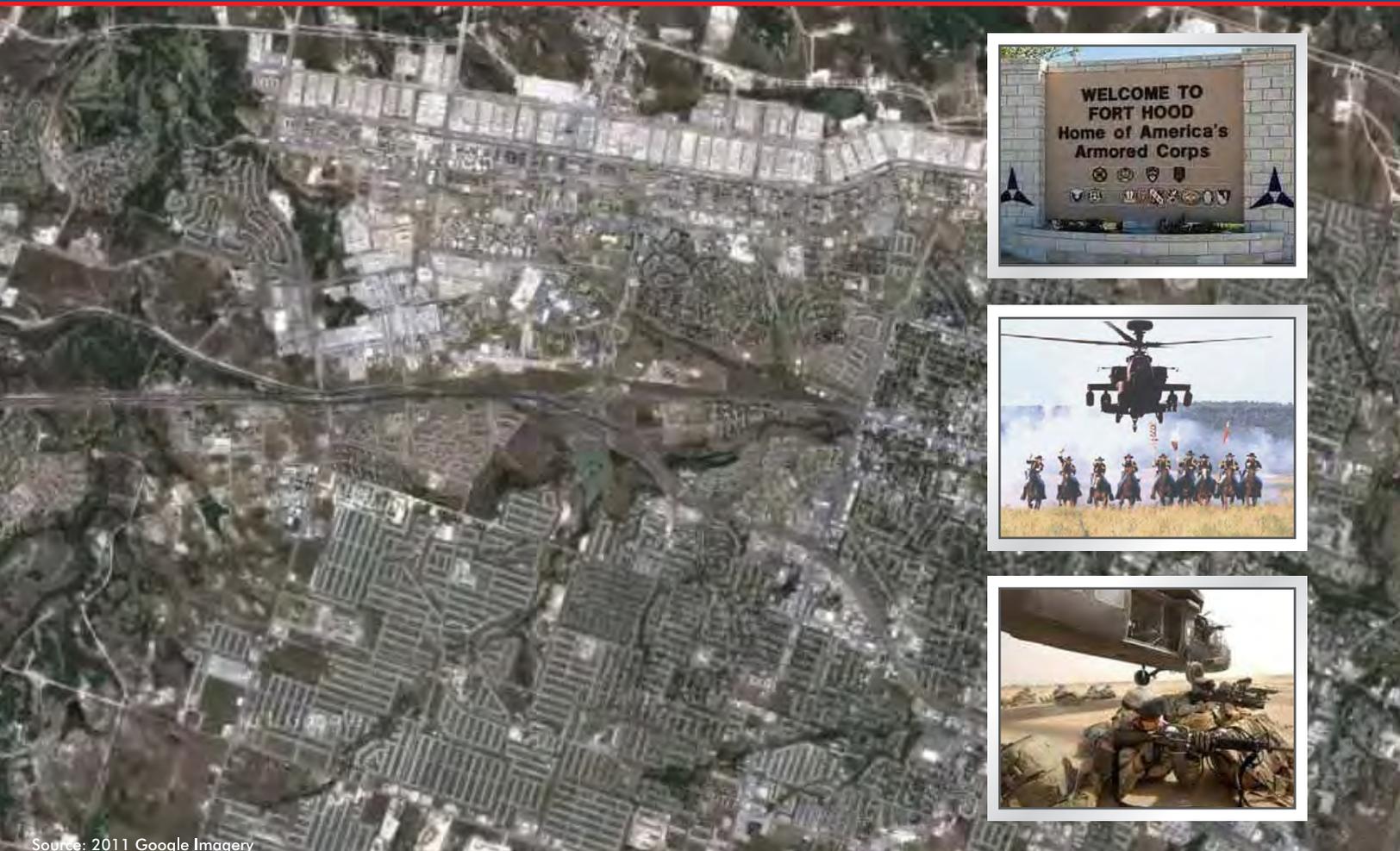


# Environmental Assessment for the Construction and Operation of the New Clear Creek Shopping Center at Fort Hood, Texas

Fort Hood, Texas

September 2011



Source: 2011 Google Imagery

Prepared by:



DEPARTMENTS OF THE ARMY  
AND AIR FORCE

Operations Center  
P.O. Box 225887  
Dallas, Texas 75222-5887

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**Environmental Assessment**  
for the  
**Construction and Operation of the**  
**New Clear Creek Shopping Center at Fort Hood, Texas**

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**September 2011**

Prepared by:



**Departments of the Army and Air Force**  
**Army and Air Force Exchange Service**  
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Dallas, Texas 75222-5887

**Environmental Assessment**

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

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# Environmental Assessment

## for the

### Construction and Operation of the New Clear Creek Shopping Center at Fort Hood, Texas

**Proposed Action:** Construction and operation of a new shopping center at Fort Hood, Texas. New construction would total approximately 244,000 square feet and include a main store area, merchandise processing area, concessions, Medcom Satellite Pharmacy, an Army and Air Force Exchange Service (AAFES) dental concession, a food court containing nine food concepts including Burger King, Manchu Wok, Del Taco, Charley’s, Starbucks, Baskin Robbins, Froots, Arby’s, and Subway, and parking.

**Report Designation:** Environmental Assessment (EA).

**Responsible Agency:** Department of the Army.

**Point of Contact:** Mr. Greg Smith, Project Engineer/Manager, AAFES Headquarters, 3911 South Walton Blvd., Dallas, Texas 75236-1598, (214) 312-2109, SmithGregory@aafes.com

**Fort Hood Point of Contact:** Ms. Charlotte Baldwin, NEPA Specialist, DPW Environmental, 4612 Engineer Drive, Fort Hood, Texas, 76544, (254) 286-6262, Charlotte.F.Baldwin@us.army.mil

**Abstract:** AAFES proposes to construct and operate a new shopping center for use by authorized patrons at Fort Hood Army Base, Bell and Coryell Counties, Texas.

The existing AAFES Post Exchange is outdated and unable to meet customer demand. Under the Proposed Action, a new and larger facility would be constructed that would enhance and consolidate customer services on the Base and would provide AAFES with additional revenue.

Under the No Action Alternative, AAFES would not construct the new facility and Fort Hood patrons would continue to use the outdated, undersized facility that has exceeded its useful life.

This EA evaluates the Preferred Alternative and the No Action Alternative. Resources evaluated in this EA include: land use; socioeconomics; transportation; infrastructure and utilities; topography, geology, and soils; water resources; biological resources; cultural resources; air quality; noise; hazardous materials and waste; protection of children; environmental justice; and cumulative impacts. No significant impacts would result from the implementation of the Proposed Action at the preferred site location or from the No Action Alternative.

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1

## **Executive Summary**

2

The Environmental Assessment (EA) provides an analysis of the potential environmental impacts associated with the construction and operation of a new shopping center at Fort Hood, Texas. Alternative locations are also identified and considered as part of the site-selection process.

5

### **Proposed Action**

6

The Army and Air Force Exchange Service (AAFES) proposes to construct and operate a new shopping center at Fort Hood, Texas. New construction would total approximately 244,000 square feet and would include a main store area, merchandise processing area, concessions, Medcom Satellite Pharmacy, an AAFES dental concession, a food court containing nine food concepts, and parking. The purpose of the action is to better serve the needs of the military community through the improvement and expansion of shopping services. The need for the action is to provide an updated, expanded, and consolidated facility where authorized customers can obtain multiple services at a single location.

14

### **Description of Alternatives**

15

This EA considers six alternative site locations for the Proposed Action:

16

- Demolish the existing Post Exchange (PX) and rebuild in its place;

17

- Renovate and expand the existing PX;

18

- Construct a new shopping center immediately south of the existing PX;

19

- Construct a new shopping center on the southeast corner of the intersection of Clear Creek Road and Tank Destroyer Boulevard

20

21

- Construct a new shopping center southeast of the Clear Creek Road/Tank Destroyer Boulevard intersection immediately east of the MWR facility; or

22

23

- Construct a new shopping center northeast of the intersection of Santa Fe Avenue and Clear Creek Road.

24

25

Five of the six sites were eliminated from further analysis for reasons discussed in Section 2.3. The Preferred Alternative – construction of a new shopping center on the southeast corner of the intersection of Clear Creek Road and Tank Destroyer Boulevard – and the No Action Alternative were carried forward for analysis in this EA. The Preferred Alternative is found to be consistent with all the site-selection criteria described in Section 2.2.1.

26

27

28

29

## Environmental Assessment

### Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas

#### 1 Scope of Environmental Assessment

2 This EA describes the baseline conditions (affected environment) at Fort Hood and assesses  
3 the potential environmental impacts from the Proposed Action on the following resources: land use;  
4 socioeconomics; transportation; infrastructure and utilities; topography, geology, and soils; water  
5 resources; biological resources; cultural resources; air quality; noise; and hazardous materials and  
6 waste management.

#### 7 Potential Environmental Impacts

8 This EA concludes that no significant impacts to resources would be associated with  
9 implementation of the Preferred Alternative or the No Action Alternative. The selection of the  
10 Preferred Alternative would result in short-term, minor impacts to land use, infrastructure and  
11 utilities; topography, geology, and soils; water resources; biological resources; air quality; noise; and  
12 hazardous materials and waste. Socioeconomics, transportation, and environmental justice would  
13 benefit from the implementation of the Preferred Alternative. The selection of the No Action  
14 Alternative would result in negative impacts to socioeconomics and transportation. Table ES-1  
15 summarizes the environmental consequences of the Proposed Action.

16

<b>Resources / Issues (Threshold Criteria)</b>	<b>Preferred Alternative</b>	<b>No Action Alternative</b>
Land Use	Consistent with Real Property Master Plan; Change from undeveloped to developed land use	No change from existing conditions
Socioeconomics	Positive Impact	Negative Impact
Transportation	Positive Impact	Negative Impact
Infrastructure and Utilities	Minor Impact	No change
Topography, Geology, and Soils	Short-Term Negative Impact <sup>(a)</sup>	No change
Water Resources	Minor Impact	No change
Biological Resources	Minor Impact	No change
Cultural Resources	No Effect	No Effect
Air Quality	Short-Term Negative Impact <sup>(a)</sup>	No change
Noise	Short-Term Negative Impact <sup>(a)</sup>	No change
Hazardous Materials and Waste	Minor Impact	No change
Protection of Children	No environmental health and safety risks that may disproportionately affect children	No environmental health and safety risks that may disproportionately affect children
Environmental Justice	Positive Impact	No disproportionately high and adverse human health or environmental effect on minority and low income populations

Note: (a) Impacts would be minimized through the employment of best management practices during construction and operation activities.

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## **Acronyms and Abbreviations**

AAFES	Army and Air Force Exchange Service
ACP	access control point
AQCR	air quality control region
AR	Army Regulation
BCWCID	Bell County Water Control and Improvement District (#1)
BMP	best management practice
C&D	construction and demolition
CAA	Clean Air Act (of 1970)
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	carbon monoxide
CO <sub>2</sub>	carbon dioxide
CO <sub>2</sub> eq	carbon dioxide equivalent
CWA	Clean Water Act
dB	decibel
DoD	(United States) Department of Defense
DPW	Directorate of Public Works
DRMO	Defense Reutilization and Marketing Office
EA	Environmental Assessment
EO	Executive Order
EPCRA	Emergency Planning and Community Right to Know Act
FHFH	Fort Hood Family Housing
FNSI	Finding of No Significant Impact
Fort Hood	Fort Hood Army Base in Bell and Coryell Counties, Texas; <i>also</i> the Installation
FY	fiscal year
GTA	Grow the Army
GWP	Global Warming Potential
HAP	hazardous air pollutant
HMMP	hazardous material management program
HQ	headquarters

## **Environmental Assessment**

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

#### ***Acronyms and Abbreviations (continued)***

Installation, the	Fort Hood Army Base in Bell and Coryell Counties, Texas; <i>also</i> Fort Hood
IPCC	Intergovernmental Panel on Climate Change
KW	kilowatt(s)
LEED	Leadership in Energy and Environmental Design
LOS	level of service
mgd	million gallons per day
MH <sub>4</sub>	methane
MOI	Memorandum of Instruction
MS4	municipal separate storm sewer system
MSDS	Material Safety Data Sheet
MWR	Morale, Welfare, and Recreation
N <sub>2</sub> O	nitrous oxide
NAAQS	National Ambient Air Quality Standards
NC	New Construction
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO <sub>2</sub>	nitrogen dioxide
NO <sub>x</sub>	nitrogen oxide
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
O <sub>3</sub>	ozone
Oncor	Oncor Electric Delivery Company, LLC
Pb	lead
PM	particulate matter
PM <sub>10</sub>	particulate matter 10 microns or less in diameter
PM <sub>2.5</sub>	particulate matter less than 2 microns in diameter
PTE	potential to emit
PX	Post Exchange
SO <sub>2</sub>	sulfur dioxide
SPCC	spill prevention, control, and countermeasures
SWMP	Solid Waste Management Plan
TCEQ	Texas Commission on Environmental Quality

## **Environmental Assessment**

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

#### ***Acronyms and Abbreviations (continued)***

TPDES	Texas Pollution Discharge Elimination System
tpy	tons per year
TxDOT	Texas Department of Transportation
U.S.C.	United States Code
UFC	Unified Facilities Code
USACHPPM	United States Army Center for Health Promotion and Preventive Medicine
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
VOC	volatile organic compound
WOTUS	Waters of the United States

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1 **1 Purpose and Need for Action**

2 **1.1 Introduction**

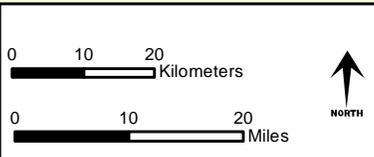
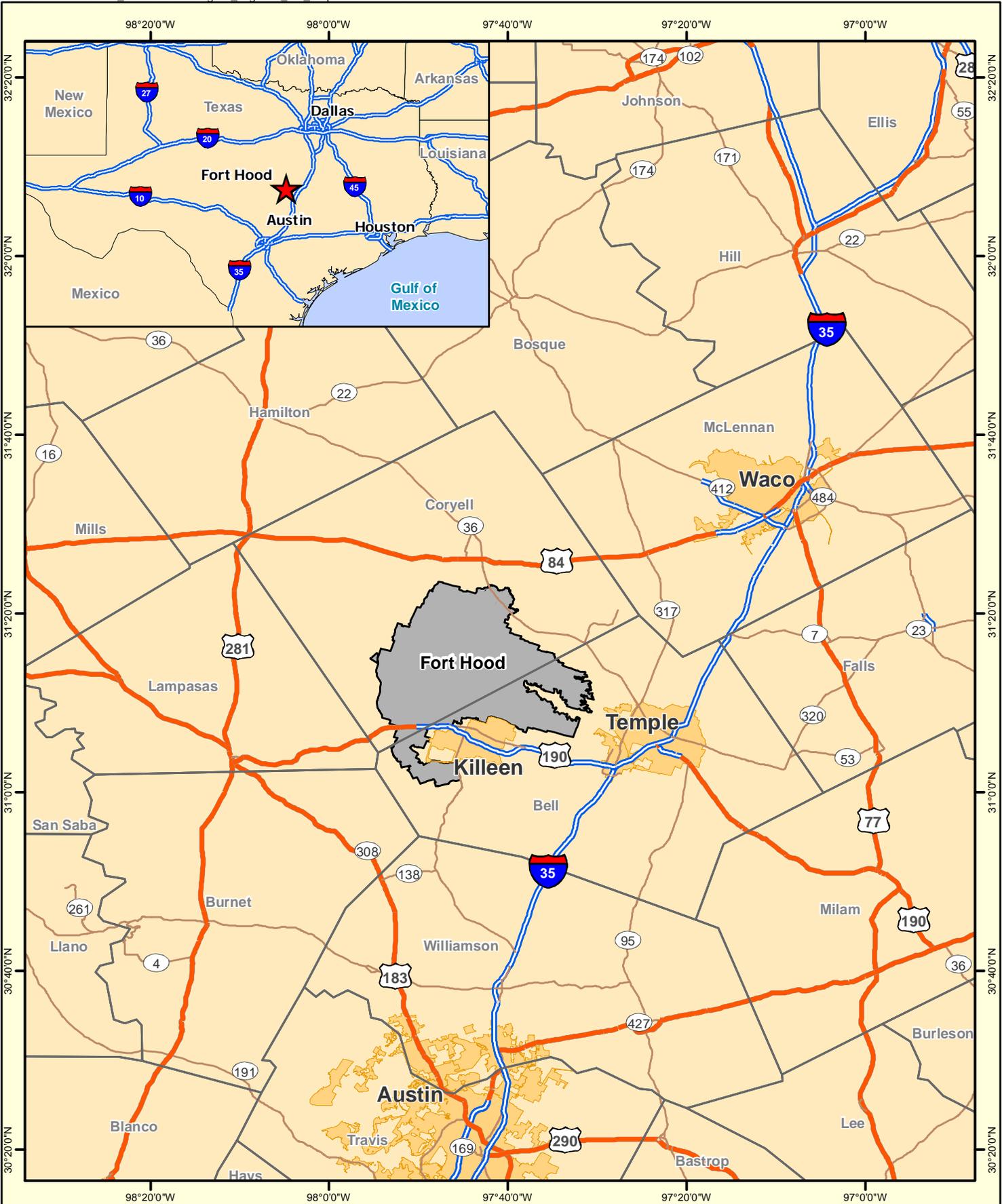
3 The Army and Air Force Exchange Service (AAFES) proposes to construct and operate a  
4 new Shopping Center on Fort Hood Army Base (referred to herein as ‘Fort Hood’ or the  
5 ‘Installation’) in Bell and Coryell Counties, Texas (see Figure 1-1). This Environmental Assessment  
6 (EA) has been prepared to address the potential human and natural environmental impacts related to  
7 the construction and operation of the new facilities and the associated permit requirements. In  
8 addition, this report identifies mitigation measures to minimize the potential environmental  
9 consequences associated with the implementation of the Proposed Action.

