SECTION IX

APPENDIX D – TECHNICAL DESIGN SUMMARY

The Cities of Bryan and College Station both require storm drainage design to follow these Unified Stormwater Design Guidelines. Paragraph C2 of Section III (Administration) requires submittal of a drainage report in support of the drainage plan (stormwater management plan) proposed in connection with land development projects, both site projects and subdivisions. That report may be submitted as a traditional prose report, complete with applicable maps, graphs, tables and drawings, or it may take the form of a "Technical Design Summary". The format and content for such a summary report shall be in substantial conformance with the description in this Appendix to those Guidelines. In either format the report must answer the questions (affirmative or negative) and provide, at minimum, the information prescribed in the "Technical Design Summary" in this Appendix.

The Stormwater Management Technical Design Summary Report shall include several parts as listed below. The information called for in each part must be provided as applicable. In addition to the requirements for the Executive Summary, this Appendix includes several pages detailing the requirements for a Technical Design Summary Report as forms to be completed. These are provided so that they may be copied and completed or scanned and digitized. In addition, electronic versions of the report forms may be obtained from the City. Requirements for the means (medium) of submittal are the same as for a conventional report as detailed in Section III of these Guidelines.

Note: Part 1 – Executive Summary must accompany any drainage report required to be provided in connection with any land development project, regardless of the format chosen for said report.

Note: Parts 2 through 6 are to be provided via the forms provided in this Appendix. Brief statements should be included in the forms as requested, but additional information should be attached as necessary.

Part 1 – Executive Summary Report

Part 2 – Project Administration

Part 3 – Project Characteristics

Part 4 – Drainage Concept and Design Parameters

Part 5 – Plans and Specifications

Part 6 – Conclusions and Attestation

STORMWATER MANAGEMENT TECHNICAL DESIGN SUMMARY REPORT

Part 1 – Executive Summary

This is to be a brief prose report that must address each of the seven areas listed below. Ideally it will include one or more paragraphs about each item.

1. Name, address, and contact information of the engineer submitting the report, and of the land owner and developer (or applicant if not the owner or developer). The date of submittal should also be included.
2. Identification of the size and general nature of the proposed project, including any proposed project phases. This paragraph should also include reference to

applications that are in process with either City: plat(s), site plans, zoning requests, or clearing/grading permits, as well as reference to any application numbers or codes assigned by the City to such request.

3. The location of the project should be described. This should identify the Named Regulatory Watershed(s) in which it is located, how the entire project area is situated therein, whether the property straddles a watershed or basin divide, the approximate acreage in each basin, and whether its position in the Watershed dictates use of detention design. The approximate proportion of the property in the city limits and within the ETJ is to be identified, including whether the property straddles city jurisdictional lines. If any portion of the property is in floodplains as described in Flood Insurance Rate Maps published by FEMA that should be disclosed.

4. The hydrologic characteristics of the property are to be described in broad terms: existing land cover; how and where stormwater drains to and from neighboring properties; ponds or wetland areas that tend to detain or store stormwater; existing creeks, channels, and swales crossing or serving the property; all existing drainage easements (or ROW) on the property, or on neighboring properties if they service runoff to or from the property.

5. The general plan for managing stormwater in the entire project area must be outlined to include the approximate size, and extent of use, of any of the following features: storm drains coupled with streets; detention / retention facilities; buried conveyance conduit independent of streets; swales or channels; bridges or culverts; outfalls to principal watercourses or their tributaries; and treatment(s) of existing watercourses. Also, any plans for reclaiming land within floodplain areas must be outlined.

6. Coordination and permitting of stormwater matters must be addressed. This is to include any specialized coordination that has occurred or is planned with other entities (local, state, or federal). This may include agencies such as Brazos County government, the Brazos River Authority, the Texas A&M University System, the Texas Department of Transportation, the Texas Commission for Environmental Quality, the US Army Corps of Engineers, the US Environmental Protection Agency, et al. Mention must be made of any permits, agreements, or understandings that pertain to the project.

