UTILITIES & ENERGY SERVICES
TEXAS A&M UNIVERSITY

Design Standard

Storm Drainage Utilities

All new construction should be modeled to demonstrate the impact to the existing storm water flows. The project must be designed in a way that does not create an increase to the storm water runoff from the campus.

Detailed specifications follow.

PART 1 - GENERAL

1.01 This policy applies to stormwater infrastructure within Texas A&M property.

1.02 Design in accordance with **Unified Stormwater Design Guidelines, City of Bryan, City of College Station,** August 2012 (or latest edition).

1.03 The Design Storm to be used is as follows:

A. 10 year recurrence interval:
   1. Design of storm drain conduits and inlets
   2. Design of minor surface streams that are linked to a downstream subsurface conduit

B. 100 year recurrence interval:
   1. Grading and design of surface conveyance pathways
   2. Design of on-site detention facilities
   3. Check flood: all 100 year surface flow should be within an established drainage path.

1.04 For new projects, all pipes shall have a larger hydraulic capacity and at least equal in internal hydraulic area to the conduit immediately upstream.

1.05 All new development projects shall be approved against the campus wide hydrologic and hydraulic model before construction and all new storm drain infrastructure shall be included in the campus wide storm drain hydraulic model.

1.06 New development shall have adequate on-site detention and shall not discharge more than pre-development flows to downstream infrastructure.

1.07 Building designs with below-grade spaces such as basements, service tunnels, etc. are discouraged in areas subject to flooding. Should below-grade service areas or basements be required, they should not have openings located below the 500yr+2ft in areas subject to flooding, or below grade of the surrounding terrain in areas not subject to flooding.

1.08 Storm sewer shall be RCP Class III (ASTM C76) for 12” and above, SDR 26 PVC (ASTM D3034) or heavier for less than 12”, or Corrugated HDPE (ASTM 2306). RCP joints shall meet ASTM C443. PVC pipe shall have water

tight push-on joints meeting the requirements of ASTM F477. Corrugated HDPE fitting shall meet ASTM F2648.

1.09 Storm roof drains shall be run separately from all other storm water sources to the outside of the building. Both sanitary and storm sewers sizes shall be determined by a Texas Professional Engineer (PE) and should be based on existing/future sewer capacities and a drainage study for storm sewers. If the existing infrastructure cannot accommodate the increased loads, then an estimate shall be presented to the Owner to determine if additional funds need to be appropriated for any up-sizing.

1.10 Manholes and/or junction boxes with access openings shall be installed on the storm sewer system at all piping intersections, changes in slope and angle points with the exception of small drain leads which may use appropriate wye fittings. Manholes shall be either pre-cast (ASTM C 478) or cast-in-place with a reinforced concrete foundation. Junction boxes shall be of reinforced pre-cast or cast-in-place construction. Minimum 28 day concrete strength shall be 3,000 psi. Foundation for manholes and/or junction boxes shall be on 1-1/2 sack cement stabilized sand.

1.11 Provide 30 inch diameter minimum size access openings for all manholes. Iron castings for manhole rings shall conform to ASTM A 48, Class 30 and be traffic rated. Area inlets for the storm sewer system shall be either pre-cast or cast-in-place reinforced concrete with frame and grate iron castings conforming to ASTM A48 Class 30 and shall be traffic rated. Curb inlets shall also be either pre-cast or cast-in-place with a manhole frame and cover installed in the top to allow access. In high visibility areas near buildings or at pedestrian drop off points, inlet tops shall be cast-in-place. Minimum concrete 28 day compressive strength for inlets shall be 3,000 psi. Typically storm sewer discharge points shall be stabilized with either a pre-cast or cast-in-place headwall structure with adequate surrounding rip-rap to control erosion. Minimum concrete 28 day compressive strength for headwalls shall be 3,000 psi. Iron castings for manhole rings and covers shall conform to ASTM A48, Class 30 and be traffic rated.

PART 2 - DESIGN STORM REOCCURRENCE INTERVAL

2.01 STORM DRAIN DESIGN EVENT

A. Drainage is to be designed such that 100-year rainfall event will be conveyed to the receiving stream within a designated public easement, such as within the street right-of-way or within a swale or a channel. The storm sewer system is to be designed to convey at least the 10-year storm. The rainfall intensity for both the 100-Year storm and the 10-Year storm is to be determined using a storm duration equal to the time of concentration at the outfall of the drainage basin.

2.02 FUTURE PROJECTS

A. Drainage design for any new development within campus must not result in an increase in peak discharge at the relevant drainage basin outlet over existing conditions for the 2-Year, 5-Year, 10-Year and 100-Year rainfall events. Local or regional detention may be used to attenuate peak flows. If regional detention is used, calculations by a Texas Professional Engineer must demonstrate that the conveyance path between the new development and the detention basin has the capacity for the increased discharge.

PART 3 - OTHER REGULATORY POLICIES

3.01 Local design projects on campus shall achieve full stormwater capture efficiency and meet the spread requirements of the Unified Stormwater Design Guidelines of the City of Bryan and the City of College Station.

3.02 New development projects shall include obtaining additional survey of storm drain facilities (inverts, conduit sizes, and connectivity) of the building as well as downstream. Extent of additional survey is to be determined with UES for each individual project.

3.03 Stormwater Best Management Practices (BMPs) recommended by the EPA, TAMU, and by the Unified Stormwater Design Guidelines include Low impact development (LID) green roofs, bio-swales, planted buffers, grassed swales, sand filters, local and regional detention, infiltration, irrigation cisterns, porous paving, natural prairie vegetation, protected wetlands, and constructed wetlands. These BMPs provide two significant benefits:

A. Reduce peak flows in receiving streams and thereby reduce erosion, improve bank stability, and help to sustain the natural flora and fauna.

B. Reduce pollution by filtering contaminants and providing time and space for bioremediation.

More information for selection of BMP features is available on the TAMU website *Texas Water* http://texaswater.tamu.edu/stormwater/best-management-practices.html and on the EPA website *Water: Best Management Practices* http://water.epa.gov/polwaste/npdes/swbmp/

3.04 The EPA website – *Water: Low Impact Development* contains information and links to design and guidance manuals for the features listed above.

A. http://water.epa.gov/polwaste/green/index.cfm

3.05 The use of the above mentioned BMPs/LID is highly recommended for new developments within campus.

3.06 Any new development on campus should be reviewed by UES staff to ensure that enough storm drain capacity is available downstream. Storm Drain design for new projects must take into consideration the entire trunk line, upstream and downstream for the new development. The storm sewer database provides the means to assess the changes.

3.07 Temporary stormwater BMPs need to be strictly enforced during construction to minimize erosion and sedimentation.

3.08 Evaluate the hydraulic capacity of the impacted storm sewer line all the way to the outfall before making new connections. Determine how the additional flow will impact water levels upstream and downstream.