10 This EA has been prepared to analyze the potential impacts associated with the Proposed  
11 Action in accordance with the:

- 12 ▪ National Environmental Policy Act (NEPA) of 1969, 42 United States Code  
13 (U.S.C.) 4231 *et seq.*, as amended in 1975; and
- 14 ▪ Council on Environmental Quality (CEQ), 40 Code of Federal Regulations  
15 (CFR) §§ 1500-1508.
- 16 ▪ Department of the Army Regulation (AR) 200-2 “Environmental Analysis of  
17 Army Actions” as promulgated by 32 CFR Part 651.

18 Fort Hood is a 218,502-acre (340-square-mile) U.S. Army installation located in Central  
19 Texas; the Installation is approximately 60 miles north of Austin, 50 miles southwest of Waco, and  
20 spans the counties of Bell and Coryell (see Figure 1-1) (Fort Hood 2009a). The City of Killeen is  
21 adjacent to the southern boundary of the Installation. Established in 1942, Fort Hood serves as a  
22 premier training installation for the Army, providing a full range of mission-related training activities,  
23 including maneuver exercises for armored units up to brigade level, live weapon firing, and aviation  
24 training operations. Fort Hood is currently the home of III Corps Headquarters, 1st Cavalry Division,  
25 4th Infantry Division, 1st Army Division West, 3rd Armored Cavalry Regiment, and numerous other  
26 military commands. With 45,414 active duty enlisted, 4,929 active duty officer and 8,909 civilian  
27 employees, Fort Hood is the largest single-site employer in Texas (Fort Hood 2009b) Additionally,  
28 Fort Hood supports 17,954 family members on-Installation and 89,933 family members off-  
29 Installation (Fort Hood 2009c).

30



**Figure 1-1**  
**Regional Location Map**  
**Fort Hood, Texas**

1 **1.2 Purpose of and Need for the Proposed Action**

2 The Proposed Action is needed to improve shopping facilities on Fort Hood to better serve  
3 the military community. The existing Post Exchange (PX; Building 50004) is approximately 128,336  
4 square feet and was constructed in 1973. The facility is located on Clear Creek Road adjacent to the  
5 commissary, Class Six, a bank, thrift shop, and other service facilities (Section 2.2.2). After operating  
6 for over 35 years, the facility has deteriorated, does not meet current AAFES retail standards, and is  
7 unable to keep up with the demand associated with population growth at the Installation. Specifically,  
8 the existing PX is:

- 9       ▪ Inefficient and undersized for the sales volume of the facility (the sales-per-  
10 square-foot ratio of this facility is twice the AAFES standard for this size  
11 shopping center);
- 12       ▪ Outdated to the extent that building upgrades cannot be accomplished to meet  
13 current building standards; and
- 14       ▪ Located in a confined space adjacent to the commissary, is congested, and is too  
15 small to adequately serve the existing customer base.

16 Further, the United States Department of Defense (DoD) has several initiatives in place to  
17 restructure and reorganize the composition and location of Army forces including: Base Closure and  
18 Realignment 2005, Global Defense Posture Realignment, Army Modular Force, and Grow the Army  
19 (GTA). The *Environmental Assessment for the Stationing Actions to Support the Grow the Army*  
20 *Initiative at Fort Hood, Texas* (Fort Hood 2009d) analyzes the stationing of approximately 2,300 new  
21 soldiers as well as an increase in existing units by approximately 1,000 soldiers. This document also  
22 analyzed the non-related stationing of approximately 1,000 non-GTA-related Combat Service Support  
23 soldiers at Fort Hood, which would account for a total increase of approximately 4,300 soldiers (Fort  
24 Hood 2009d). The new soldier population, in addition to their families moving into the surrounding  
25 community, would result in an estimated overall population increase of between 5,775 and 7,525  
26 individuals.

27 The purpose of the Proposed Action is to:

- 28       ▪ Meet current AAFES retail standards;
- 29       ▪ Improve sizing of and reduce overcrowding in the current facility;
- 30       ▪ Expand the number of shopping, dining, and service opportunities for soldiers  
31 and their families;
- 32       ▪ Increase customer convenience by collocating existing services into one facility;
- 33       ▪ Improve energy efficiency and reduce overall operational and maintenance costs  
34 through the consolidation of existing services;

- 1           ▪ Generate dividends to help support the Army and Air Force Morale, Welfare, and  
2           Recreation (MWR) programs;
- 3           ▪ Meet future demand for expected troop growth;
- 4           ▪ Preserve soldier and family quality of life which is a critical aspect of Army  
5           growth and transformation; and
- 6           ▪ Help ensure the Army is capable of maintaining an all-volunteer force by  
7           encouraging soldier retention and attracting new recruits (United States Army  
8           Environmental Command 2007).

### 9   **1.3 Scope of the EA**

10           This EA evaluates the potential impacts associated with constructing a shopping center  
11 including a main store area, merchandise processing area, concessions, Medcom Satellite Pharmacy,  
12 an AAFES dental concession, a food court area containing nine food concepts, and parking located at  
13 Fort Hood. It is important to note that prior to the commencement of construction at the Preferred  
14 Alternative site, the Installation would be responsible for the demolition of the existing Defense  
15 Reutilization and Marketing Office (DRMO) Tire Barn. This EA does not address the direct impacts  
16 associated with the demolition of the Tire Barn, though it is analyzed as a related action in Section  
17 3.14 “Cumulative Impacts.” Additionally, once the new shopping center is operational, AAFES  
18 would transfer the existing PX and dental clinic facilities (Building Nos. 50004 and 330) back to Fort  
19 Hood for final disposition. This EA does not address impacts associated with the future disposition of  
20 these facilities; separate environmental documentation would be required.

21           Relevant resources evaluated in this EA include: land use; socioeconomics; transportation;  
22 infrastructure and utilities; topography, geology, and soils; water resources; biological resources;  
23 cultural resources; air quality; noise; hazardous materials and waste management; and cumulative  
24 impacts.

### 25   **1.4 Decision to be Made**

26           The Director of Public Works at Fort Hood is responsible for selecting the Preferred  
27 Alternative. Fort Hood will provide appropriate review and comment periods on the EA prior to  
28 making a decision. The decision will be to sign a Finding of No Significant Impact (FNSI) or to  
29 prepare an Environmental Impact Statement for implementing either the Proposed Action at the  
30 preferred site location or the No Action Alternative. If the No Action Alternative is selected, the  
31 AAFES facility will not be constructed. The decision will be based on the findings contained in this  
32 EA.

1 **1.5 Agency and Public Participation**

2 III Corps and Fort Hood invite public participation in the NEPA process. Consideration of the  
3 views and information of all interested persons, as required by NEPA, promotes open communication  
4 and enables better decision making. All agencies, organizations, and members of the public having a  
5 potential interest in the Proposed Action are encouraged to participate in the decision-making process.

6 The public comment period will be held for 30 days beginning the date the Notice of  
7 Availability is published in the *Killeen Daily Herald*. This EA and draft FNSI (Appendix A), if  
8 applicable, are available for review at the Killeen Public Library located at 205 E. Church Street,  
9 Killeen, Texas 78544, and through the Environmental Division, Directorate of Public Works (DPW),  
10 Fort Hood, Texas. The documents also are available online through the Fort Hood DPW website at  
11 <http://www.dpw.hood.army.mil/> (select Public Notices).

12 **1.6 Applicable Regulatory Requirements and Required**  
13 **Coordination**

14 This EA was prepared in accordance with NEPA (Public Law 91-190, 42 U.S.C. §4321 et.  
15 seq.); the CEQ regulations for implementing NEPA (40 CFR §§1500-1508); and AR 200-2  
16 “Environmental Analysis of Army Actions” as promulgated by 32 CFR Part 651.

17 The development of this EA included coordination and consultation with appropriate local,  
18 state, and federal agencies. Other environmental regulatory requirements relevant to the Proposed  
19 Action include, but are not limited to:

- 20 ▪ Archeological Protection Act, 16 U.S.C 470 et. seq.;
- 21 ▪ Clean Air Act (CAA), 42 U.S.C. 7401 et. seq.;
- 22 ▪ Clean Water Act (CWA), 33 U.S.C. 1251 et. seq.;
- 23 ▪ Endangered Species Act, 16 U.S.C. 1531 et. seq.;
- 24 ▪ Energy Independence and Security Act, 42 U.S.C. 17094 et. seq.;
- 25 ▪ Migratory Bird Treaty Act, 16 U.S.C. 703 et. seq.;
- 26 ▪ National Historic Preservation Act, 16 U.S.C. 470 et. seq.;
- 27 ▪ Noise Control Act, 42 U.S.C. 4901 et. seq.;
- 28 ▪ Occupational Safety and Health Act, 29 U.S.C. 651 et. seq.;
- 29 ▪ Pollution Prevention Act, 42 U.S.C. 13101 et. seq.;
- 30 ▪ Resource Conservation and Recovery Act, 42 U.S.C. 6901 et. seq.; and
- 31 ▪ Toxic Substances Control Act, 15 U.S.C. 2601 et. seq.

**Environmental Assessment**

**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 In addition, the Proposed Action must comply with a number of Executive Orders (EOs),  
2 including:

- 3       ▪ EO 11514, Protection and Enhancement of Environmental Quality;
- 4       ▪ EO 11990, Protection of Wetlands;
- 5       ▪ EO 11988, Floodplain Management;
- 6       ▪ EO 12898, Federal Actions to Address Environmental Justice in Minority  
7 Populations and Low-Income Populations;
- 8       ▪ EO 13045, Protection of Children from Environmental Health Risks and Safety  
9 Risks;
- 10      ▪ EO 13175, Consultation and Coordination with Indian Tribal Governments; and
- 11      ▪ EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds.

12 Table 1-1 lists the applicable and relevant Army, state, and federal laws and regulations, and  
13 their associated regulatory agency consultations and permits that would be required with the  
14 implementation of the Proposed Action.

<b>Table 1-1</b>		
<b>Environmental, Safety, and Health Compliance Requirements</b>		
<b>Source</b>	<b>Responsible Entity</b>	<b>Requirement</b>
Fort Hood Real Property Master Plan (Clear Creek Area Development Plan)	Fort Hood	Consistency
Fort Hood Installation Design Guide	Fort Hood	Consistency
Fort Hood Hazardous Waste Management Plan	Fort Hood	Consistency
Fort Hood Spill Prevention Control and Countermeasures Plan	Fort Hood	Consistency
Fort Hood Integrated Natural Resources Management Plan	Fort Hood	Consistency
Fort Hood Integrated Cultural Resources Management Plan (includes compliance with the Fort Hood inadvertent discovery procedures)	Fort Hood	Consistency
Fort Hood Tree Care Ordinance	AAFES	Consistency
National Pollutant Discharge Elimination System Construction General Permit	AAFES	Preparation and submittal of Notice of Intent, preparation of a Stormwater Pollution Prevention Plan and a Notice of Termination
Clean Water Act	AAFES	404 Clean Water Permit (due to the minimal amount of wetland disturbance AAFES would utilize Nationwide Permit #39; an Individual Section 404 Permit would not be required.)

1 **2 Description of the Proposed**  
2 **Action and Alternatives**

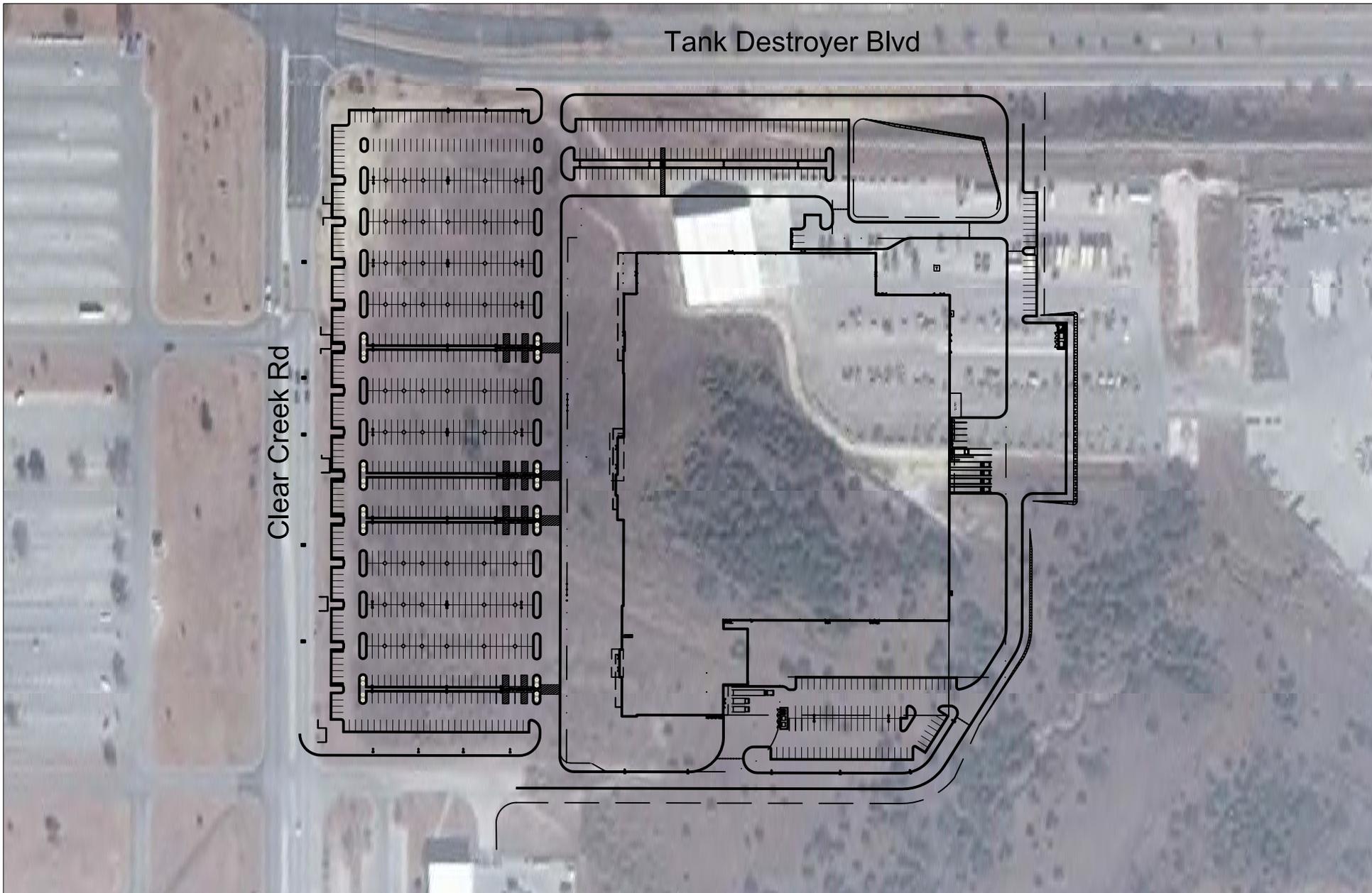
3 This section describes the Proposed Action, the site selection process, alternatives, and the  
4 Preferred Alternative. The No Action Alternative is carried forward for analysis as a baseline to  
5 which all other alternatives are compared in accordance with NEPA and CEQ implementing  
6 regulations 40 CFR Part 1502.14(d).