7. Reference is to be made to the full drainage report (or the Technical Design Summary Report) which the executive summary represents. The principal elements of the main report (and its length), including any maps, drawings or construction documents, should be itemized. An example statement might be:

> **"**One _____-page drainage report dated _____, one set of construction drawings (_____sheets) dated _____, and a _____-page specifications document dated _____ comprise the drainage report for this project.**"**

Part 2 – Project Administration	Start (Page 2.1)

Engineering and Design Professionals Information	
Engineering Firm Name and Address:	Jurisdiction City: _____ Bryan _____ College Station Date of Submittal:
Lead Engineer's Name and Contact Info.(phone, e-mail, fax):	Other:
Supporting Engineering / Consulting Firm(s):	Other contacts:

Developer / Owner / Applicant Information	
Developer / Applicant Name and Address:	Phone and e-mail:
Property Owner(s) if not Developer / Applicant (& address):	Phone and e-mail:

Project Identification	
Development Name:	
Is subject property a site project, a single-phase subdivision, or part of a multi-phase subdivision? _____ If multi-phase, subject property is phase _____ of _____.	
Legal description of subject property (phase) or **Project Area:** (see Section II, Paragraph B-3a)	
If subject property (phase) is second or later phase of a project, describe general status of all earlier phases. For most recent earlier phase Include submittal and review dates.	
General Location of **Project Area,** or subject property (phase):	
In City Limits? Bryan: _____ acres. College Station: _____ acres.	Extraterritorial Jurisdiction (acreage): Bryan: _____ College Station: _____ Acreage Outside ETJ: _____

Part 2 – Project Administration	Continued (page 2.2)

Project Identification (continued)

Roadways abutting or within **Project Area** or subject property:	Abutting tracts, platted land, or built developments:
Named Regulatory Watercourse(s) & Watershed(s):	Tributary Basin(s):

Plat Information For Project or Subject Property (or Phase)

Preliminary Plat File #: _____ Name:	Final Plat File #: _____ Date:_____ Status and Vol/Pg:
If two plats, second name: Status:	File #: _____ Date: _____

Zoning Information For Project or Subject Property (or Phase)

Zoning Type: Existing or Proposed? Case Code: _____
Case Date _____ Status:

Zoning Type: Existing or Proposed? Case Code: _____
Case Date _____ Status:

Stormwater Management Planning For Project or Subject Property (or Phase)

Planning Conference(s) & Date(s):	Participants:

Preliminary Report Required? _____ Submittal Date _____ Review Date _____

Review Comments Addressed? Yes ____ No ____ In Writing? _____ When? _____

Compliance With Preliminary Drainage Report. Briefly describe (or attach documentation explaining) any deviation(s) from provisions of Preliminary Drainage Report, if any.

Part 2 – Project Administration	Continued (page 2.3)

Coordination For Project or Subject Property (or Phase)

Note: For any Coordination of stormwater matters indicated below, attach documentation describing and substantiating any agreements, understandings, contracts, or approvals.

	Dept.	Contact:	Date:	Subject:
Coordination With Other Departments of **Jurisdiction City** (Bryan or College Station)				

Coordination With **Non-jurisdiction City** Needed? Yes ____ No ____	Summarize need(s) & actions taken (include contacts & dates):
Coordination with Brazos County Needed? Yes ____ No ____	Summarize need(s) & actions taken (include contacts & dates):
Coordination with TxDOT Needed? Yes _____ No ____	Summarize need(s) & actions taken (include contacts & dates):
Coordination with TAMUS Needed? Yes ____ No ____	Summarize need(s) & actions taken (include contacts & dates):

Permits For Project or Subject Property (or Phase)

As to stormwater management, are permits required for the proposed work from any of the entities listed below? If so, summarize status of efforts toward that objective in spaces below.

Entity	**Permitted or Approved ?**	**Status of Actions** (include dates)
US Army Crops of Engineers No _____ Yes ___		
US Environmental Protection Agency No ____ Yes ___		
Texas Commission on Environmental Quality No _____ Yes ____		
Brazos River Authority No _____ Yes ___		

Part 3 – Property Characteristics	Start (Page 3.1)

Nature and Scope of Proposed Work

Existing: Land proposed for development currently used, including extent of impervious cover?

Site Development Project (select all applicable)	_____ Redevelopment of one platted lot, or two or more adjoining platted lots. _____ Building on a single platted lot of undeveloped land. _____ Building on two or more platted adjoining lots of undeveloped land. _____ Building on a single lot, or adjoining lots, where proposed plat will not form a new street (but may include ROW dedication to existing streets). _____ Other (explain):
Subdivision Development Project	_____ Construction of streets and utilities to serve one or more platted lots. _____ Construction of streets and utilities to serve one or more proposed lots on lands represented by pending plats.
Describe Nature and Size of Proposed Project	Site projects: building use(s), approximate floor space, impervious cover ratio. Subdivisions: number of lots by general type of use, linear feet of streets and drainage easements or ROW.

