORM DRAIN" cast integrally in the top of the cover. No "decorative" working is allowed. The manhole cover shall be flush with the finished grade.

Concrete collars shall have steel or fiber reinforcement and shall be cast-in-place after paving is complete.

8014.3 Pipe

Stormwater pipe shall meet the requirements of the ISPWC, Section 600 Storm Drain. See Section 8011.5.4 for information on pipe sizing.

8014.4 Catch Basins, Frames & Grates

Catch basins shall be cast-in-place or precast concrete as specified in the ISPWC, Section 600 Storm Drain. Catch basins and frame and grates shall accommodate HS-25 loading with grate bars set at 90 degrees to curb face per the ISPWC.

Longitudinal slopes of 3% and greater shall require vaned grates for improved capture. Double inlets or grooved angled gutter pans may also be required.

8015 STORMWATER BMP MAINTENANCE INSPECTION PROGRAM

8015.1 Inspection Procedures and Frequencies

ACHD owned stormwater facilities are inspected and cleaned on a periodic rotation based on maintenance zones or as needed. Subdivision stormwater

facilities are normally maintained by a HOA and ACHD performs heavy maintenance duties as needed.

8015.2 Violations, Enforcement and Penalties

8015.2.1 Illicit Discharge Prohibited

Illicit discharge to any stormwater drain, including both the MS4, and any ACHD owned stormwater drain or facility is prohibited and a violation of this Ordinance unless:

The discharge is exempted as an allowed non-stormwater use of stormwater drains, such as: water line flushing and other discharges from potable water sources; landscape irrigation and lawn watering; diverted stream flows; rising ground waters; uncontaminated groundwater infiltration to storm drains; uncontaminated pumped ground water; foundation and footing drains; roof drains; water from crawl space pumps; residential air condition condensation; springs; individual residential car washes; flows from riparian habitats and wetlands; de-chlorinated swimming pool discharges; or, flows from firefighting activities and training; or

The discharge is pursuant to an NPDES permit issued and administered by the EPA, provided that the discharger is in full compliance with all requirements of the permit and other applicable laws or regulations. Compliance with an applicable NPDES permit governing discharges into the MS4 shall be considered compliance with this Ordinance.

8015.2.2 Illicit Connections Prohibited

It is prohibited and a violation of this Ordinance to establish, use, maintain or continue illicit drainage connections to the MS4 or any ACHD owned stormwater drain or facility, or to commence or continue any illicit discharges to the MS4 or any ACHD owned stormwater drain or facility.

8015.2.3 Concealment

Causing, permitting, aiding, abetting, or concealing a violation of any provision of this Ordinance shall constitute a violation of such provision.

8015.2.4 Continuing Violation

Unless otherwise provided, a person, firm, corporation or organization shall be deemed guilty of a separate offense for each and every day during any portion of which a violation of this Ordinance is committed, continued or permitted by the person, firm, corporation or organization and shall be punishable accordingly, as herein provided.

8015.2.5 Notification

ACHD will provide written notification of any violations impacting the public street stormwater system and indicate a deadline for corrective action.

8015.2.6 Enforcement

- i. General. If violations are not adequately addressed within the specified timeframe, ACHD shall take measures to correct the violation and use any and all legal means available to recover the associated costs.
- ii. Civil Enforcement. In addition to the penalties provided in this section, any violation may be enforced by civil action brought by ACHD. In any such action, ACHD may seek, and the Court shall grant, as appropriate, any or all of the following remedies:
 - A. A temporary and/or permanent injunction.
 - B. Assessment of the violator for the costs of any investigation, inspection, or monitoring survey which led to the establishment of the violation, and for the reasonable costs of preparing and bringing legal action under this subsection.
 - C. Costs incurred in removing, correcting, or terminating the adverse effects resulting from the violation.
 - D. Compensatory damages for loss or destruction to water quality, wildlife, fish and aquatic life. Assessments under this subsection shall be paid to ACHD to be used exclusively for costs associated with monitoring and establishing stormwater control systems and/or implementing or enforcing the provisions of this Ordinance.
- iii. Administrative Enforcement. In addition to the other enforcement powers and remedies established by this Ordinance, the Director or his designee has the authority to utilize the following administrative remedies:
 - A. Cease and Desist Orders. When the Director or his designee finds that a discharge, illicit discharge or illicit connection has taken place or is likely to take place in violation of this Ordinance, the Director or his designee may issue an order to cease and desist such discharge, or practice or operation likely to cause such discharge, illicit discharge or illicit connection and direct that those persons not complying shall: (a) comply with the requirement; (b) comply with the schedule for compliance, and/or (c) take appropriate remedial or preventative action to prevent the violation from recurring.
 - B. Notice to Clean. Whenever the Director or his designee finds any oil, earth dirt, grass, weeds, dead trees, tin cans, rubbish, refuse, waste or any other materials of any kind, in or upon the sidewalk abutting or adjoining any parcel of land, or upon any parcel of land or grounds in close proximity to any drain or ditch, which may result in an increase in pollutants entering the stormwater drain facility or a non-stormwater discharge to the stormwater drain facility, he may give notice to the owner of the subject property requesting the removal

and lawful disposal of such material. The owner of the subject property shall undertake the activities as described in the notice within the time frames set forth therein.

In the event the owner of the subject property fails to conduct the activities as described in the notice within the frames set forth therein, the Director or his designee may cause such required activities as described in the notice to be performed, and the cost thereof shall be assessed and invoiced to the owner of the subject property.

- iv. Nonexclusivity of Remedies. Remedies under this Ordinance are in addition to and do not supersede or limit any and all other remedies, civil or criminal of ACHD or another jurisdiction. The remedies provided for herein shall be cumulative and not exclusive.

8015.3 Nuisance Water Control

With the availability of gravity and pressure irrigation, overwatering of landscape is a common problem in Ada County. Irrigation runoff from overwatering flows to the street and into the stormwater system where it saturates the system, creates mud and ponding in borrow ditches, swales and low spots, and decreases the capacity and efficiency of the system. Nuisance flows are also a source of pollutants to the storm drain system. It is the responsibility of property owners, HOAs and businesses to adjust their water use as needed to maintain landscaping, conserve water and not release flows to the public street and stormwater system.