7 **2.1 Description of the Proposed Action**

8 The Proposed Action is the construction and operation of an approximately 244,000-square-  
9 foot shopping center on Fort Hood for use by authorized individuals (Figure 2-1). The shopping  
10 center would contain a main store, merchandise processing area, concessions, Medcom Satellite  
11 Pharmacy, an AAFES dental concession, and a food court including nine food concepts: Burger King,  
12 Manchu Wok, Del Taco, Charley's, Starbucks, Baskin Robbins, Froots, Arby's, and Subway. Should  
13 the Preferred Alternative site location be selected, the Installation would be responsible for providing  
14 a clean site, which would include the demolition of an existing DRMO Tire Barn facility and  
15 associated parking lot, as detailed in Section 3.14.

16 Construction of the Proposed Action would entail relocation, to the new shopping center, of  
17 services currently offered in Building 330 (the dental clinic). Once the new shopping center is  
18 operational, AAFES would transfer Building Nos. 50004 and 330 (the existing PX and dental clinic  
19 facilities, respectively) back to Fort Hood for final disposition. Should these facilities require  
20 demolition, separate environmental documentation would be required. The future intended use of  
21 Building No. 330 (the existing dental clinic) is unknown at this time. The future intended use of  
22 Building No. 50004 (the existing PX) is undetermined, but the facility may be re-used for  
23 administrative or warehouses purposes (Alexander 2010).

24 New construction would consist of reinforced concrete slab/foundation with exterior walls of  
25 predominantly concrete tiltwall construction with some brick, stone, and plaster veneers added, steel  
26 structure and built-up partitions, AAFES-provided shelving, suspended ceilings, and recessed energy-  
27 efficient lighting. The proposed facilities would connect to existing utility services and  
28 communications systems and would provide for pavement, sidewalks, curbs, gutters, storm drainage,  
29 retention walls, and other site improvements, as necessary. Construction products would meet United  
30 States Environmental Protection Agency (USEPA) recycled content requirements. New construction



Tank Destroyer Blvd

Clear Creek Rd

Scale:



**Figure 2-1**

**Preliminary Site Plan**

**Proposed AAFES Shopping Center**

**Fort Hood, Texas**

Source: SaenzBury Engineering, LLC



## Environmental Assessment

### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 would be in accordance with all applicable DoD Unified Facilities Criteria (UFC) provisions. The  
2 proposed facility would be designed and built in accordance with Leadership in Energy and  
3 Environmental Design (LEED) Silver-New Construction (NC) standards and LEED-NC certification  
4 would be sought for this facility. Exterior support would include required utilities, communications,  
5 paving, walks, curbs, storm drainage, site improvements, electrical, mechanical, and life/safety  
6 systems for a complete and usable facility. Only authorized patrons would use the facility including  
7 active-duty and retired military personnel, their family members, certain categories of reserve military  
8 personnel and authorized civilians.

9 All applicable regulatory requirements (i.e., permits, plans, etc.) would be met prior to  
10 commencement of the Proposed Action. Mitigation measures will be incorporated as part of the final  
11 site design. The Proposed Action will be in accordance with all applicable DoD UFC provisions, the  
12 Fort Hood Installation Design Guide, and all other applicable requirements. AAFES anticipates that  
13 construction of the new shopping center would last approximately 17.5 months, and construction is  
14 anticipated to begin in May 2012.

## 15 **2.2 Alternatives Development Process**

16 NEPA and 32 CFR Part 651 require the consideration of reasonable alternatives to the  
17 Proposed Action. In an attempt to minimize the impact on existing training activities and future  
18 projects, Fort Hood and AAFES staff both evaluated several feasible sites for the shopping center  
19 against site-selection criteria to determine the most viable and reasonable alternative locations.  
20 Proposed sites were identified according to the size of the parcel and the ability to meet the  
21 requirements of the purpose and need.

### 22 **2.2.1 Site-Selection Criteria**

23 The selection criteria included:

- 24 **Consistent with AAFES Mission.** AAFES aims to provide adequate services to  
25 Fort Hood personnel in a timely and efficient manner through the establishment  
26 of central, collocated facilities. Location of the AAFES services must be close to  
27 other AAFES and Defense Commissary Agency services. In addition, it must not  
28 cause interruption of existing services offered or interfere with any existing  
29 services' ability to expand.
- 30 **Convenient and Highly Visible to Potential Customers.** The site must be  
31 convenient to customers and be located in an area of heavy traffic flow and high  
32 visibility.
- 33 **Adequate Space and Infrastructure to Accommodate New Facilities.** The site  
34 must provide adequate developable land to accommodate the Proposed Action.

1 The building footprint would require approximately 5.6 acres (244,000 square  
2 feet), and additional space would be needed for parking, security setbacks, and  
3 other design considerations. In addition, the site must provide safe and efficient  
4 connectivity to existing infrastructure (i.e., utilities).

- 5     ▪ **Compatible with Fort Hood Master Plan.** Construction of the new AAFES  
6 facility must not conflict with the Installation’s long-range development plans,  
7 including the Clear Creek Area Development Plan and the Long Range  
8 Component of the Real Property Master Plan. New development must be  
9 consistent with land use, giving adequate consideration to the existing functional  
10 relationships that support the mission. Additionally, Army Force Protection  
11 regulations must be adhered to, including standoff distances for Access Control  
12 Points (ACP).
- 13     ▪ **Provide for Safe and Efficient Traffic Flow and Access.** The site must allow  
14 for safe vehicular movement and provide minimal impacts on existing traffic  
15 flow at Fort Hood. Preference is given to sites with direct access to four-lane  
16 roadways.

17 **2.2.2 Description of the Alternatives**

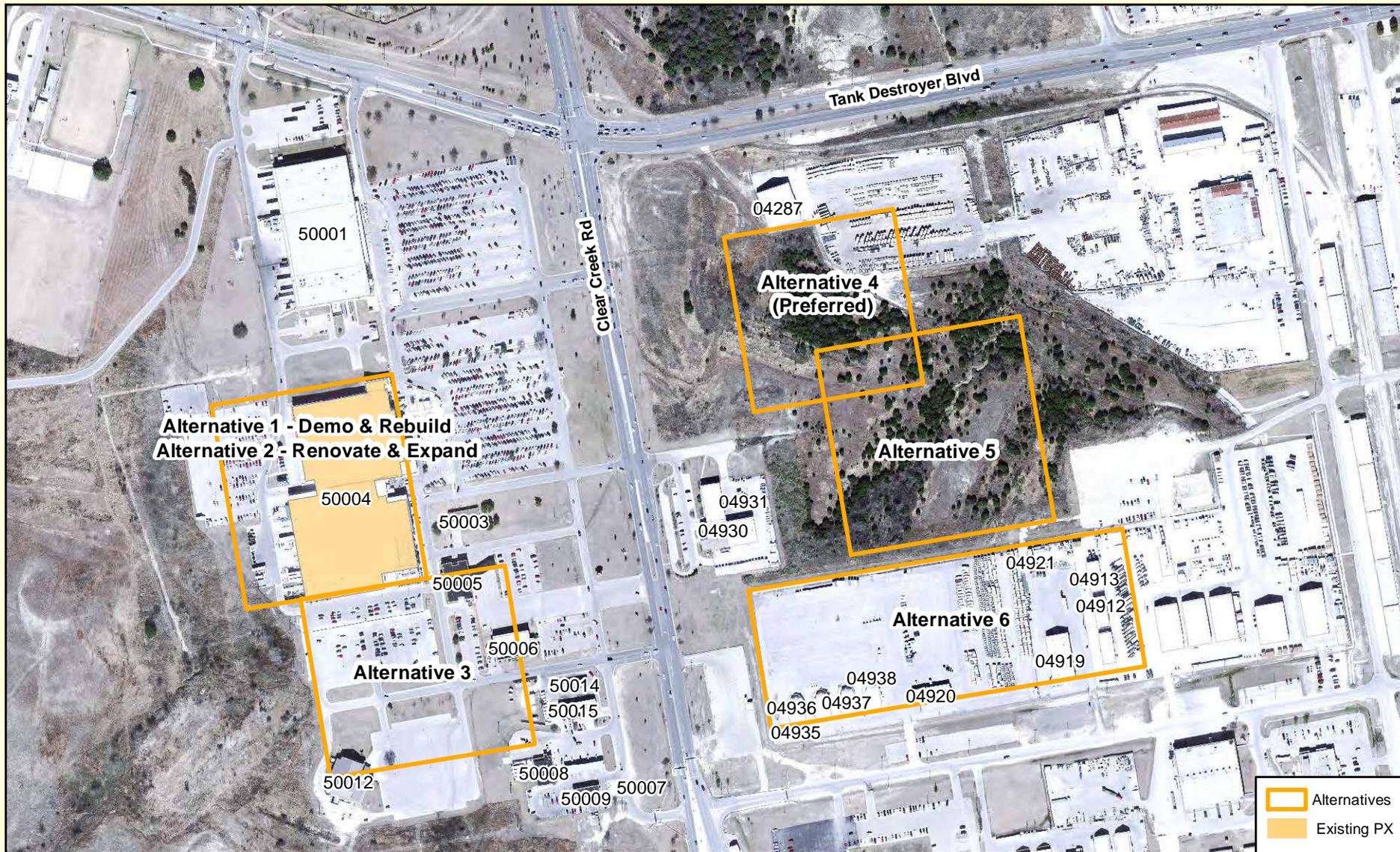
18 Figure 2-2 illustrates the alternatives described below.

19 **Alternative 1: Demolish Existing PX and Construct New Facility in Same Location**

20 Under Alternative 1, the existing PX would be completely demolished, and a new shopping  
21 center would be built on the same site. This alternative would not be consistent with AAFES mission  
22 because it would result in an approximately two-year gap in the provision of services at Fort Hood.  
23 This location would be convenient and highly visible to customers, would comply with Force  
24 Protection requirements, and would allow for a safe and efficient traffic pattern. This site does not  
25 offer adequate space to expand the existing parking to accommodate the expanded facility.

26 **Alternative 2: Renovate and Expand the Existing AAFES Facility**

27 Under Alternative 2, the existing PX would be renovated and expanded to incorporate the  
28 design changes needed to adequately service the patrons and to bring the facility up to current  
29 standards. This alternative would require the phasing of construction activities, which would result in  
30 a longer construction timeframe than the other alternatives. This longer construction timeframe would  
31 not be consistent with the AAFES mission because it would result in a disruption in the provision of  
32 AAFES services. Similar to Alternative 1, this site does not offer adequate space for parking to  
33 accommodate the expanded facility. Also similar to Alternative 1, this site would provide a  
34 convenient and highly visible location that would comply with Force Protection requirements while  
35 ensuring a safe and efficient traffic flow.



**Figure 2-2**  
**Alternative Site Locations**  
**Proposed AAFES Shopping Center**  
**Fort Hood, Texas**

Source: AAFES, 2009



1 **Alternative 3: Demolish Existing PX and Construct New Facility South of Existing Site**

2 Under Alternative 3, AAFES would continue to offer its full range of services at the existing  
3 PX during construction of the new facility. However, the location of the new facility would require  
4 the demolition and relocation of the existing bank, Class Six, car care center, and thrift store, none of  
5 which are planned for relocation. Therefore, this alternative would result in the interruption and  
6 relocation of numerous services and would not meet the mission of AAFES. This alternative would  
7 provide a highly visible location able to comply with Force Protection requirements and would  
8 provide a safe and efficient traffic pattern. Additionally, with the demolition of the existing PX, this  
9 site would have adequate space to accommodate the parking necessary for the new facility.

10 **Alternative 4: Construct the New Shopping Center Southeast of the Intersection of**  
11 **Clear Creek Road and Tank Destroyer Boulevard**

12 Under Alternative 4, the new shopping center would be constructed on the southeast corner of  
13 the intersection of Clear Creek Road and Tank Destroyer Boulevard, a site that would partially  
14 overlap the existing DRMO Tire Barn. This alternative would satisfy all the criteria identified in  
15 Section 2.2.1.

16 AAFES would continue to offer its full range of services at the existing PX during  
17 construction of the new facility, and the existing PX would not be demolished. This alternative would  
18 require the demolition and relocation of the DRMO Tire Barn, which is already planned for relocation  
19 by the Installation. This alternative would not cause an interruption of provision of other services on  
20 the Installation and would therefore be compatible with the AAFES mission.

21 This site is of sufficient size for the facility and parking and is close enough to existing  
22 utilities to allow easy tie-in to existing utility infrastructure. The site is located such that compliance  
23 with Force Protection requirements would be attainable. This site is highly visible near the  
24 intersection of two major thoroughfares, providing a safe and efficient traffic flow and also allowing  
25 convenient access to customers.

26 **Alternative 5: Construct the New Shopping Center Southeast of the Intersection of**  
27 **Clear Creek Road and Tank Destroyer Boulevard, Immediately East of the MWR**  
28 **Facility**

29 Under Alternative 5, AAFES would continue to offer its full range of services at the existing  
30 PX during construction of the new facility, and the existing PX would not be demolished. This  
31 alternative would require the demolition and relocation of the DRMO Tire Barn, which is already  
32 planned for relocation by the Installation. This alternative would not cause an interruption of the

## **Environmental Assessment**

### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 provision of other services on the Installation and would therefore be compatible with the AAFES  
2 mission. This site would provide sufficient space for the required facility and parking, would allow  
3 compliance with Force Protection standards, and would accommodate a safe and efficient traffic flow.

4 The configuration of this alternative would result in the building being set back from both  
5 Clear Creek Road and Tank Destroyer Boulevard. This set back coupled with the topography of the  
6 site would partially hide the facility from Clear Creek Road and partially obscure the site from Tank  
7 Destroyer Boulevard. Therefore, this site is not considered a highly visible location.

### **Alternative 6: Construct the New AAFES Shopping Center on the Northeast Corner of Santa Fe Avenue and Clear Creek Road**

10 Under Alternative 6, AAFES would continue to offer its full range of services at the existing  
11 PX during construction of the new facility, and the existing PX would not be demolished. This  
12 alternative would require the demolition and relocation of Building Nos. 4911, 4912, 4913, 4919,  
13 4921, and 4935 through 4938; all are already planned for relocation by the Installation. This  
14 alternative would not cause an interruption of the provision of other services on the Installation and  
15 would therefore be compatible with the AAFES mission. This site would be convenient to customers  
16 and is in a highly visible location near the Clear Creek Road Gate.

17 This site provides limited space to accommodate parking and would not provide a safe and  
18 efficient traffic pattern. The site is located on Santa Fe Avenue, a two-lane road close to the Clear  
19 Creek Gate. Portions of this site are within the 150-foot standoff distance from the Clear Creek Gate  
20 and egress traffic from the gate, coupled with traffic from the shopping center at this location, would  
21 cause congestion in this area. Therefore, this location would not provide a safe and efficient traffic  
22 flow, nor would it allow for compliance with Force Protection requirements.

### **No Action Alternative**

24 Although the No Action Alternative would not fulfill the purpose and need for the Proposed  
25 Action, it is carried forward as a baseline for comparison of the environmental effects of the Proposed  
26 Action. Under the No Action Alternative, AAFES would not construct the new facilities at Fort Hood  
27 and would continue operations under present conditions. Implementation of this alternative would not  
28 result in an improvement in shopping, dining, and entertainment opportunities for soldiers and their  
29 families and would result in the continued use of inadequate facilities and provision of inadequate  
30 services. Further, Fort Hood personnel would not benefit from the expanded customer services and  
31 AAFES would not receive additional revenue from these services, which, in turn, would not  
32 contribute to the Installation's MWR program budget.

**2.3 Results of the Site Selection Process**

All of the alternatives are located within the Clear Creek Area Development Plan and are compatible with Fort Hood’s land use designations and the area’s visual character. Additionally, all of the alternatives are within an acceptable proximity to the commissary and other retail services. Alternative 4 (the Preferred Alternative) meets all of the proposed site evaluation criteria (see Table 2-1) and is evaluated, along with the No Action Alternative, beginning in Section 3 of this EA.

<b>Table 2-1 Evaluation of Alternative Sites for the Proposed Action</b>					
<b>Alternative Site Locations</b>	<b>Selection Criteria Met</b>				
	<b>AAFES Mission, Limited Interruption of Existing Services</b>	<b>Convenient and Highly Visible</b>	<b>Adequate Space and Infrastructure</b>	<b>Compatible with Fort Hood Master Plan</b>	<b>Safe and Efficient Traffic Flow</b>
Alternative 1		✓		✓	✓
Alternative 2		✓		✓	✓
Alternative 3		✓	✓	✓	✓
Alternative 4 (Preferred Alternative)	✓	✓	✓	✓	✓
Alternative 5	✓		✓	✓	✓
Alternative 6	✓	✓			

7

**2.4 Alternatives Considered but Eliminated from Detailed Study**

9

Alternatives 1, 2, 3, 5 and 6 do not meet all of the site evaluation criteria and, therefore, are not considered in subsequent sections of the analysis.