Is any work planned on land that is not platted or on land for which platting is not pending? _____ No _____ Yes	If yes, explain:

FEMA Floodplains

Is any part of subject property abutting a Named Regulatory Watercourse (Section II, Paragraph B1) or a tributary thereof?	No _____ Yes _____
Is any part of subject property in floodplain area of a FEMA-regulated watercourse?	No _____ Yes _____ Rate Map _____
Encroachment(s) into Floodplain areas planned? No _____ Yes _____	Encroachment purpose(s): _____ Building site(s) _____ Road crossing(s) _____ Utility crossing(s) _____ Other (explain):

If floodplain areas not shown on Rate Maps, has work been done toward amending the FEMA-approved Flood Study to define allowable encroachments in proposed areas? Explain.

How much fill is being placed within the floodplain? _____ AC-FT Provide documentation proving the floodplain fill is being mitigated adequately and appropriately.

Part 3 – Property Characteristics	Continued (Page 3.2)
Hydrologic Attributes of Subject Property (or Phase)	
Has an earlier hydrologic analysis been done for larger area including subject property?	
Yes ____	Reference the study (& date) here, and attach copy if not already in City files.
	Is the stormwater management plan for the property in substantial conformance with the earlier study? Yes _____ No _____ If not, explain how it differs.
No ____	If subject property **is not** part of multi-phase project, describe stormwater management plan for the property in Part 4.
	If property **is** part of multi-phase project, provide overview of stormwater management plan for **Project Area** here. In Part 4 describe how plan for subject property will comply therewith.
Do existing topographic features on subject property store or detain runoff? _____ No _____ Yes Describe them (include approximate size, volume, outfall, model, etc).	
Any known drainage or flooding problems (including infrastructure capacity limitations) in areas near subject property? _____ No _____ Yes Identify:	
Based on location of study property in a watershed, is **Type 1 Detention** (flood control) needed? (see Table B-1 in Appendix B) _____ Detention is required. _____ Need must be evaluated. _____ Detention not required.	
If the need for **Type 1 Detention** must be evaluated:	What decision has been reached? By whom?
	How was determination made?

Part 3 – Property Characteristics	Continued (Page 3.3)

Hydrologic Attributes of Subject Property (or Phase) (continued)

Does subject property straddle a Watershed or Basin divide? _____ No _____ Yes If yes, describe splits below. In Part 4 describe design concept for handling this.

Watershed or Basin	Larger acreage	Lesser acreage

Above-Project Areas(Section II, Paragraph B3-a)

Does Project Area (project or phase) receive runoff from upland areas? ____ No ____ Yes
Size(s) of area(s) in acres: 1) _____ 2) _____ 3) _____ 4) _____

Flow Characteristics (each instance) (overland sheet, shallow concentrated, recognizable concentrated section(s), small creek (non-regulatory), regulatory Watercourse or tributary);

Flow determination: Outline hydrologic methods and assumptions:

Does storm runoff drain from public easements or ROW onto or across subject property?
_____ No _____ Yes If yes, describe facilities in easement or ROW:

Are changes in runoff characteristics subject to change in future? Explain

Conveyance Pathways (Section II, Paragraph C2)

Must runoff from study property drain across lower properties before reaching a Regulatory Watercourse or tributary? _____ No _____ Yes

Describe length and characteristics of each conveyance pathway(s). Include ownership of property(ies).

Part 3 – Property Characteristics			Continued (Page 3.4)
Hydrologic Attributes of Subject Property (or Phase) (continued)			
Conveyance Pathways (continued)			
	Do drainage easements exist for any part of pathway(s)? ____ No ____ Yes	If yes, for what part of length? _____% Created by? ____ plat, or _____instrument. If instrument(s), describe their provisions.	
Pathway Areas	Where runoff must cross lower properties, describe characteristics of abutting lower property(ies). (Existing watercourses? Easement or Consent aquired?)		
Nearby Drainage Facilities	Describe any built or improved drainage facilities existing near the property (culverts, bridges, lined channels, buried conduit, swales, detention ponds, etc).		
	Do any of these have hydrologic or hydraulic influence on proposed stormwater design? _____ No _____ Yes If yes, explain:		

Part 4 – Drainage Concept and Design Parameters	Start (Page 4.1)
Stormwater Management Concept	
Discharge(s) From Upland Area(s)	
If runoff is to be received from upland areas, what design drainage features will be used to accommodate it and insure it is not blocked by future development? Describe for each area, flow section, or discharge point and include upland areas in the drainage area map.	
Discharge(s) To Lower Property(ies) (Section II, Paragraph E1)	
Does project include drainage features (existing or future) proposed to become public via platting? _____ No _____ Yes Separate Instrument? _____No _____Yes	
Per Guidelines reference above, how will runoff be discharged to neighboring property(ies)?	_____ Establishing Easements (Scenario 1) _____ Pre-development Release (Scenario 2) _____ Combination of the two Scenarios
Scenario 1: If easements are proposed, describe where needed, and provide status of actions on each. (Attached Exhibit #_____)	
Scenario 2: Provide general description of how release(s) will be managed to pre-development conditions (detention, sheet flow, partially concentrated, etc.). (Attached Exhibit #_____)	
Combination: If combination is proposed, explain how discharge will differ from pre-development conditions at the property line for each area (or point) of release.	
If Scenario 2, or Combination are to be used, has proposed design been coordinated with owner(s) of receiving property(ies)? _____ No _____ Yes Explain and provide	

	documentation.

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.2)

Stormwater Management Concept (continued)

Within Project Area Of Multi-Phase Project

Will project result in shifting runoff between Basins or between Watersheds? _____ No _____ Yes	Identify gaining Basins or Watersheds and acres shifting:
	What design and mitigation is used to compensate for increased runoff from gaining basin or watershed?
How will runoff from **Project Area** be mitigated to pre-development conditions? Select any or all of 1, 2, and/or 3, and explain below.	1. _____ With facility(ies) involving other development projects. 2. _____ Establishing features to serve overall Project Area. 3. _____ On phase (or site) project basis within Project Area.
1. Shared facility (type & location of facility; design drainage area served; relationship to size of Project Area): (Attached Exhibit #_____)	
2. For Overall Project Area (type & location of facilities): (Attached Exhibit #_____)	
3. By phase (or site) project: Describe planned mitigation measures for phases (or sites) in subsequent questions of this Part.	
Are Special Designs Planned? Yes	Are aquatic eco-systems proposed? _____ No _____ Yes In which phase(s) or project(s)?
Are Special Designs Planned? No	Are other Best Management Practices for reducing stormwater pollutants proposed? _____ No _____ Yes Summarize type of BMP and extent of use:

		If design of any runoff-handling facilities deviate from provisions of B-CS Technical Specifications, check type facility(ies) and explain in later questions. _____ Detention elements _____ Conduit elements _____ Channel features _____ Swales _____ Ditches _____ Inlets _____ Valley gutters ____ Outfalls _____ Culvert features _____ Bridges _____Other

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.3)

Stormwater Management Concept (continued)

Within Project Area Of Multi-Phase Project (continued)

	Will Project Area include bridge(s) or culvert(s)? _____ No _____ Yes Identify type and general size and In which phase(s).
	If detention/retention serves (will serve) overall Project Area, describe how it relates to subject phase or site project (physical location, conveyance pathway(s), construction sequence):

Within Or Serving Subject Property (Phase, or Site)

	If property part of larger Project Area, is design in substantial conformance with earlier analysis and report for larger area? _____ Yes _____ No, then summarize the difference(s):			
	Identify whether each of the types of drainage features listed below are included, extent of use, and general characteristics.			
	Are roadside ditches used? ____ No ____ Yes	Typical shape?	Surfaces?	
		Steepest side slopes:	Usual front slopes:	Usual back slopes:
		Flow line slopes: least_____ typical_____ greatest_____	Typical distance from travelway: (Attached Exhibit #_____)	
		Are longitudinal culvert ends in compliance with B-CS Standard Specifications? _____ Yes _____ No, then explain:		
	and gutter use	At intersections or otherwise, do valley gutters cross arterial or collector streets? _____ No _____ Yes If yes explain:		

		Are valley gutters proposed to cross any street away from an intersection? ____ No ____ Yes Explain: (number of locations?)

Part 4 – Drainage Concept and Design Parameters			Continued (Page 4.4)
Stormwater Management Concept (continued)			
Within Or Serving Subject Property (Phase, or Site) (continued)			
	Are streets with curb and gutter used? (continued)	Gutter line slopes: Least _____ Usual _____ Greatest _____	
		Are inlets recessed on arterial and collector streets? _____ Yes _____ No If "no", identify where and why.	
		Will inlets capture 10-year design stormflow to prevent flooding of intersections (arterial with arterial or collector)? _____ Yes _____ No If no, explain where and why not.	
		Will inlet size and placement prevent exceeding allowable water spread for 10-year design storm throughout site (or phase)? _____ Yes _____ No If no, explain.	
		Sag curves: Are inlets placed at low points? _____ Yes _____ No Are inlets and conduit sized to prevent 100-year stormflow from ponding at greater than 24 inches? _____ Yes _____ No Explain "no" answers.	
		Will 100-yr stormflow be contained in combination of ROW and buried conduit on whole length of all streets? _____ Yes _____ No If no, describe where and why.	
		Do designs for curb, gutter, and inlets comply with B-CS Technical Specifications? _____ Yes _____ No If not, describe difference(s) and attach justification.	
	Is storm drain system used? No ___	Are any 12-inch laterals used? _____ No _____ Yes Identify length(s) and where used.	
		Pipe runs between system access points (feet):	Typical _____ Longest _____
		Are junction boxes used at each bend? _____ Yes _____ No If not, explain where and why.	