11

1 **3 Affected Environment and**  
2 **Environmental Consequences**

3 **3.1 Land Use**

4 **3.1.1 Affected Environment**

5 Fort Hood encompasses over 218,000 acres. The Installation is comprised of airfields, a vast  
6 training area, and three urbanized cantonment areas: the Main Cantonment and the North Fort Hood  
7 and West Fort Hood Cantonment areas. The Main Cantonment area is a developed portion of the  
8 Installation containing multiple land uses including housing, administrative, industrial, troop,  
9 community, medical and recreation, among others (Fort Hood 2010). Specifically, the site would be  
10 located within an area proposed for “community” uses, within the Clear Creek Area Development  
11 Plan planning area (Fort Hood 2010). Allowable uses within the “community” land use designation  
12 include religious, family support, personnel services, professional services, medical, community,  
13 housing, commercial, and recreational services.

14 **3.1.2 Environmental Consequences**

15 **Alternative 4: Preferred Alternative**

16 Under the Preferred Alternative, the Proposed Action would be constructed on the southeast  
17 corner of the intersection of Clear Creek Road and Tank Destroyer Boulevard. This site is consistent  
18 with the existing commercial nature of the area and consistent with proposed and anticipated land  
19 uses for the area. The proposed shopping center is an allowable use under this land use designation  
20 (Fort Hood 2010); therefore, the land use designation would not change. The Proposed Action would  
21 result in the permanent conversion of approximately 25 acres of land to developed property.

22 **No Action Alternative**

23 Implementation of the No Action Alternative would not require the construction of a new  
24 facility and would result in the continued use of the existing outdated and undersized facility. Existing  
25 facilities in the Clear Creek area would continue to operate under the status quo and there would be  
26 no change to land use.

1 **3.2 Socioeconomics**

2 **3.2.1 Affected Environment**

3 **Economy, Employment, and Income**

4 Fort Hood’s boundaries encompass portions of both Bell and Coryell Counties. Fort Hood  
5 provides a major economic contribution to Coryell and Bell Counties through military and civilian  
6 payroll and the purchase of goods and services. As of 2009, the Installation served a population  
7 including 50,343 active duty personnel (officer and enlisted); 17,954 family members on-Installation;  
8 89,933 family members off-Installation; 246,718 retirees, survivors, and family members; and 8,909  
9 civilian and other employees (Fort Hood 2009c). Fort Hood’s military and civilian components are by  
10 far the largest employers of Killeen and Copperas Cove residents (Real Estate Center at Texas A&M  
11 University 2010).

12 The 2006-2008 American Community Survey 3-Year Estimates show the median income of  
13 households in Bell County was \$48,771, less than the national median household income of \$52,175.  
14 Eighty-three (83) percent of the households received earnings and 21.7 percent received retirement  
15 income other than Social Security. Nearly 21 percent of households received Social Security, with an  
16 average income of \$13,923. According to the 2006-2008 American Community Survey 3-Year  
17 Estimates, in the past twelve months, an estimated 13.6 percent of all people (10.5 percent of all  
18 families) in Bell County were living below the poverty level. (U.S. Census 2008)

19 According to the 2006-2008 American Community Survey 3-Year Estimates, there were  
20 113,117 housing units in Bell County, 15.4 percent of which were vacant. An estimated 60.5 percent  
21 of housing units were owner occupied, while the remaining 39.5 percent of units were rented. Of the  
22 total housing units, 62.5 percent were in single-unit detached structures and 7.8 percent were mobile  
23 homes.

24 The 2006-2008 American Community Survey 3-Year Estimates show the median income of  
25 households in Coryell County was \$48,230, somewhat less than the nation median household income  
26 of \$52,175. Eighty-three (83) percent of the households received earnings, and 23.7 percent received  
27 retirement income other than Social Security. Twenty (20) percent of households received Social  
28 Security, with an average income of \$12,519. According to the 2006-2008 American Community  
29 Survey 3-Year Estimates, in the past twelve months, an estimated 13.4 percent of all people (11.7  
30 percent of all families) in Coryell County were living below the poverty level. (U.S. Census 2008)

**1 Population and Demographics**

2 Table 3-1 demonstrates the population growth between 1990 and 2009 in cities and towns  
 3 surrounding Fort Hood. Of particular note are the cities of Killeen, Harker Heights and Morgan’s  
 4 Point Resort which experienced large population growth while others cities experienced less dramatic  
 5 population growth.

<b>Table 3-1 Population Growth in Communities Surrounding Fort Hood: 1990-2009</b>				
<b>City/County</b>	<b>1990</b>	<b>2000</b>	<b>2009</b>	<b>% Growth</b>
Killeen, Bell County	63,535	86,911	119,510	88%
Copperas Cove, Coryell County	24,079	29,592	30,806	28%
Harker Heights, Bell County	12,841	17,308	26,026	103%
Nolanville, Bell County	1,834	2,150	2,972	62%
Belton, Bell County	12,476	14,623	17,799	43%
Temple, Bell County	46,109	54,514	60,118	30%
Gatesville, Coryell County	11,492	15,591	15,136	32%
Morgan’s Point Resort City, Bell County	1,766	2,989	4,385	148%

Source: U.S. Census Bureau 1990, 2000, and 2009.

6  
 7 Table 3-2 provides population statistics for Bell and Coryell Counties in comparison to the  
 8 state of Texas and the United States. Of note, between 1990 and 2009, both Bell and Coryell counties  
 9 experienced population increases; however, Bell County increased at more than twice the rate of the  
 10 national average. The median age in Bell and Coryell counties is 30.5 and 29.3 respectively,  
 11 significantly less than the national average age of 36.7.

<b>Table 3-2 Demographic Information</b>					
		<b>Bell County, Texas</b>	<b>Coryell County, Texas</b>	<b>State of Texas</b>	<b>United States</b>
<b>Total Population</b>	1990	191,088	64,213	16,986,510	248,709,873
	2000	237,974	74,978	20,851,820	281,421,906
	2009	285,787	75,529	24,782,302	307,006,550
	% Change	50%	18%	46%	23%
Percentage Male <sup>(a)</sup>		49.5	49.4	49.9	49.3
Percentage Female <sup>(a)</sup>		50.5	50.6	50.1	50.7
Median Age		30.5	29.3	33.2	36.7

Source: U.S. Census Bureau 2000 and 2009, except median age figures which are the latest available gender numbers from U.S. Census Bureau 2008.

13

1 **3.2.2 Environmental Consequences**

2 **Alternative 4: Preferred Alternative**

3 The number of personnel assigned to Fort Hood would not be expected to increase as a result  
4 of the Proposed Action. During construction, temporary construction jobs would be created that  
5 would be distributed throughout the Fort Hood/Killeen area. These jobs would benefit the local  
6 economy and would result in both direct and indirect revenues to the local community. In general, the  
7 long-term operation of the proposed project would likely create some new job opportunities at the  
8 proposed facility, thereby resulting in a beneficial impact to the overall employment and/or income  
9 potential of residents in the Fort Hood/Killeen area.

10 **No Action Alternative**

11 Implementation of the No Action Alternative would not require the construction of a new  
12 facility and would result in the continued use of the existing outdated and undersized facility. There  
13 would be no job creation or changes to existing socioeconomic conditions.

14 **3.3 Transportation**

15 **3.3.1 Affected Environment**

16 The Installation is situated between US 190 and Route 36, which provide access to Interstate  
17 35 to the east. The primary artery serving Fort Hood is US 190 which parallels the south side of the  
18 Installation and provides direct access to the Installation via the Main Gate at Hood Road, Clear  
19 Creek Gate at Clear Creek Road, and the North Clarke Road Gate at West Fort Hood. Other primary  
20 access control points providing access from the external roadway network include the West Fort  
21 Hood Gate at Clarke Road, the East Range Road Gate, the Warrior Way Gate, and the East Gate at  
22 Fort Hood Street.

23 Within Fort Hood, the roadway network forms a grid pattern with major roads in the  
24 cantonment area running in an east-west direction. Major east-west roads include: Tank Destroyer  
25 Boulevard and Battalion, Hell on Wheels, and Old Ironsides Avenues. The main north-south roads  
26 include Clear Creek Road to the west, Martin Drive to the east, and Hood Road near the center of the  
27 Main Cantonment area. Roadways on Fort Hood are classified into one of three categories depending  
28 upon their function in moving people and freight. These include:

- 29
  - 30 **Arterial Highways.** These roadways include principal arterial highways and  
31 minor arterial highways. The former serve national and regional movements  
32 while the latter serve movements between population and activity centers within  
a region. Arterials generally have four to six lanes within developed areas or two

## **Environmental Assessment**

### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 or more lanes outside of developed areas. Arterial highways in the Main  
2 Cantonment area include Clear Creek Road and Tank Destroyer Boulevard.

- 3 ▪ **Collector Roadways.** These roadways include major collector roadways and  
4 minor collector roadways. The former connect larger population and activity  
5 centers to arterial highways, while the latter connect smaller areas with major  
6 collector roadways or arterial highways. Santa Fe Avenue is a collector roadway.
- 7 ▪ **Local Roadways.** These roadways provide access to adjacent properties and  
8 move people onto collector and arterial roadway (Gannett Fleming 2008).

9

### **10 Postwide Traffic Engineering and Safety Study**

11 In 2008, the Military Surface Deployment and Distribution Command, Transportation  
12 Engineering Agency, completed the *Postwide Traffic Engineering and Safety Study* with the purpose  
13 of assessing existing conditions and identifying short- and long-term transportation needs to safely  
14 and efficiently provide for existing and future transportation demands. The study revealed that, given  
15 Fort Hood's large population and land area, the Installation lacks roadways that provide limited  
16 access and high-speed travel. All of the Installation's arterial roadways consist of frequent access  
17 points and signalized intersections that slow traffic (Gannett Fleming 2008). The study issued specific  
18 recommendations Installation-wide for improvements to the roadway network.

### **19 3.3.2 Environmental Consequences**

#### **20 Alternative 4: Preferred Alternative**

21 The Preferred Alternative site is located on the southeast corner of the intersection of Clear  
22 Creek Road and Tank Destroyer Boulevard, near the existing DRMO Tire Barn. Road infrastructure  
23 in this area is currently undersized and poorly designed for the amount of traffic it accommodates.  
24 Currently, the PX, commissary, Class Six, bank, gas station, thrift shop, car wash, and car repair  
25 center are all located within an area that generates high volumes of traffic creating hazards for drivers  
26 and emergency vehicles using these roads and intersections. Given the current congestion in the area  
27 and the projected population growth at Fort Hood, this area is likely to get worse in the future unless  
28 improvements are made. Relocating the PX, which creates the highest traffic volumes, and improving  
29 the road network in the area as discussed below, would increase the safety of base housing, and all  
30 other developments on the west side of Fort Hood and would improve response times of emergency  
31 response vehicles (Fort Hood 2009e).

32 In 2007, the level of service (LOS) at the Clear Creek Road/Tank Destroyer Boulevard  
33 intersection was designated C during the morning peak period and D during the midday and evening  
34 peak travel hours. LOS refers to the operational condition of an intersection and is described by one

## Environmental Assessment

### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 of six categories: A through F. LOS A represents operating conditions with free-flowing traffic and  
2 no congestion, while LOS F represents high-volume stop-and-go traffic and unpredictable conditions  
3 resulting in travel delays (Gannett Fleming 2008).

4 **Construction Traffic.** Construction associated with the Proposed Action at the Preferred  
5 Alternative site would result in a minor increase in traffic volume within the proposed project area  
6 due to the presence of construction equipment, construction workforce vehicles, vehicles delivering  
7 construction and fill material, and vehicles removing debris. Phasing construction associated with the  
8 Proposed Action would vary the size of the workforce and the associated number of daily trips,  
9 distributing construction vehicle trips throughout the workday and over the course of the project.  
10 Additional trips associated with construction would not be anticipated to exceed an average of 25  
11 trips on a daily basis. The addition of these vehicle trips over the Installation roadway network would  
12 not be expected to degrade the current LOS of any Installation roadways.

13 Over the short-term, during construction, the Installation would experience minor, short-term  
14 road closures, detours, delays, and potential decreases in LOS in the immediate vicinity of the  
15 proposed project area. To minimize these minor, short-term adverse impacts, the contractor would  
16 schedule truck trips at intervals over the entire working day, thereby evenly distributing these trips  
17 over the existing roadways and avoiding peak-hour traffic times. Additionally, short-term adverse  
18 impacts associated with construction vehicle traffic would be mitigated through the encouragement of  
19 construction workers to carpool to the site and scheduling truck trips of construction vehicles,  
20 deliveries, and debris removal at intervals throughout the entire working day to avoid peak travel  
21 hours.

22 **Operations Traffic.** The shopping center at the preferred location would result in a small  
23 number of new personnel at Fort Hood because of the marginal increase in staff for the expanded  
24 facility. The increase in personnel in comparison to the number of employees currently at Fort Hood  
25 would be minor. Additionally, the proposed shopping center would continue to be accessible only to  
26 authorized patrons, thus would not be expected to expand the customer base. On-Installation trips  
27 would be slightly redistributed over the existing roadway network with the consolidation of the  
28 existing dental clinic (Building No. 330) within the proposed shopping center.

29 The Preferred Alternative would be located at the intersection of Clear Creek Road and Tank  
30 Destroyer Boulevard – two arterial roadways that serve as major thoroughfares on the Installation. In  
31 an effort to alleviate existing congestion and mitigate the redistribution of traffic resulting from the  
32 operation of the shopping center, the Installation plans several roadway improvements in the  
33 proposed project area. These improvements are programmed to begin construction in fiscal year 2016

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

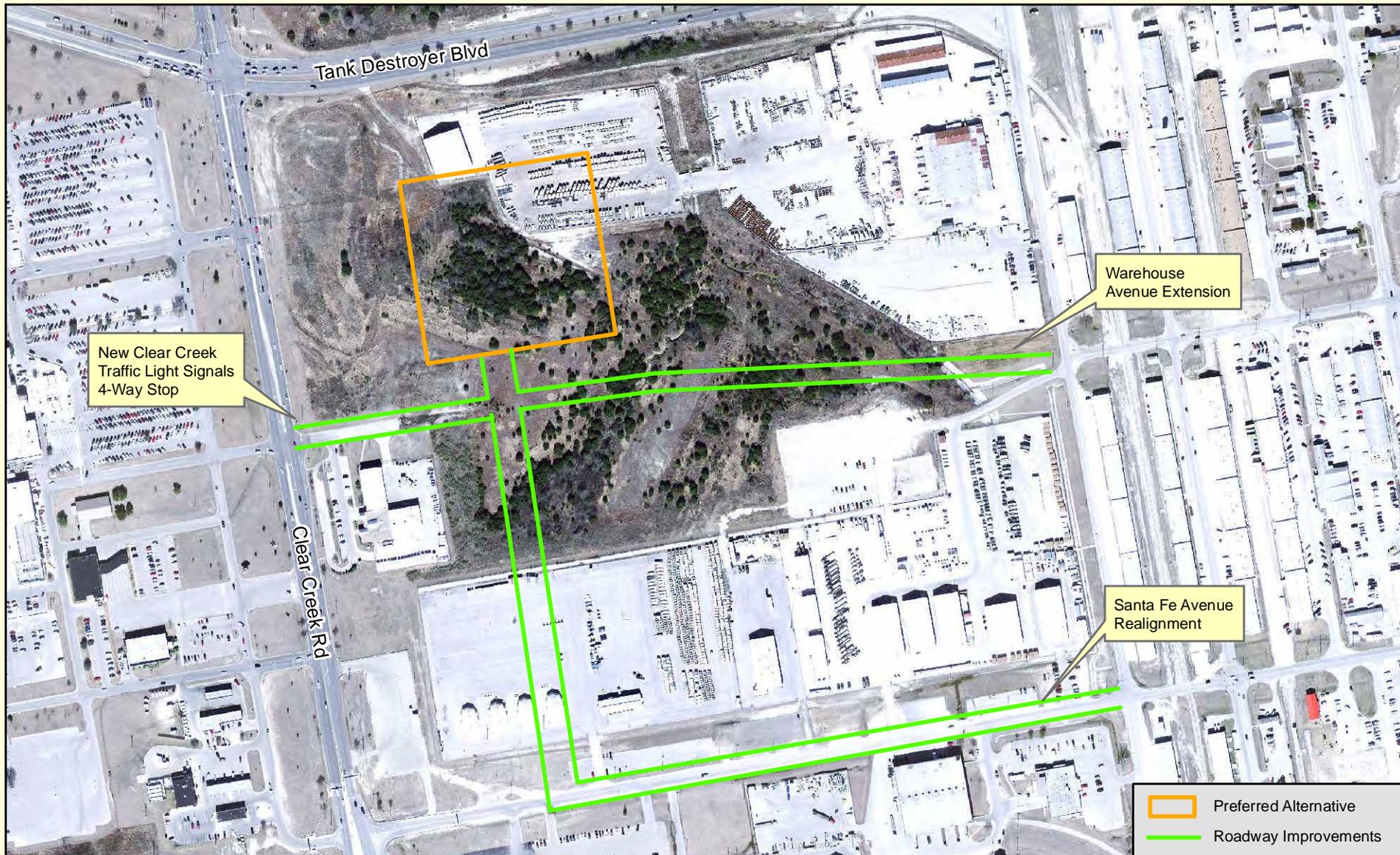
1 (FY16; see Figure 3-1; Erwin 2010). Planned roadway improvements in the proposed project area  
2 include the following:

- 3       ▪ To support the efficient flow of traffic in and out of the proposed shopping  
4 center, the existing traffic signal on Clear Creek Road in front of the commissary  
5 would be removed and a new signal would be installed on Clear Creek Road at  
6 the Warehouse Avenue extension. The entrance from Tank Destroyer Boulevard  
7 would be a right-only entrance for vehicles traveling east on Tank Destroyer  
8 Boulevard. Vehicles traveling west on Tank Destroyer Boulevard would utilize  
9 the Clear Creek Road entrance (Erwin 2010). To further alleviate traffic in the  
10 area an additional westbound left-turn lane on Clear Creek Road to provide dual  
11 lefts at the intersection with Tank Destroyer Boulevard is in the Installation’s  
12 five-year plan (Gannett Fleming 2008).
  