		Are downstream soffits at or below upstream soffits? Yes _____ No _____ If not, explain where and why:	Least amount that hydraulic grade line is below gutter line (system-wide):

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.5)

Stormwater Management Concept (continued)			
Within Or Serving Subject Property (Phase, or Site) (continued)			
	Storm drain system (continued) (on separate sheet provide same info. for more instances)	Outfall(s)	Describe watercourse(s), or system(s) receiving system discharge(s) below (include design discharge velocity, and angle between converging flow lines).
			1) Watercourse (or system), velocity, and angle?
			2) Watercourse (or system), velocity, and angle?
			3) Watercourse (or system), velocity, and angle?
			For each outfall above, what measures are taken to prevent erosion or scour of receiving and all facilities at juncture? 1) 2) 3)
	Are swales used to drain streets? Yes ____ No ____		Are swale(s) situated along property lines between properties? _____ No _____ Yes Number of instances: _____ For each instance answer the following questions.
			Surface treatments (including low-flow flumes if any):
			Flow line slopes (minimum and maximum):
			Outfall characteristics for each (velocity, convergent angle, & end treatment).

		Will 100-year design storm runoff be contained within easement(s) or platted drainage ROW in all instances? _____ Yes _____ No If "no" explain:

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.6)
Stormwater Management Concept (continued)	
Within Or Serving Subject Property (Phase, or Site) (continued)	
Roadside Ditches	Are roadside ditches used? _____ No _____ Yes If so, provide the following: Is 25-year flow contained with 6 inches of freeboard throughout ? ____ Yes ____ No Are top of banks separated from road shoulders 2 feet or more? ____ Yes ____ No Are all ditch sections trapezoidal and at least 1.5 feet deep? ____ Yes ____ No
	For any "no" answers provide location(s) and explain:
Are swale/conduit combinations used in lieu of open channels? ___ Yes ___ No	If conduit is beneath a swale, provide the following information (each instance).
	Instance 1 Describe general location, approximate length:
	Is 100-year design flow contained in conduit/swale combination? ____ Yes ____ No If "no" explain:
	Space for 100-year storm flow? ROW _____ Easement _____ Width _____
	Swale Surface type, minimum and maximum slopes: / Conduit Type and size, minimum and maximum slopes, design storm:
	Inlets Describe how conduit is loaded (from streets/storm drains, inlets by type):
	Access Describe how maintenance access is provided (to swale, into conduit):
	Instance 2 Describe general location, approximate length:
	Is 100-year design flow contained in conduit/swale combination? ____ Yes ____ No If "no" explain:
	Space for 100-year storm flow? ROW _____ Easement _____ Width _____

		Swale Surface type, minimum and maximum slopes:	Conduit Type and size, minimum and maximum slopes, design storm:
		Inlets Describe how conduit is loaded (from streets/storm drains, inlets by type):	
		Access Describe how maintenance access is provided (to swale, into conduit):	

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.7)

Stormwater Management Concept (continued)		
Within Or Serving Subject Property (Phase, or Site) (continued)		
	Will swales without buried conduit receive runoff from public ROW or easements? ____ No ____ Yes. Explain	If "yes" provide the following information for each instance:
		Instance 1 Describe general location, approximate length, surfacing:
		Is 100-year design flow contained in swale? ____ Yes ____ No Is swale wholly within drainage ROW? _____ Yes _____ No Explain "no" answers:
		Access Describe how maintenance access is provide:
		Instance 2 Describe general location, approximate length, surfacing:
		Is 100-year design flow contained in swale? ____ Yes ____ No Is swale wholly within drainage ROW? _____ Yes _____ No Explain "no" answers:
		Access Describe how maintenance access is provided:
		Instance 3, 4, etc. If swales are used in more than two instances, attach sheet providing all above information for each instance.
	Channel improvements proposed?	**"New" channels:** Will any area(s) of concentrated flow be channelized (deepened, widened, or straightened) or otherwise altered? ____ No ____ Yes If only slightly shaped, see "Swales" in this Part. If creating side banks, provide information below.
		Will design replicate natural channel? ____ Yes _____ No If "no", for each instance describe section shape & area, flow line slope (min. & max.), surfaces, and 100-year design flow, and amount of freeboard:

		Instance 1: Instance 2: Instance 3:

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.8)