- 13       ▪ Warehouse Avenue, an east-west two-lane road that currently connects 62<sup>nd</sup>  
14 Street and 80<sup>th</sup> Street, would be extended from 80<sup>th</sup> Street east to Clear Creek  
15 Road. This extension would result in the construction of a new approximately  
16 2,300-foot roadway, approximately 30 feet wide. New traffic signals would be  
17 installed along Warehouse Avenue at Clear Creek Road, 79<sup>th</sup> Street, and 62<sup>nd</sup>  
18 Street, and a signal upgrade would be installed at 72<sup>nd</sup> Street. Additionally,  
19 Warehouse Avenue from 62<sup>nd</sup> to 80<sup>th</sup> Streets would be resurfaced (Erwin 2010).  
20 The new Warehouse Avenue extension would run immediately south of the  
21 Preferred Alternative site and would provide an entrance/exit to the shopping  
22 center from the south on Warehouse Avenue (see Figure 3-1). Construction of  
23 the proposed shopping center is anticipated to commence in FY11, while the  
24 roadway improvements discussed herein would not be implemented until FY16.  
25 Until the main Warehouse Avenue extension is constructed, the shopping center  
26 would be accessible from the south by a smaller entrance off Clear Creek Road  
27 and Warehouse Avenue (Erwin 2010).

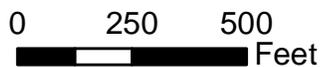
28 **No Action Alternative**

29       Implementation of the No Action Alternative would require no new construction on the  
30 Installation; therefore, no change in the existing transportation network would occur. Further, the  
31 existing road infrastructure in this area would continue to be undersized and poorly designed for the  
32 amount of traffic it accommodates within the Clear Creek Development Area.

33



Scale



NORTH

**Figure 3-1**  
**Conceptual Roadway Improvements**  
**Proposed AAFES Shopping Center**  
**Fort Hood, Texas**

Source: Fort Hood DPW, 2010



1 **3.4 Infrastructure and Utilities**

2 **3.4.1 Affected Environment**

3 **Sanitary Sewer and Wastewater**

4 Fort Hood’s wastewater collection system has been privatized and ownership, operations, and  
5 maintenance are under a 50-year contract with American Water. The majority of Fort Hood’s  
6 wastewater is treated off-Installation by the Bell County Water Control and Improvement District #1  
7 (BCWCID) who owns and operates the wastewater treatment plant serving Fort Hood. This plant has  
8 a capacity of 24 million gallons per day (mgd) (Atkinson 2010). The BCWCID is contracted to  
9 receive up to 7.5 mgd from the Installation; however, the average use in 2008 was 3.62 mgd (Lee  
10 2010).

11 **Potable Water Supply**

12 The majority of the potable water used on Fort Hood is provided by the BCWCID, which  
13 treats surface water from Lake Belton. Lake Belton, located along the southeastern border of the  
14 Installation, has a capacity of 887,000 acre-feet of water; of that amount 372,000 acre-feet is reserved  
15 for water supply (BCWCID 2010). The Brazos River Authority, which regulates Fort Hood’s water  
16 allotment, has allocated 42,800 acre-feet of water annually from Belton Lake to the BCWCID (Fort  
17 Hood 2009d), of which 12,000 acre-feet is reserved exclusively for Fort Hood.

18 The BCWCID guarantees Fort Hood a delivery of 16.0 mgd (Fort Hood 2009d). In 2009, the  
19 District completed an upgrade and expansion project at the water treatment plant, increasing  
20 treatment capacity to over 90 mgd (BCWCID 2010). The water is distributed throughout the Main  
21 Cantonment area, as well as to the Belton Lake Outdoor Recreation Area via water infrastructure that  
22 is owned, operated, and maintained by American Water (Fort Hood 2008a).

23 **Solid Waste Management**

24 The Fort Hood landfill is located in Coryell County and is a government-owned, contractor-  
25 operated Class I municipal solid waste permitted facility operating under Permit Number 1866 (Fort  
26 Hood 2007). The landfill has been in operation since October 1990 and serves only the Installation.  
27 Solid waste collection is accomplished under contract with a private refuse contractor. Fort Hood has  
28 developed a solid waste management plan (SWMP) and a Qualified Recycling Program and has  
29 received many awards, such as the Army Recycling Award and the White Housing Closing the Circle  
30 Award (Fort Hood 2009d). The Installation employs a source segregation policy for all solid waste

1 meaning that recyclable materials are separated from other solid waste at the point of generation. The  
2 landfill accepts all municipal-type solid waste and construction and demolition (C&D) waste.

3 **Natural Gas**

4 Natural gas service at Fort Hood is currently provided by Atmos Energy. Atmos Energy is  
5 obligated to provide Fort Hood an annual delivery of 2,463,750,000 cubic feet of natural gas (Thomas  
6 2010). Installation-wide distribution of natural gas is provided through a network of distribution lines  
7 from three main meter/regulator stations and nine smaller regulator stations provided by Atmos  
8 Energy. Over the last 10 years, 98 percent of the natural gas infrastructure has been upgraded (Fort  
9 Hood 2010).

10 **Electricity**

11 Oncor Electric Delivery Company, LLC (Oncor) supplies power to Fort Hood and is  
12 responsible for maintenance of transformers and high-voltage equipment at two of the four existing  
13 substations, while Fort Hood is responsible for the medium-voltage linear infrastructure. Fort Hood is  
14 in the process of determining whether privatizing their electric utility infrastructure is viable; a final  
15 decision is anticipated on this privatization by the fourth quarter of 2011. If approved, the  
16 privatization contractor would take ownership of the system infrastructure, including substation  
17 equipment not owned by Oncor, and will provide maintenance, operation, upgrades, and expansion to  
18 the system as needed (Fort Hood 2010).

19 The electric substations on the Installation are used to lower the transmission voltage for  
20 distribution to customers. Overhead utility lines parallel the southern side of Tank Destroyer  
21 Boulevard (Fort Hood 2007). Four substations provide power for the Installation: the Main  
22 Substation, West Fort Hood Substation, Clarke Road Substation, and the North Fort Hood Substation  
23 (Fort Hood 2010).

24 **3.4.2 Environmental Consequences**

25 **Alternative 4: Preferred Alternative**

26 **Sanitary Sewer and Wastewater.** The sanitary sewer system at Fort Hood is more than  
27 adequate for the current demands, however, upgrades are planned to increase the capacity of the  
28 system to support future development in the Main Cantonment area. Fort Hood currently depends on  
29 a 30-inch sewer line to transport its wastewater to the treatment plant. That line is scheduled to be  
30 upgraded to a 42-inch line within the next two years which will further increase the capacity of the  
31 wastewater transport system (Lee 2010). Additionally, sewer lines upgrades are programmed in the

## Environmental Assessment

### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 vicinity of the Darnall Army Medical Center to better serve future development in the area of the  
2 hospital and the proposed shopping center. These lines would be upgraded from 21- to 24-inch  
3 sanitary sewer lines (Alexander 2010). Implementation of the Proposed Action at the Preferred  
4 Alternative site would marginally increase demand over existing conditions, but with existing excess  
5 capacity and future planned expansions, the Proposed Action would not have a significant impact on  
6 sanitary sewer and wastewater.

7 **Potable Water Supply.** Fort Hood's peak consumption of potable water in 2009 was 11.1  
8 mgd (Young 2010). The Installation uses an annualized average of 5.842 mgd of potable water (Lee  
9 2010). With a guaranteed delivery of 16.0 mgd, the available potable water supply is sufficient to  
10 accommodate the Proposed Action. In addition, the Installation has programmed improvements to the  
11 potable water transport infrastructure including an upgrade of the existing 8-inch water line along  
12 Clear Creek Road to a 12-inch water line (Alexander 2010). While the Proposed Action would  
13 marginally increase demand of potable water over existing conditions, the existing excess capacity  
14 coupled with the programmed improvements would not result in a significant negative impact on  
15 potable water supply and infrastructure.

16 **Solid Waste Management.** The Fort Hood landfill is approximately 154 acres, has a design  
17 capacity of 4,042,949 cubic yards, and a current life expectancy of approximately 67 years (Fort  
18 Hood 2007). The landfill accepts approximately 25,000 tons of municipal type waste per year (70  
19 tons per day) plus 3,100 tons C&D debris annually (Fort Hood 2007). Special wastes, such as  
20 regulated and non-regulated asbestos-containing material and lead-based paint, are accepted with a  
21 manifest from the DPW Classification Unit (Fort Hood 2007). Also, no less than five other landfills  
22 within a 60-mile radius of Fort Hood can accept C&D debris and other types of solid waste. The Fort  
23 Hood landfill has more than sufficient capacity to accommodate both the C&D and municipal waste  
24 resulting from the Proposed Action. As a result, the Proposed Action would not significantly impact  
25 landfill capacity.

26 **Natural Gas.** Fort Hood used 945,360,000 cubic feet of natural gas in 2009, which accounts  
27 for only 38 percent of the annual contracted available supply of 2,463,750,000 cubic feet (Thomas  
28 2010). Over a six-year period, the average annual peak flow rate was approximately 62 percent of  
29 contracted peak capacity (Fort Hood 2010). The Proposed Action would create only a marginal  
30 increase in natural gas demand, for which the Installation has adequate contracted supply.

31 **Electricity.** In 2009, Fort Hood used 433,650 megawatt-hours of electricity (Thomas 2010).  
32 The four substations provide an electric capacity of 183.6 megawatts (Thomas 2010). The existing  
33 PX is supplied by the West Fort Hood substation, also referred to as the Clear Creek substation,

## **Environmental Assessment**

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 which is located on Ammo Road southwest of the Central Texas College campus. The West Fort  
2 Hood and Clarke Road substations are supplied through one 138,000-volt transmission line with the  
3 ability to supply power from two different directions (Thomas 2010). The West Fort Hood substation  
4 has a total capacity of 45,000 kilowatts (KW), with an average monthly demand in 2009 of 14,492  
5 KW. The five-year high peak demand was reached in November 2005 with a usage of 34,273 KW  
6 (Thomas 2010), leaving more than sufficient capacity for the Proposed Action in even the highest of  
7 peak demand times. The capacity of Fort Hood's electricity infrastructure is sufficient to handle the  
8 marginal increase in demand associated with the Proposed Action. Improvements that require  
9 connecting the proposed shopping center to main power lines have been planned and programmed by  
10 the Installation. With the excess available capacity and the planned improvements, the electrical  
11 supply or infrastructure at Fort Hood are not anticipated to be negatively impacted by the construction  
12 and operation of the proposed shopping center.

### **No Action Alternative**

14 Under the No Action Alternative, there would be no impacts to infrastructure.  
15 Implementation of the No Action Alternative would require no new construction activities on the  
16 Installation. There would be no change in utilities or infrastructure as a result of this alternative since  
17 activities would continue per the status quo.

## **3.5 Topography, Geology, and Soils**

### **3.5.1 Affected Environment**

#### **Topography**

21 Fort Hood is sited within the "Hill and Lake Country" of Central Texas, which is  
22 characterized by plateaus, ridges, isolated hills, and sloping valley-sides (Fort Hood 2007). Fort Hood  
23 is located close to the southeastern border of the Mid-Continent Plains and Escarpments identified as  
24 the Lampasas Cut Plains on the eastern margin of the Edwards Plateau (Fort Hood 2007). The  
25 Edwards Plateau is a series of undulating, juniper oak-clad hills that are the foundation for the Texas  
26 Hill Country. Upward displacement, weathering, and erosion of limestone, shale, and other  
27 sedimentary rock strata shaped the landscape of Fort Hood. The topography of the Main Cantonment  
28 area consists primarily of smaller hills and plateaus (Fort Hood 2007).

29 The proposed site is located in southern Coryell County. The site ranges in elevation from  
30 933 to 968 feet above mean sea level with undulating topography generally draining west to east and  
31 north to south. The topography is relatively flat near the roadways and intersection. Within the

## Environmental Assessment

### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 proposed building area, site grade slopes from southwest to northeast with approximately 24 feet of  
2 fall. The northeast portion of the site is covered with an asphalt-paved storage yard and the DRMO  
3 Tire Barn. The remainder of the site is covered with native grasses and trees, with the bulk of the trees  
4 located in the site's central and southeast portions (Omniplan 2009).

#### **5 Geology**

6 Fort Hood is located on a dissected limestone plateau underlain by erosion-resistant limestone  
7 on higher ridges with less resistant limestone on rolling hills and mesa. The underlying geology of  
8 Fort Hood is predominantly composed sedimentary rocks of Cretaceous Age limestone and sandstone  
9 formations, and Quaternary deposits are present along major streams (Fort Hood 2006a). The major  
10 rock layers beneath Fort Hood are the Glen Rose Formation, Paluxy Sand, Walnut Clay, Comanche  
11 Peak Formation, Edwards Limestone-Kiamichi Clay Complex, Denton Clay-Fort Worth Limestone,  
12 and Duck Creek Limestone Complex (Fort Hood 2009a). The Balcones Fault Zone passes  
13 immediately east of the Installation running north to southwest.

#### **14 Soils**

15 According to soil surveys, the dominant soil series on Fort Hood include Topsey Clay Loam,  
16 Doss-Real Complex, Real-Rock Outcrop Complex, Nuff Very Stony Silty Clay Loam, and Slidell  
17 Silty Clay. These soils account for 154,640 acres or 77 percent of Fort Hood. Soils in the Main  
18 Cantonment area, the central portion of the rangelands, and a large portion of North Fort Hood and  
19 West Fort Hood consist of the soil types described in the Slidell-Topsey-Brackett map unit:

- 20       ▪ **Slidell Series.** Consists of very deep, moderately well-drained, very slowly  
21 permeable soils.
- 22       ▪ **Topsey Series.** Consists of moderately deep, well-drained, moderately slowly  
23 permeable soils.
- 24       ▪ **Brackett Series.** Consists of very shallow to shallow soils over bedrock. These  
25 well-drained and moderately permeable soils formed in residuum over chalky  
26 limestone bedrock mainly of the Glen Rose Formation (Fort Hood 2010).

27 Soil borings conducted on the proposed site revealed that the subsurface conditions consist of  
28 fill and alluvial soils over severely weathered calcareous shale and grading to unweathered limestone  
29 of the Cretaceous Walnut Formation (Omniplan 2009). The alluvial soils below the fill also consist of  
30 high plasticity clay to moderate plasticity gravelly clay, as well as silty clay and gravelly clay  
31 (Omniplan 2009). The severely weathered calcareous shale below the alluvial soils reflects the  
32 engineering properties of high plasticity clay, moderate plasticity gravelly clay, and silty clay  
33 (Omniplan 2009). The silty clay soils make up the majority of the site and consist of very deep,

1 moderately well-drained, very slowly permeable soils that formed in calcareous, clayey sediments  
2 (United States Department of Agriculture-Natural Resources Conservation Service 2009).

### 3 **3.5.2 Environmental Consequences**

#### 4 **Alternative 4: Preferred Alternative**

5 Construction at the preferred site would require soil material, rocks, and clays to be  
6 excavated, compacted, and graded as part of site preparation over approximately 25 acres for building  
7 and parking lot construction. In addition, existing asphalt and vegetation would require removal.  
8 Given the sloping topography of the site, cut and fill would be required to create a level surface for  
9 the development. Retaining walls would be implemented in the final design to minimize erosion and  
10 withhold lateral earth pressures, as needed (Omniplan 2009).

11 Short-term adverse construction impacts may result from an increase in soil erosion and  
12 sediment transport due to excavation, grading, and vegetation removal activities. Best management  
13 practices (BMPs), including but not limited to hay bales, silt fences, and phasing of construction-  
14 related activities, would be implemented to minimize soil erosion and sediment transport.  
15 Implementation of a stormwater pollution prevention plan (SWPPP) with specific mitigation  
16 measures would minimize the potential for erosion and soil runoff and would specifically address  
17 measures aimed at protecting the unnamed tributary of Clear Creek. Minor long-term impacts would  
18 result to the topography of the proposed site due to the cut and fill required during site preparation.  
19 No long-term or operational impacts to geology would occur. With mitigation, impacts to soils would  
20 be minimized.

#### 21 **No Action Alternative**

22 Implementation of the No Action Alternative would require no new construction or land  
23 disturbance activities on the Installation; therefore, no topographic resources, geologic features, or  
24 soils would be impacted.

## 25 **3.6 Water Resources**

### 26 **3.6.1 Affected Environment**

#### 27 **Groundwater**

28 Fort Hood is underlain by the Trinity Aquifer which extends through parts of 55 counties in  
29 central Texas. The primary source of groundwater recharge for this area is from rainfall and stream  
30 seepage located within the Travis Peak, a 1,732-square-mile formation located 60 to 80 miles

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 northwest of Fort Hood (United States Army Center for Health Promotion and Preventive Medicine  
2 [USACHPPM] 2001). Secondary recharge areas are located within outcrops of alluvial deposits  
3 adjacent to Cowhouse Creek, Henson Creek, and Leon River, as well as karst or cave systems found  
4 throughout the Installation (USACHPPM 2001). Currently, there is no known usage of groundwater  
5 at Fort Hood, as surface water is the Installation's potable water source (Fort Hood 2006a). The  
6 proposed site is not located within any known groundwater recharge areas nor is it located in  
7 proximity to any secondary recharge areas such as Cowhouse Creek, Henson Creek, Leon River, or  
8 karst areas within the Installation.

9 Groundwater was not initially encountered during geotechnical borings at the site; however,  
10 two borings encountered groundwater at depths of 18.5 to 21 feet (elevation 934 to 924.5 feet above  
11 mean sea level) approximately 24 hours following drilling. The presence of and depth to groundwater  
12 will fluctuate with variations in seasonal and yearly rainfall. However, quantities are anticipated to be  
13 limited (Omniplan 2009).

#### **14 Surface Water**

15 Fort Hood is located within the Brazos River Basin. Surface waters in the area consist of  
16 small to moderate-sized streams that generally flow in a southeasterly direction (Fort Hood 2009f).  
17 Surface waters within the Installation include approximately 200 impoundment areas and 35 springs,  
18 692 acres of lakes and ponds, approximately 55 miles of rivers and permanent streams, and 43 miles  
19 of Belton Lake shoreline (Fort Hood 2007).

20 The proposed site is located within the Cowhouse Creek watershed (USEPA 2010a). A small  
21 unnamed tributary of Clear Creek runs along the eastern boundary of the proposed site location. This  
22 creek flows northwest to Clear Creek; Clear Creek flows to the north to tie into House Creek which  
23 flows east into Cowhouse Creek. Portions of this tributary are considered Waters of the United States  
24 (WOTUS). Section 404 of the CWA protects jurisdictional waters of the U.S., including navigable  
25 waterways.

#### **26 Wetlands**

27 Wetland areas are also regulated under the CWA and are considered WOTUS. *The Corps of*  
28 *Engineers Wetlands Delineation Manual* (Environmental Laboratory 1987) and the *Regional*  
29 *Supplement to the Corps of Engineers Wetlands Delineation Manual: Great Plains Region* (USACE  
30 2009) are used to delineate the boundaries of wetland areas. Wetlands on the Installation are most  
31 commonly riparian wetlands located on floodplains along rivers and streams and along the margins of  
32 lakes and ponds, but wetlands are also present in other low-lying areas where the groundwater

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 intercepts the soil (Fort Hood 2006a). There is a wetland approximately 810 feet southeast of the  
2 Preferred Alternative site (Alexander 2010; see Figure 3-2).

#### **3 Floodplains**

4 EO 11988 “Floodplain Management” requires federal agencies to take action to minimize  
5 development within floodplains. A small unnamed tributary of Clear Creek runs along the eastern  
6 boundary of the proposed site location. However, according to Federal Emergency Management  
7 Agency (FEMA) Flood Insurance Rate Map number 48099C0575F, February 17, 2010 (Appendix B),  
8 no portions of the proposed site are located within a FEMA-defined flood zone.

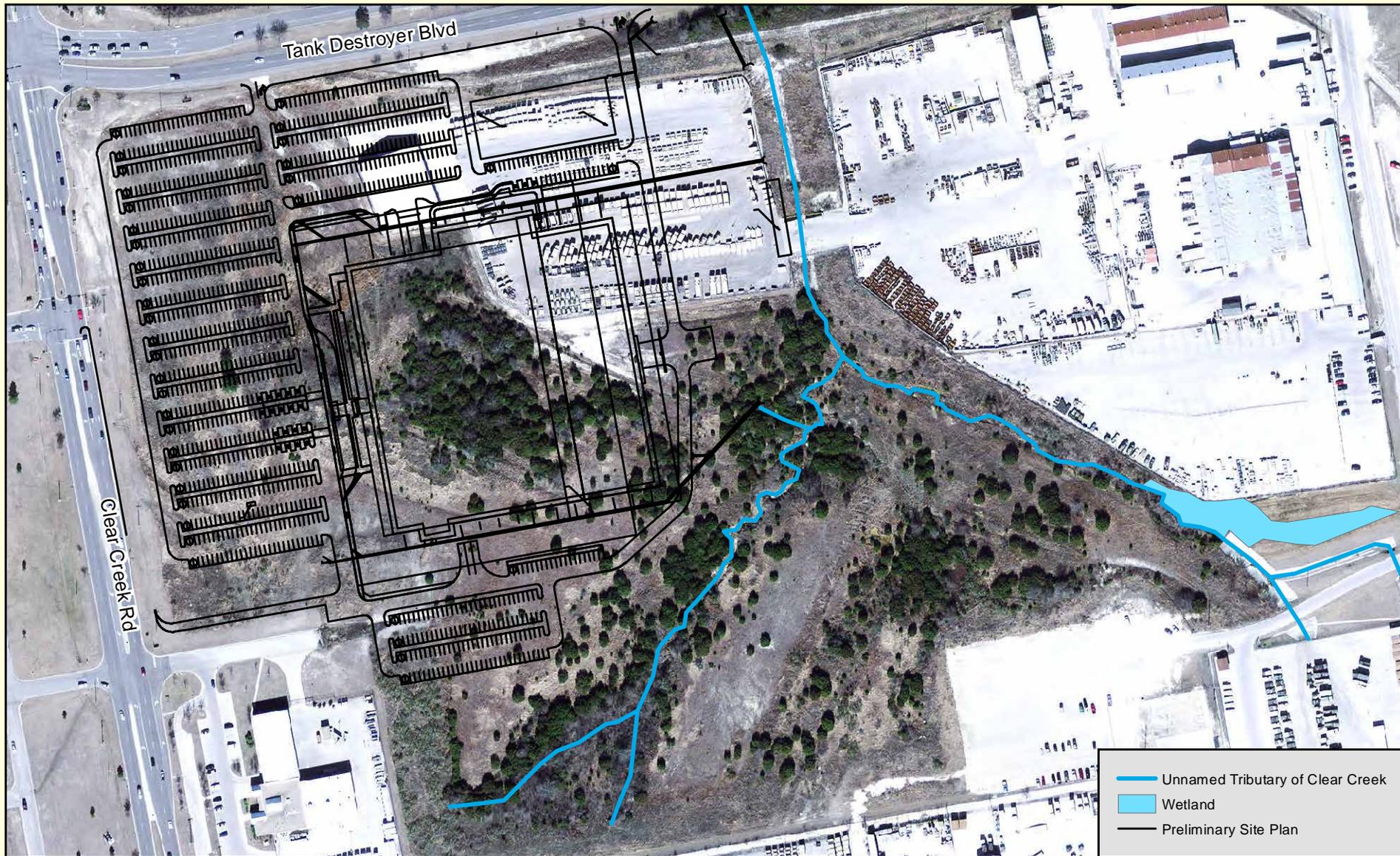
#### **9 Stormwater and Drainage**

10 The CWA prohibits pollutant discharge from a point source to any waters of the U.S. unless  
11 authorized by a National Pollutant Discharge Elimination System (NPDES) permit. In the state of  
12 Texas, the Texas Commission on Environmental Quality (TCEQ) is authorized to implement all  
13 stormwater regulations, including Texas Pollution Discharge Elimination System (TPDES) permits  
14 and the TPDES general permit issued pursuant to Section 26.040 of the Texas Water Code and  
15 Section 402 of the CWA.

16 The Fort Hood cantonment is considered a Phase II or small municipal separate storm sewer  
17 systems (MS4) area, and therefore under the general permit conditions, must obtain authorization  
18 from the TCEQ to discharge stormwater runoff (Fort Hood 2009g). Fort Hood has been granted  
19 permission by TCEQ to discharge stormwater to surface waters in the state under the TPDES General  
20 Permit No. TXR040000. On January 30, 2009, TCEQ approved Fort Hood’s SWMP that outlines all  
21 requirements of the permit and summarizes the work plan that will be conducted over a five-year  
22 period. The SWMP must be fully implemented by August 12, 2012 (Fort Hood 2010).

23 Stormwater is collected from developed areas of the Main Cantonment area, West Fort Hood,  
24 and North Fort Hood. Stormwater discharge in Fort Hood’s Main Cantonment area is conveyed  
25 through a system of natural streams, improved channels, and underground storm drain pipes into  
26 Nolan Creek and Cowhouse Creek which flows into the Brazos and Lampasas River System (Fort  
27 Hood 2009g). The majority of the Installation is in the Cowhouse Creek drainage area and upstream  
28 of Lake Belton (Fort Hood 2008a). The remaining sections of the Main Cantonment area are in the  
29 Nolan Creek watershed that drains into the Leon River and Belton Lake. The existing stormwater  
30 system in the Main Cantonment area is designed to handle a ten-year storm (Fort Hood 2008a).

31



Scale

0 150 300 Feet



NORTH

**Figure 3-2**  
**Surface Water Features**  
**Proposed AAFES Shopping Center**  
**Fort Hood, Texas**

Source: Ft. Hood, 2009  
 Walter P. Moore & Associates Inc.



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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1           A SWPPP for Industrial Stormwater (or Multi-Sector General) Permit TXR050000 was  
2 completed in February 2007. It is a permanent permit that will be updated annually. Other SWPPPs  
3 for specific projects fall under requirements for a Construction General Permit (TPDES General  
4 Permit No. TXR150000) issued by TCEQ. Construction activities that disturb 1 or more acres of land  
5 must comply with all applicable requirements of the Fort Hood Construction Site Stormwater  
6 Inspection Program MOI and the Construction General Permit. The contractor must submit the  
7 complete SWPPP to the MS4 operator at least seven days prior to the start of construction of land-  
8 disturbing activities (Fort Hood 2010).

9           All new developments at the Installation are required to meet Section 438 of the Energy  
10 Independence and Security Act of 2007. This act states that new construction and renovation on  
11 federal projects must adhere to specific provisions for stormwater planning and management (Fort  
12 Hood 2010).

### **13 3.6.2 Environmental Consequences**

#### **14 Alternative 4: Preferred Alternative**

15           **Groundwater.** The Proposed Action would not occur within groundwater recharge areas nor  
16 impact secondary recharge areas such as Cowhouse Creek, Henson Creek, Leon River, or karst areas  
17 within the base. The Preferred Alternative, therefore, would not result in impacts to groundwater at  
18 Fort Hood.

19           **Surface Water.** The Preferred Alternative site is adjacent to an unnamed tributary of Clear  
20 Creek. The stream has altered hydrologic conditions through past additions of culverts and is  
21 considered WOTUS. Proposed grading and earthwork adjacent to the watercourse would avoid any  
22 substantial direct impacts to the WOTUS and associated wetland areas and would be located outside  
23 the 50-foot buffer from the centerline of the tributary with the exception of a small amount of grading  
24 required to achieve proper drainage to the existing channel. This minimal disturbance would be  
25 covered under Nationwide Permit #39 and would not require an Individual Section 404 permit. Under  
26 this permit, disturbances are allowed to less than 0.5 acre of non-tidal WOTUS, including the loss of  
27 less than 300 linear feet of stream bed. Implementation of the Proposed Action at the preferred site  
28 would result in an impact of approximately 60 linear feet on the creek (Pelham 2011).

29           **Wetlands.** A small wetland approximately 0.43 acre in size exists southeast of the Preferred  
30 Alternative site off the eastern fork of the unnamed tributary and just south of the paved area east of  
31 the Preferred Alternative (Figure 3-2). With surface waters flowing north, away from this wetland,  
32 coupled with the wetland's distance from the Preferred Alternative site, direct impacts to the wetland

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 would not be anticipated. Indirect impacts from stormwater runoff or erosion would be minimized  
2 with surface water flow away from the wetland and implementation of BMPs and other permit  
3 conditions.

4 **Floodplains.** The unnamed tributary of Clear Creek flows northwest, crossing under Tank  
5 Destroyer Boulevard through two 9-foot by 6-foot box culverts (approximate dimensions). While no  
6 FEMAdefined flood zones are on or adjacent to the proposed site, further hydrological analyses of  
7 this creek concluded that during a 100-year storm event (1% annual probability), the capacity of the  
8 culverts at Tank Destroyer Boulevard would be exceeded, and water would impound behind the berm  
9 on the south side of Tank Destroyer Boulevard. Without mitigation, the Proposed Action at the  
10 Preferred Alternative site would encroach into this existing area of inundation.

11 Proposed grading and earthwork would elevate the developed area above that inundation  
12 level by excavating along the creek. These mitigation measures would provide an equivalent storage  
13 volume to ensure no increase in water surface elevation or increase in the rate of discharge through  
14 the existing culverts. Drainage analyses demonstrated that the proposed grading would mitigate any  
15 loss of storage volume in the inundation area by creating additional storage volume adjacent to the  
16 creek. (see Appendix C). The drainage study also shows that there would be no adverse impacts from  
17 water levels caused by the proposed grading.

18 **Stormwater and Drainage.** Implementation of the Proposed Action on the preferred site  
19 would have a minor impact on water resources due to an increase in stormwater runoff from the  
20 increase in impervious surface area associated with the Proposed Action. The design team is required  
21 to maintain “pre-developmental” off-site flow discharge. This would require the use of retention and  
22 metering of out-flow under Tank Destroyer Boulevard (Omniplan 2009).

23 NPDES regulations require that if a proposed construction site is larger than 1 acre, a Notice  
24 of Intent (Appendix D) must be submitted to the TCEQ to comply with the NPDES Construction  
25 General Permit. Further, AAFES will develop and implement an SWPPP prior to construction and  
26 will submit the draft SWPPP to Fort Hood DPW, Environmental Division, for review prior to  
27 submitting a Notice of Intent to the TCEQ. A copy of this plan would be located and maintained at  
28 the proposed construction site. As a part of the SWPPP, the contractor would be required to  
29 implement erosion control measures, including but not limited to hay bales, silt fencing, sodding, and  
30 phasing of construction, to prevent the uncontrolled discharge of sediments and pollutants during  
31 construction.