Stormwater Management Concept (continued)		
Within Or Serving Subject Property (Phase, or Site) (continued)		
	Channel Improvements (continued)	**Existing channels (small creeks):** Are these used? _____ No _____ Yes If "yes" provide the information below.
		Will small creeks and their floodplains remain undisturbed? ____ Yes ____ No How many disturbance instances? _____ Identify each planned location:
		For each location, describe length and general type of proposed improvement (including floodplain changes):
		For each location, describe section shape & area, flow line slope (min. & max.), surfaces, and 100-year design flow.
		Watercourses (and tributaries): Aside from fringe changes, are Regulatory Watercourses proposed to be altered? _____ No _____ Yes Explain below.
		Submit full report describing proposed changes to Regulatory Watercourses. Address existing and proposed section size and shape, surfaces, alignment, flow line changes, length affected, and capacity, and provide full documentation of analysis procedures and data. Is full report submitted? _____ Yes _____ No If "no" explain:
		All Proposed Channel Work: For all proposed channel work, provide information requested in next three boxes.
		If design is to replicate natural channel, identify location and length here, and describe design in Special Design section of this Part of Report.

		Will 100-year flow be contained with one foot of freeboard? ____ Yes ____ No If not, identify location and explain:
		Are ROW / easements sized to contain channel and required maintenance space? ____ Yes ____ No If not, identify location(s) and explain:

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.9)

Stormwater Management Concept (continued)

Within Or Serving Subject Property (Phase, or Site) (continued)

Are Detention Facilities Proposed? ____ Yes ____ No

How many facilities for subject property project? _____ For each provide info. below.				
For each dry-type ~~facilitiy~~facility:	Facility 1		Facility 2	
Acres served & design volume + 10%				
100-yr volume: free flow & plugged				
Design discharge (10 yr & 25 yr)				
Spillway crest at 100-yr WSE?	_____ yes	____ no	_____ yes	____ no
Berms 6 inches above plugged WSE?	_____ yes	____ no	_____ yes	____ no

Explain any "no" answers:

For each facility what is 25-yr design Q, and design of outlet structure?

Facility 1:

Facility 2:

Do outlets and spillways discharge into a public facility in easement or ROW?

Facility 1: ____ Yes ____ No Facility 2: ____ Yes ____ No

If "no" explain:

For each, what is velocity of 25-yr design discharge at outlet? & at spillway?

Facility 1: _____ & _____ Facility 2: _____ & _____

Are energy dissipation measures used? _____ No ____ Yes Describe type and location:

For each, is spillway surface treatment other than concrete? Yes or no, and describe:

		Facility 1: Facility 2:
		For each, what measures are taken to prevent erosion or scour at receiving facility? Facility 1: Facility 2:
		If berms are used give heights, slopes and surface treatments of sides. Facility 1: Facility 2:

Part 4 – Drainage Concept and Design Parameters		Continued (Page 4.10)
Stormwater Management Concept (continued)		
Within Or Serving Subject Property (Phase, or Site) (continued)		
	Detention Facilities (continued)	Do structures comply with B-CS Specifications? Yes or no, and explain if "no": Facility 1: Facility 2:
		For additional facilities provide all same information on a separate sheet.
		Are parking areas to be used for detention? _____ No _____ Yes What is maximum depth due to required design storm?
	Are culverts used at private crossings? No ___ Yes ___	**Roadside Ditches:** Will culverts serve access driveways at roadside ditches? ____ No ____ Yes If "yes", provide information in next two boxes.
		Will 25-yr. flow pass without flowing over driveway in all cases? _____ Yes ____ No Without causing flowing or standing water on public roadway? _____ Yes ____ No Designs & materials comply with B-CS Technical Specifications? _____ Yes ____ No Explain any "no" answers:
		Are culverts parallel to public roadway alignment? _____ Yes _____ No Explain:
		Creeks at Private Drives: Do private driveways, drives, or streets cross drainage ways that serve Above-Project areas or are in public easements/ ROW? _____ No _____ Yes If "yes" provide information below.
		How many instances? _____ Describe location and provide information below. Location 1:

		Location 2: Location 3:			
		For each location enter value for:	1	2	3
		Design year passing without toping travelway?			
		Water depth on travelway at 25-year flow?			
		Water depth on travelway at 100-year flow?			
		For more instances describe location and same information on separate sheet.			

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.11)
Stormwater Management Concept (continued)	
Within Or Serving Subject Property (Phase, or Site) (continued)	

	Are culverts used at public roadway crossings? ____ No _____ Yes (for more instances of any type describe location and same information on separate sheet)	**Named Regulatory Watercourses (& Tributaries):** Are culverts proposed on these facilities? _____ No _____ Yes, then provide full report documenting assumptions, criteria, analysis, computer programs, and study findings that support proposed design(s). Is report provided? _____ Yes ____ No If "no", explain:			
		Arterial or Major Collector Streets: Will culverts serve these types of roadways? _____ No _____ Yes How many instances? _____ For each identify the location and provide the information below. Instance 1: Instance 2: Instance 3:			
		Yes or No for the 100-year design flow:	1	2	3
		Headwater WSE 1 foot below lowest curb top?			
		Spread of headwater within ROW or easement?			
		Is velocity limited per conditions (Table C-11)?			
		Explain any "no" answer(s):			
		Minor Collector or Local Streets: Will culverts serve these types of streets? _____ No _____ Yes How many instances? _____ for each identify the location and provide the information below: Instance 1: Instance 2: Instance 3:			

		For each instance enter value, or "yes" / "no" for:	1	2	3
		Design yr. headwater WSE 1 ft. below curb top?			
		100-yr. max. depth at street crown 2 feet or less?			
		Product of velocity (fps) & depth at crown (ft) = ?			
		Is velocity limited per conditions (Table C-11)?			
		Limit of down stream analysis (feet)?			
		Explain any "no" answers:			

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.12)

Stormwater Management Concept (continued)

Within Or Serving Subject Property (Phase, or Site) (continued)

	Culverts (continued)	**All Proposed Culverts:** For all proposed culvert facilities (except driveway/roadside ditch intersects) provide information requested in next eight boxes.
		Do culverts and travelways intersect at 90 degrees? ____ Yes ____ No If not, identify location(s) and intersect angle(s), and justify the design(s):
		Does drainage way alignment change within or near limits of culvert and surfaced approaches thereto? ____ No ____ Yes If "yes" identify location(s), describe change(s), and justification:
		Are flumes or conduit to discharge into culvert barrel(s)? _____ No ____ Yes If yes, identify location(s) and provide justification:
		Are flumes or conduit to discharge into or near surfaced approaches to culvert ends? _____ No ____ Yes If "yes" identify location(s), describe outfall design treatment(s):
		Is scour/erosion protection provided to ensure long term stability of culvert structural components, and surfacing at culvert ends? _____ Yes ____ No If "no" Identify locations and provide justification(s):
		Will 100-yr flow and spread of backwater be fully contained in street ROW, and/or drainage easements/ ROW? ____ Yes ____ No if not, why not?

		Do appreciable hydraulic effects of any culvert extend downstream or upstream to neighboring land(s) not encompassed in subject property? _____ No _____ Yes If "yes" describe location(s) and mitigation measures:
		Are all culvert designs and materials in compliance with B-CS Tech. Specifications? _____ Yes _____ No If not, explain in Special Design Section of this Part.

Part 4 – Drainage Concept and Design Parameters			Continued (Page 4.13)
Stormwater Management Concept (continued)			
Within Or Serving Subject Property (Phase, or Site) (continued)			
	Bridge(s)	Is a bridge included in plans for subject property project? _____ No _____ Yes If "yes" provide the following information.	
		Name(s) and functional classification of the roadway(s)?	
		What drainage way(s) is to be crossed?	
		A full report supporting all aspects of the proposed bridge(s) (structural, geotechnical, hydrologic, and hydraulic factors) must accompany this summary report. Is the report provided? _____ Yes _____ No If "no" explain:	
	Water Quality	Is a Stormwater Pollution Prevention Plan (SW3P) established for project construction? _____ No _____ Yes	Provide a general description of planned techniques:
	Special Designs – Non-Traditional Methods		
	Are any non-traditional methods (aquatic eco-systems, wetland-type detention, natural stream replication, BMPs for water quality, etc.) proposed for any aspect of subject property project? _____ No _____ Yes If "yes" list general type and location below.		

	Provide full report about the proposed special design(s) including rationale for use and expected benefits. Report must substantiate that stormwater management objectives will not be compromised, and that maintenance cost will not exceed those of traditional design solution(s). Is report provided? _____ Yes _____ No If "no" explain:

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.14)
Stormwater Management Concept (continued)	
Within Or Serving Subject Property (Phase, or Site) (continued)	
Special Designs – Deviation From B-CS Technical Specifications	
If any design(s) or material(s) of traditional runoff-handling facilities deviate from provisions of B-CS Technical Specifications, check type facility(ies) and explain by specific detail element. _____ Detention elements _____ Drain system elements _____ Channel features _____ Culvert features _____ Swales _____ Ditches _____ Inlets ____Outfalls _____ Valley gutters _____ Bridges (explain in bridge report)	
In table below briefly identify specific element, justification for deviation(s).	