1 Under Section 438 of the Energy Independence and Security Act of 2007, federal facilities  
2 over 5,000 square feet must “maintain or restore, to the maximum extent technically feasible, the  
3 predevelopment hydrology of the property with regard to the temperature, rate, volume, and duration  
4 of flow.” The Proposed Action would incorporate low-impact development techniques in compliance  
5 with the USEPA’s “Technical Guidance on Implementing the Stormwater Runoff Requirements for  
6 Federal Projects under Section 438 of the Energy Independence and Security Act.”

### 7 **No Action Alternative**

8 Under the No Action Alternative, no construction activities would occur. There would be no  
9 new land disturbance activities, no new impervious surfaces constructed, and the hydrology of the site  
10 and surrounding areas would remain in its current state. There would be no changes to water  
11 resources under the No Action Alternative.

## 12 **3.7 Biological Resources**

### 13 **3.7.1 Affected Environment**

#### 14 **Vegetation**

15 Fort Hood is located in the Lampasas Cut Plain physiographic region (Fort Hood 2008b) and  
16 is composed of a diversity of vegetative communities including grasslands, shrub communities,  
17 juniper-oak woodlands, oak savannahs, and riparian forests (Pekins 2010).

18 The Preferred Alternative site is a disturbed area, consisting of a mixed community of native  
19 and non-native grass species, shrub tree species, and hydrophilic plant species common in low-lying  
20 drainage areas. Several grasses are located on the site, such as king ranch bluestem (*Bothriochloa*  
21 *laguroides*), Mediterranean love grass (*Eragrostis barrelieri*), broomweed (*Gutierrezia*  
22 *dracunculoides*), buffalo grass (*Buchloe dactyloides*), gumweed (*Grindelia camporum*), silver  
23 bluestem (*Bothriochloa laguroides*), ragweed (*Ambrosia artemisiifolia*), yellow Indiangrass  
24 (*Sorghastrum nutans*), and big bluestem (*Andropogon gerardii*). Native ashe juniper (*Juniperus*  
25 *ashei*) trees are spread throughout the site (Fort Hood 2006a and Fort Hood 2006b).

#### 26 **Fort Hood Tree Care Ordinance**

27 Approximately sixteen native hardwood trees have been identified on the parcel southeast of  
28 the intersection of Clear Creek and Tank Destroyer Boulevard (Hansen 2009). According to the Fort  
29 Hood Tree Care Ordinance, all native trees on the Installation are protected. For every native tree that  
30 is removed from the cantonment area(s), ten native trees must be planted, preferably on the same

## **Environmental Assessment**

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 parcel or close thereto. Replacement trees must be chosen from Fort Hood’s Landscaping  
2 Memorandum of Instruction (MOI); however, preservation of native trees is preferred over  
3 replacement. Juniper (cedar) trees are not a protected species on Fort Hood (Fort Hood 2007).

#### **4 Wildlife**

5 The Installation contains 199,000 acres of mission land suitable for fish and wildlife  
6 management, including 692 surface acres of lakes and ponds, 816 miles of rivers and permanent  
7 streams, and 43 miles of shoreline access to Belton Lake (Fort Hood 2009d). Fort Hood coordinates  
8 with the United States Fish and Wildlife Service (USFWS) on fish and wildlife management, as well  
9 as the Endangered Species Act and the Migratory Bird Treaty Act (Fort Hood 2009d).

10 The Migratory Bird Treaty Act (1989, as amended) implements various international treaties  
11 and conventions that serve to protect migratory birds. Pursuant to EO 13186 “Responsibilities of  
12 Federal Agencies to Protect Migratory Birds,” the DoD entered into a Memorandum of  
13 Understanding with the USFWS to promote the conservation of migratory bird populations.  
14 Migratory birds utilize reservoirs, grass and shrub ecosystems, and riparian areas at Fort Hood for  
15 nesting, feeding, and breeding grounds.

#### **16 Threatened and Endangered Species**

17 Three federally listed threatened or endangered species are known to occur on or in the  
18 vicinity of the Installation including the whooping crane (*Grus americana*), the golden-cheeked  
19 warbler (*Dendroica chrysoparia*), and the black-capped vireo (*Vireo atricapilla*) (Fort Hood 2006a).  
20 The bald eagle (*Haliaeetus leucocephalus*), also know to be present at Fort Hood, has been delisted.  
21 No threatened or endangered species are known to occur within the Main Cantonment area of the  
22 Installation (Fort Hood 2009a).

23 Bald eagles are protected under the Bald and Golden Eagle Protection Act. They primarily  
24 feed on fish and therefore use lakes, ponds, rivers, estuaries, and the coast as habitat. Bald eagles  
25 utilize tall mature trees and cliffs for nesting areas (USFWS 2007). The Preferred Alternative site  
26 does not contain suitable habitat for nesting or foraging for bald eagles.

27 Whooping cranes are known to pass over Fort Hood during fall or spring migration and have  
28 been known to stop over to rest and forage (Fort Hood 2006a). The fall migration typically occurs  
29 from September to November, while the spring migration occurs in March and April. They forage in  
30 wetland areas dominated by saltwort (*salsola*), smooth cordgrass (*Spartina alterniflora*), glasswort  
31 (*Salicornia* sp.) and sea ox-eye (*Borrchia arborescens*), as well as in sandy grasslands, swales and

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1 ponds (USFWS 2009a). The Preferred Alternative site does not contain suitable habitat for nesting or  
2 foraging for whooping cranes.

3 The golden-cheeked warbler and black-capped vireo nest on Fort Hood from March through  
4 August each year (Fort Hood 2006a). These species utilize natural mixed woodlands with mature ashe  
5 juniper of at least 15 feet in height with nearly continuous canopy cover of 50 to 100 percent  
6 (USFWS 2009b). The Preferred Alternative site does not contain suitable habitat for nesting or  
7 foraging for the golden-cheeked warbler or black-capped vireo.

### **3.7.2 Environmental Consequences**

#### **Alternative 4: Preferred Alternative**

10 **Vegetation.** Implementation of the Proposed Action at the Preferred Alternative site would  
11 result in minor impacts to existing vegetation. The Preferred Alternative site is a previously disturbed  
12 area with low quality vegetation consisting of native and non-native grass species, shrub tree species,  
13 and hydrophilic plant species within drainage areas. Construction of the Preferred Alternative would  
14 result in clearing of natural vegetation. In December 2009, approximately sixteen native hardwood  
15 trees were observed in the vicinity of the Preferred Alternative site (Hansen 2009). These trees would  
16 be preserved to the extent feasible, and where not feasible they would be replaced at a 10:1 ratio  
17 pursuant to the Fort Hood Tree Care Ordinance.

18 Due to the low quality, previously disturbed nature of the site, coupled with the preservation  
19 and/or replacement of hardwood trees, the Proposed Action at the Preferred Alternative site is not  
20 expected to have significant impacts on vegetation within the area.

21 **Wildlife.** The Proposed Action at the Preferred Alternative site would not result in significant  
22 negative impacts to wildlife species within the area. The Preferred Alternative site includes wooded  
23 areas next to the unnamed tributary of Clear Creek, but the site is bounded by developed areas. The  
24 nature of the site limits its usefulness as habitat so that it is likely to contain urban wildlife, such as  
25 skunks, opossums and raccoons, as well as herpetofauna. Upland areas of the site would be cleared  
26 for construction, but areas surrounding the stream would remain undisturbed to the extent feasible in  
27 order to mitigate any negative impact to wildlife habitat. During construction, the partially  
28 constructed shopping center structure may be utilized by wildlife, particularly during the spring and  
29 autumn migration seasons. If any wildlife is discovered in any structures during construction, Fort  
30 Hood Natural Resources Branch would be notified immediately.

31 **Threatened and Endangered Species.** No threatened or endangered species are known to  
32 occur within the Main Cantonment area of the Installation (Fort Hood 2009a). All aspects of the

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1 Proposed Action would occur within the Main Cantonment area; therefore, there would be no effect  
2 on threatened or endangered species.

### **3 No Action Alternative**

4 Under the No Action Alternative, no construction would occur. There would be no new land  
5 disturbance and vegetation and wildlife would continue to use the site in its current capacity. There  
6 would be no change to biological resources under the No Action Alternative.

## **7 3.8 Cultural Resources**

### **8 3.8.1 Affected Environment**

9 The National Historic Preservation Act (NHPA) defines cultural resources as prehistoric and  
10 historic sites, structures, districts, or any other physical evidence of human activity considered  
11 important to a culture, a subculture, or a community for scientific, traditional, religious, or any other  
12 reason. The NHPA requires that federal agencies account for actions that have the potential to affect  
13 historic sites and properties eligible for listing under the National Register of Historic Places (NRHP).  
14 The construction for the Proposed Action is sited within the Main Cantonment area, which has been  
15 surveyed for historic and cultural resources. No identified NRHP-eligible or potentially NRHP-  
16 eligible archaeological sites are located in the vicinity of the Preferred Alternative, and there are no  
17 other known historic or culturally significant resources on the Preferred Alternative site. There are no  
18 known eligible or ineligible cultural resources within the proposed action footprint.

19 Seven federally recognized Native American tribes are associated with the lands of Fort  
20 Hood: the Apache Tribe of Oklahoma, Caddo Nation, Comanche Nation, Kiowa Tribe of Oklahoma,  
21 Mescalero Apache Tribe, Tonkawa Tribe of Oklahoma, and Wichita and Affiliated Tribes (Keechi,  
22 Waco, and Tawakonie). Additionally, the Tap Pilam Coahuiltecan Nation is a State-recognized tribe  
23 (Fort Hood 2008c). Fort Hood has not conducted an inventory of traditional cultural properties or  
24 sacred sites; however, one Native American Traditional Cultural Property was found at Fort Hood,  
25 the Leon River Medicine Wheel, which has been recognized by tribal representatives and is used for  
26 ceremonial activities. A repatriation cemetery, which was established in 1991 for the reburial of  
27 remains recovered since the establishment of Fort Hood, is also considered an important Native  
28 American resource (Fort Hood 2008c).

1 **3.8.2 Environmental Consequences**

2 **Alternative 4: Preferred Alternative**

3 No known cultural or archaeological resources are located on the proposed project site;  
4 however, if cultural resources are inadvertently discovered during construction, the contractor would  
5 cease all work, would notify the Fort Hood Cultural Resources Manager, and would comply with Fort  
6 Hood inadvertent discovery procedures. All applicable federal, state, and local cultural resources laws  
7 and regulations would be followed and appropriate State Historic Preservation Officer (SHPO)  
8 consultations would occur.

9 The DRMO Tire Barn and associated facilities on the Preferred Alternative site are not  
10 considered to have any historic and cultural significance. Therefore, the Preferred Alternative would  
11 have no effect on cultural or historic resources.

12 **No Action Alternative**

13 Implementation of the No Action Alternative would require no new construction or land  
14 disturbance on the Installation; therefore, there would be no effect on cultural resources.

15 **3.9 Air Quality**

16 **3.9.1 Affected Environment**

17 **Clean Air Act (42 U.S.C. 7401 et seq.)**

18 The CAA of 1970, 42 U.S.C. 7401 et seq., amended in 1977 and 1990, is the primary federal  
19 statute governing air pollution. The CAA designates six pollutants as criteria pollutants for which  
20 National Ambient Air Quality Standards (NAAQS) have been promulgated to protect public health  
21 and welfare. The six criteria pollutants are respirable particulate matter 10 microns or smaller in  
22 diameter (PM<sub>10</sub>) and particulate matter less than 2.5 microns in diameter (PM<sub>2.5</sub>), carbon monoxide  
23 (CO), sulfur dioxide (SO<sub>2</sub>), nitrogen dioxide (NO<sub>2</sub>), lead (Pb), and ozone (O<sub>3</sub>).

24 The primary NAAQS represent maximum background air pollution levels with an adequate  
25 margin of safety to protect public health. Secondary NAAQS represent the maximum pollutant  
26 concentration allowable to protect vegetation, crops, and other public resources along with  
27 maintaining visibility standards (see Table 3-3). Areas that meet the NAAQS are designated as “in  
28 attainment,” while those where the ambient pollutant concentration exceeds one or more of the  
29 NAAQS are designated as “nonattainment” for each criteria pollutant that is exceeded.

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1 The number of exceedances and their concentrations determine the nonattainment  
 2 classification of an area. There are six classifications of O<sub>3</sub> nonattainment status—transitional,  
 3 marginal, moderate, serious, severe, and extreme—and two classifications of CO and PM<sub>10</sub>  
 4 nonattainment status—moderate and serious.

5 The CAA requires states or local air quality control agencies to adopt state implementation  
 6 plans that prescribe measures to eliminate or reduce the severity or number of NAAQS violations and  
 7 to achieve and maintain attainment of the NAAQS. The State of Texas has established ambient air  
 8 standards that are the same as the NAAQS (see Table 3-3).

9

Pollutant	Primary Standards		Secondary Standards	
	Level	Averaging Time	Level	Averaging Time
Carbon Monoxide (CO)	9 ppm (10 mg/m <sup>3</sup> )	8-hour <sup>(a)</sup>	None	
	35 ppm (40 mg/m <sup>3</sup> )	1-hour <sup>(a)</sup>		
Lead (Pb)	0.15 µg/m <sup>3</sup> <sup>(b)</sup>	Rolling 3-Month Average	Same as Primary	
	1.5 µg/m <sup>3</sup>	Quarterly Average	Same as Primary	
Nitrogen Dioxide (NO <sub>2</sub> )	0.053 ppm (100 µg/m <sup>3</sup> )	Annual (Arithmetic Mean)	Same as Primary	
	0.100 ppm	1-hour <sup>(c)</sup>	None	
Particulate Matter (PM <sub>10</sub> )	150 µg/m <sup>3</sup>	24-hour <sup>(d)</sup>	Same as Primary	
Particulate Matter (PM <sub>2.5</sub> )	15.0 µg/m <sup>3</sup>	Annual <sup>(e)</sup> (Arithmetic Mean)	Same as Primary	
	35 µg/m <sup>3</sup>	24-hour <sup>(f)</sup>	Same as Primary	
Ozone (O <sub>3</sub> )	0.075 ppm (2008 std)	8-hour <sup>(g)</sup>	Same as Primary	
Sulfur Dioxide (SO <sub>2</sub> )	0.03 ppm	Annual (Arithmetic Mean)	0.5 ppm (1,300 µg/m <sup>3</sup> )	3-hour(a)
	0.14 ppm	24-hour <sup>(a)</sup>		
Notes: (a) Not to be exceeded more than once per year. (b) Final rule signed October 15, 2008. (c) To attain this standard, the 3-year average of the 98 <sup>th</sup> percentile of the daily maximum 1-hour average at each monitor within an area must not exceed 0.100 ppm (effective January 22, 2010). (d) Not to be exceeded more than once per year on average over three years (e) To attain this standard, the three-year average of the weighted annual mean PM <sub>2.5</sub> concentrations from single or multiple community-oriented monitors must not exceed 15.0 µg/m <sup>3</sup> (f) To attain this standard, the three-year average of the 98 <sup>th</sup> percentile of 24-hour concentrations at each population-oriented monitor within an area must not exceed 35 µg/m <sup>3</sup> (effective December 17, 2006) (g) To attain this standard, the three-year average of the fourth-highest daily maximum 8-hour average ozone concentrations measured at each monitor within an area over each year must not exceed 0.075 ppm (effective May 27, 2008). Key: µg/m <sup>3</sup> = micrograms per cubic meter. mg = milligrams. ppm = parts per million. Source: USEPA 2010b.				

10

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1 Areas that achieve the air quality standards after being designated in nonattainment are  
2 re-designated as being in attainment following USEPA approval of a maintenance plan. These areas  
3 are commonly known as “maintenance areas.”

#### 4 **General Conformity Rule**

5 The General Conformity Rule (40 CFR, Part 51) was created to ensure federal actions do not  
6 aggravate or add to a state’s violation of air quality standards in nonattainment and maintenance  
7 areas. Bell and Coryell Counties, where Fort Hood is located, is designated as unclassified/attainment  
8 for all criteria pollutants. An unclassified area is where there is not enough data to make a  
9 determination of attainment or nonattainment. Therefore, the General Conformity Rule does not apply  
10 to this project (TCEQ 2009b). A conformity determination is not required.

11 **Stationary Source Air Permits.** The Office of Permitting and Registration of the TCEQ  
12 operates the air permit program for stationary air pollution sources in the Fort Hood area. Normally, a  
13 permit must be obtained prior to constructing any new facility or modifying an existing facility that  
14 emits air contaminants into the atmosphere. Air pollution sources are classified as either major or  
15 minor based on their potential to emit (PTE). A major source is a facility that has a PTE of 100 tons  
16 per year (tpy) or more of any criteria air pollutant, 10 tpy or more of a single hazardous air pollutant  
17 (HAP), or 25 tpy or more of any combination of HAPs. A minor source is a facility that does not meet  
18 the definition of a major source.