Specific Detail Element	Justification for Deviation (attach additional sheets if needed)
1)	
2)	
3)	
4)	
5)	

Have elements been coordinated with the City Engineer or her/his designee? For each item above provide "yes" or "no", action date, and staff name:

1)
2)
3)
4)
5)

Design Parameters	
Hydrology	
	Is a map(s) showing all Design Drainage Areas provided? _____ Yes _____ No
	Briefly summarize the range of applications made of the Rational Formula:
	What is the size and location of largest Design Drainage Area to which the Rational Formula has been applied? _____ acres Location (or identifier):

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.15)

Design Parameters (continued)			
Hydrology (continued)			
	In making determinations for time of concentration, was segment analysis used? ____ No ____ Yes In approximately what percent of Design Drainage Areas? _____ %		
	As to intensity-duration-frequency and rain depth criteria for determining runoff flows, were any criteria other than those provided in these Guidelines used? _____ No ____Yes If "yes" identify type of data, source(s), and where applied:		
	For each of the stormwater management features listed below identify the storm return frequencies (year) analyzed (or checked), and that used as the basis for design.		
	Feature	Analysis Year(s)	Design Year
	Storm drain system for arterial and collector streets		
	Storm drain system for local streets		
	Open channels		
	Swale/buried conduit combination in lieu of channel		
	Swales		
	Roadside ditches and culverts serving them		
	Detention facilities: spillway crest and its outfall		
	Detention facilities: outlet and conveyance structure(s)		
	Detention facilities: volume when outlet plugged		
	Culverts serving private drives or streets		
	Culverts serving public roadways		

	Bridges: provide in bridge report.		

Hydraulics

What is the range of design flow velocities as outlined below?

Design flow velocities;	Gutters	Conduit	Culverts	Swales	Channels
Highest (feet per second)					
Lowest (feet per second)					

Streets and Storm Drain Systems Provide the summary information outlined below:

Roughness coefficients used: For street gutters: _____

For conduit type(s) _____ _____ Coefficients: _____ _____

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.16)

Design Parameters (continued)

Hydraulics (continued)

Street and Storm Drain Systems (continued)

For the following, are assumptions other than allowable per Guidelines?
Inlet coefficients? ____ No ____ Yes Head and friction losses ____ No ____ Yes
Explain any "yes" answer:

In conduit is velocity generally increased in the downstream direction? ____ Yes ____ No
Are elevation drops provided at inlets, manholes, and junction boxes? ____ Yes ____ No
Explain any "no" answers:

Are hydraulic grade lines calculated and shown for design storm? ____ Yes ____ No
For 100-year flow conditions? ____ Yes ____ No Explain any "no" answers:

What tailwater conditions were assumed at outfall point(s) of the storm drain system? Identify each location and explain:

Open Channels If a HEC analysis is utilized, does it follow Sec VI.F.5.a? ____ Yes ____ No

Outside of straight sections, is flow regime within limits of sub-critical flow? ____ Yes ____ No
If "no" list locations and explain:

Culverts If plan sheets do not provide the following for each culvert, describe it here.

	For each design discharge, will operation be outlet (barrel) control or inlet control?
	Entrance, friction and exit losses:
	Bridges Provide all in bridge report

Part 4 – Drainage Concept and Design Parameters	Continued (Page 4.17)
Design Parameters (continued)	
Computer Software	
What computer software has been used in the analysis and assessment of stormwater management needs and/or the development of facility designs proposed for subject property project? List them below, being sure to identify the software name and version, the date of the version, any applicable patches and the publisher	
Demonstration of No Negative Impact to Adjacent Properties	
Provide documentation proving adequate pathways been provided for extreme event flow. Provide a calculation comparison to show no increase in peak flows from the site. Provide a calculation comparison to show no increase in water surface elevations upstream or downstream of the proposed project. Provide documentation proving that all mitigation volume for the project (including floodplain fill and increased runoff) has been provided.	
Part 5 – Plans and Specifications	
Requirements for submittal of construction drawings and specifications do not differ due to use of a Technical Design Summary Report. See Section III, Paragraph C3.	
Part 6 – Conclusions and Attestation	
Conclusions	

Add any concluding information here:
Attestation
Provide attestation to the accuracy and completeness of the foregoing 6 Parts of this Technical Design Summary Drainage Report by signing and sealing below.
"This report (plan) for the drainage design of the development named in Part B was prepared by me (or under my supervision) in accordance with provisions of the Bryan/College Station Unified Drainage Design Guidelines for the owners of the property. All licenses and permits required by any and all state and federal regulatory agencies for the proposed drainage improvements have been issued or fall under applicable general permits." *(Affix Seal)* _____ *Licensed Professional Engineer* *State of Texas PE No.*_____