19 Fort Hood is considered a major source for criteria pollutants and HAPs and has a Title V  
20 permit for all on-Installation sources it owns. However, AAFES facilities are considered separate  
21 from the Installation’s sources and do not require an air permit. The Preferred Alternative qualifies as  
22 a de minimis facility or source, meaning it would have minimal impact on air quality, and would not  
23 require a permit or registration (Cavazos 2010, and TCEQ 2009a).

24 **Ambient Air Quality Conditions.** Federal regulations in 40 CFR 81 (Designation of Areas  
25 for Air Quality Planning Purposes) delineate certain air quality control regions (AQCRs), originally  
26 designated based on population and topographic criteria closely approximating each air basin. The  
27 potential influence of emissions on regional air quality would typically be confined to the air basin in  
28 which the emissions occur. Fort Hood is located in Bell and Coryell Counties within the Austin-Waco  
29 Intrastate AQCR (40 CFR 81.134). Bell and Coryell Counties are currently designated as  
30 unclassified/attainment for all criteria pollutants.

1 **Greenhouse Gas Emissions**

2 Greenhouse gases trap heat in the atmosphere. Some greenhouse gases such as carbon  
3 dioxide (CO<sub>2</sub>) are emitted through natural processes and through human activities. Other  
4 greenhouse gases are emitted solely through human activities. CO<sub>2</sub> enters the atmosphere through  
5 the burning of fossil fuels (oil, natural gas, and coal), solid waste, trees and wood products, and as a  
6 result of other chemical reactions (e.g., manufacture of cement). Methane (CH<sub>4</sub>) is emitted during the  
7 production and transport of coal, natural gas, and oil. Nitrous oxide (N<sub>2</sub>O) is emitted during  
8 agricultural and industrial activities, as well as during combustion of fossil fuels and solid waste (USEPA  
9 2010c).

10 To assist with the determination of greenhouse gasses emitted during a particular project, the  
11 Intergovernmental Panel on Climate Change (IPCC) has developed Global Warming Potentials  
12 (GWPs) that analyze the abilities of different greenhouse gases to trap heat in the atmosphere. GWPs  
13 are based on the heat-absorbing ability of each gas relative to that of CO<sub>2</sub>, as well as the decay rate of  
14 each gas (the amount removed from the atmosphere over a given number of years) relative to that of  
15 CO<sub>2</sub>. The GWPs provide a factor for converting emissions of various gases into a common measure  
16 denominated in carbon or carbon dioxide equivalent (CO<sub>2</sub>eq). The 2007 GWP factors released by the  
17 IPCC are specified in Table 3-4.

18

<b>Greenhouse Gas</b>	<b>2007 IPCC GWP Factors (100-year)</b>
Carbon Dioxide (CO <sub>2</sub> )	1
Methane (CH <sub>4</sub> )	23
Nitrous Oxide (N <sub>2</sub> O)	296

Source: Intergovernmental Panel on Climate Change 2007.

19

20 **3.9.2 Environmental Consequences**

21 **Alternative 4: Preferred Alternative**

22 **Construction.** Implementation of the Preferred Alternative would result in slight emissions  
23 during construction. Operation of construction vehicles and heavy equipment during construction  
24 (construction, grading, and paving) would result in minor, temporary negative effects on air quality.  
25 These negative effects would be primarily in the form of increased exhaust pollutants that would be  
26 minimized through proper vehicle maintenance. Windblown soil and dust could occur during  
27 construction as a result of equipment movement over exposed soil areas. Generation of fugitive dust

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1 would be minimized through the use of BMPs to control dust (i.e., wetting the surfaces and through  
2 the re-vegetation of disturbed areas as soon as possible after construction).

3 Construction for the Preferred Alternative is scheduled to take approximately eighteen  
4 months to complete (five days per week and eight hours per day). It is assumed that the final seven  
5 months would involve interior work that would have minimal emissions. Estimated emissions for the  
6 worst-case year from the construction are listed in Table 3-5. Emissions estimates are provided for the  
7 worst year and not the entire project because the emission standards are based on tpy. Construction is  
8 expected to begin in May 2012, thus 2012 would be the worst-case year for construction emissions.

9 Air quality data calculation tables are provided in Appendix E. The primary short-term air  
10 quality impacts resulting from the Preferred Alternative would be a temporary increase of air  
11 pollutants during construction, which would cease upon the completion of ground-disturbing and  
12 coating activities. The total emissions from the construction of the Proposed Action are provided in  
13 Table 3-5.

<b>Emissions (tons per year)</b>					
<b>Activity</b>	<b>Nitrogen Oxide (NO<sub>x</sub>)</b>	<b>Volatile Organic Compounds (VOCs)</b>	<b>Carbon Monoxide (CO)</b>	<b>Particulate Matter ≤ 10 microns (PM<sub>10</sub>)</b>	<b>Carbon Dioxide Equivalent (CO<sub>2</sub>eq)</b>
Vehicle Exhaust Emissions	13.81	2.08	16.27	0.40	45.34
Worker Trip Emissions	5.54	8.09	62.06	0.69	
Fugitive Dust Emissions				55.00	
Asphalt Paving Emissions		1.40			
Architectural Coatings		7.99			
<b>TOTAL</b>	<b>19.36</b>	<b>19.56</b>	<b>78.34</b>	<b>56.09</b>	<b>45.34</b>
<b>De Minimis Levels</b>	<b>100</b>	<b>50</b>	<b>NA</b>	<b>NA</b>	<b>NA</b>

14 To calculate construction emissions for the proposed project, the construction schedule was  
15 considered to include grading, paving, exterior and interior construction, and the associated  
16 equipment necessary to perform these tasks. Emission factors for these analyses were obtained from  
17 standard references: Compilation of Air Pollutant Emission Factors (AP-42; USEPA 1995) and the El  
18 Dorado County Air Pollution Control District Environmental Quality Act Guide (El Dorado County  
19 Air Pollution Control District 2002). These references recommend the numbers and types of  
20 equipment that would be used for estimating and evaluating construction emissions.

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1 Greenhouse gas emissions anticipated from construction of the Proposed Action would be  
2 45.34 tons, which was estimated by using the corresponding GWP factors given in Table 3-4. As  
3 indicated previously in this section, a conformity analysis is not required for this project.

4 **Operation.** New annual emissions would be minor since only a small number of new jobs  
5 would be created, resulting in a slight increase in operation of personally owned vehicles. All traffic  
6 areas would be paved to eliminate or minimize fugitive dust. The facility would have individually  
7 packaged rooftop units for heating and cooling that would be electrically fueled. The cooling system  
8 would use non-ozone depleting compounds or exempt hydrofluorocarbons as refrigerants. Further,  
9 these facilities would incorporate energy efficient units and building elements would be required to  
10 meet all new and existing air quality permit requirements for construction and installation. As a result,  
11 minor air emissions would be associated with the operation of the Proposed Action.

### **No-Action Alternative**

12 Implementation of the No-Action Alternative would result in no new construction activities.  
13 However, the existing AAFES facilities would continue to operate and would result in the same  
14 quantities of air emissions that currently exist. Therefore, there would be no change in existing  
15 conditions.  
16

## **3.10 Noise**

### **3.10.1 Affected Environment**

19 'Noise' is broadly characterized as sound that is undesirable due to the potential for hearing  
20 damage, communications interference, sleep disruption, or general annoyance. Typical noise sources  
21 on the Installation include aircraft, training activities, vehicular traffic and construction activities.  
22 Levels of noise are measured in decibels (dB), which is a relative measure of the sound pressure with  
23 respect to a standardized reference quantity. Noise levels below 65 dB are normally considered  
24 acceptable in suitable living environments (Fort Hood 2009a). The USEPA, the U.S. Department of  
25 Housing and Urban Development, and the DoD have identified noise levels to protect public health  
26 and welfare. Sound levels between 65 and 75 dB are normally unacceptable unless noise reduction  
27 measures are included, and sound levels exceeding 75 dB are considered unacceptable for suitable  
28 living environments.

29 Table 3-6 lists the sound levels of some common sources. The Fort Hood Installation  
30 Compatible Use Zone (ICUZ) program uses the guidelines established by the Federal Interagency

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1 Committee on Urban Noise for areas on and/or near noise-producing activities such as highways,  
 2 airports, and firing ranges. The ICUZ noise zones are defined as follows:

- 3       ▪ **Zone I.** This zone area is considered to have moderate to minimal noise exposure  
 4       and is acceptable for noise-sensitive land uses.
- 5       ▪ **Zone II.** This is an area considered to have significant noise exposure and is  
 6       normally unacceptable for noise-sensitive land uses.
- 7       ▪ **Zone III.** This is an area where the sound level is greater and is considered to be  
 8       an area of severe noise exposure and is unacceptable for noise-sensitive land uses  
 9       (Fort Hood 2007).

10       Though the Installation has not finalized its environmental noise management plan which  
 11       should designate these zones for the Installation (Alexander 2010), the Main Cantonment area of Fort  
 12       Hood exhibits uses typical of an urban and suburban environment (Zone I). Noise-sensitive land uses  
 13       such as housing, schools, and medical facilities are compatible with the noise environment in Zone I.

14  
 15

<b>Table 3-6</b>		
<b>Noise Levels of Common Sources and Human Responses</b>		
<b>Noise Source</b>	<b>dBA Noise Level</b>	<b>Response</b>
Carrier Jet Operation	140	Harmfully Loud
	130	Pain Threshold
Jet Takeoff (200 feet from the source) Discotheque	120	
Un-muffled Motorcycle Auto Horn (3 feet from the source) Rock n' Roll Band Riveting Machine	110	Maximum Vocal Effort  Physical Discomfort
Loud Power Mower Jet Takeoff (2,000 feet from the source) Garbage Truck	100	Very Annoying Hearing Damage (Steady 8-Hour Exposure)
Heavy Truck (50 feet from the source) Pneumatic Drill (50 feet from the source)	90	
Alarm Clock Freight Train (50 feet from the source) Vacuum Cleaner (10 feet from the source)	80	Annoying
Freeway traffic (50 feet from the source)	70	Telephone Use Difficult
Dishwashers Air Conditioning Unit (20 feet from the source)	60	Intrusive
Light Auto Traffic (100 feet from the source)	50	Quiet
Living Room/Bedroom	40	
Library Soft Whisper (15 feet from the source)	30	Very Quiet
Broadcasting Studio	20	
	10	Just Audible
	0	Threshold of Hearing

Source: Branch and Beland 1970.

16

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1           The three main types of noise sources that affect the environment are mobile sources,  
2 stationary sources, and construction sources (City of New York 2001). Mobile sources are those noise  
3 sources that move in relation to a noise receptor, principally automobiles, buses, trucks, aircraft, and  
4 trains (City of New York 2001). The level of traffic noise can vary depending on the volume of the  
5 traffic, the speed of the traffic, and the number of trucks and buses in the flow of traffic. Stationary  
6 sources of noise do not move in relation to a noise receptor. Stationary noise sources of concern  
7 usually include machinery or mechanical equipment associated with industrial and manufacturing  
8 operations and/or building heating, ventilating, and air-conditioning systems (City of New York  
9 2001). Construction noise sources comprise both mobile (e.g., trucks, bulldozers, etc.) and stationary  
10 (e.g., compressors, pile drivers, power tools, etc.) sources. Construction activities are considered  
11 temporary regardless of construction duration (City of New York 2001).

12           Some land uses are generally regarded as being more sensitive to noise than others due to the  
13 types of population groups or activities involved. Sensitive indoor noise receptors include, but are not  
14 limited to, residences, hotels, motels, health care facilities, nursing homes, schools, houses of  
15 worship, court houses, public meeting facilities, museums, libraries, and theaters (City of New York  
16 2001). Outdoor sensitive noise receptors include, but are not limited to, parks, outdoor theaters, golf  
17 courses, zoos, campgrounds, and beaches (City of New York 2001).

18           Sensitive noise receptors in the immediate vicinity of the proposed site are predominantly  
19 considered work spaces, mostly existing commercial and retail establishments. Work spaces include  
20 the Recreational Equipment Center (Building No. 4930), the thrift shop (Building No. 50003), and the  
21 Clear Creek Commissary (Building No. 50001). The only residences in proximity to the preferred site  
22 are within the Comanche Village II family housing area, which is more than 1,400 feet from the  
23 center of the site. The closest school is Smith Middle School (Building No. 51000) which is more  
24 than 2,550 feet from the center of the Preferred Alternative site.

### **25 3.10.2 Environmental Consequences**

#### **26 Alternative 4: Preferred Alternative**

27           Implementation of the Proposed Action at the Preferred Alternative site would not  
28 permanently alter the noise environment in and around the proposed project. The Preferred  
29 Alternative would result in temporary periods of noise due to the operation of vehicles and equipment  
30 involved in site clearing and grading, and facility construction.

31           The closest noise-sensitive area, Comanche Village II family housing, is located more than  
32 1,400 feet away from the Preferred Alternative site in an already developed and heavily traveled area

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1 of the Installation. Smith Middle School is located more than 2,550 feet from the Preferred  
2 Alternative site. Construction would take place only during the daytime and resulting noise levels  
3 would vary depending on the stage of construction. In order to lessen any potential impacts to the  
4 housing area, the contractor would route truck traffic away from sensitive noise areas, erect portable  
5 noise barriers, ensure mufflers and intake silencers are in good working condition, modify back-up  
6 alarms, or implement other mitigation measures as necessary.

7         Upon completion of the project, the noise environment resulting from operation of the  
8 Proposed Action would return to existing levels. Traffic noise would be the greatest source of noise  
9 during operation. Traffic from the existing PX would be shifted to the proposed shopping center,  
10 resulting in essentially the same noise environment as existing conditions with perhaps slightly more  
11 truck and customer traffic than existing conditions. Therefore, no long-term or significant negative  
12 impacts to the noise environment would occur from implementing the Preferred Alternative.

#### **13 No Action Alternative**

14         Under the No-Action Alternative, existing noise levels would remain the same, and no  
15 changes to the noise environment for sensitive noise receptors located adjacent to the proposed site  
16 would occur.

## **17 3.11 Hazardous Materials and Waste**

### **18 3.11.1 Affected Environment**

19         Hazardous waste, hazardous materials, and toxic substances are substances that, because of  
20 their quantity, concentration, or physical, chemical, or toxic characteristics, may present danger to  
21 public health or welfare or to the environment when released. Regulation governing these materials  
22 includes the Emergency Planning and Community Right to Know Act (EPCRA), Comprehensive  
23 Environmental Response, Compensation, and Liability Act, the Resource Conservation and Recovery  
24 Act, and the Toxic Substances Control Act. The Occupational Safety and Health Administration  
25 regulates the safe use of hazardous materials in the workplace (29 CFR).

26         Hazardous materials are managed in accordance with AR 200-1 “Environmental Protection  
27 and Enhancement” (December 2007), Section 4, in order to minimize hazards to public health and  
28 damage to the environment. Hazardous materials are also managed to reduce the generation of  
29 hazardous waste. Fort Hood has implemented a hazardous material management program (HMMP)  
30 that manages all hazardous materials on the Installation in compliance with AR 200-1. The HMMP  
31 prescribes responsibilities, policies, and procedures for managing hazardous materials and wastes on

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1 the Installation. The plan also ensures compliance with applicable federal, state, and local laws and  
2 regulations. A hazardous material tracking database, Hood Hazardous Substance Management  
3 System, is also used on the Installation to track all hazardous materials at the Installation's Supply  
4 Support Activities. These plans and systems allow Fort Hood to comply with the USEPA's reporting  
5 requirements under the EPCRA and EO 12856, which mandates DoD compliance with EPCRA (Fort  
6 Hood 2009d).

7 Fort Hood operates under a spill prevention, control, and countermeasures (SPCC) plan that  
8 details the specific storage locations, the amount of material in possible spill sites at Fort Hood, and  
9 countermeasures that should be taken if a spill occurs. The SPCC plan delineates measures and  
10 practices that require implementation to prevent and/or minimize spill/release from storage and  
11 handling of hazardous materials to protect ground and water resources (Fort Hood 2009a).

12 Contractors are required to provide Material Safety Data Sheets (MSDSs) and product labels  
13 for all hazardous and toxic materials brought onto the Installation. Contractors also must comply with  
14 the Fort Hood HMMP and must obtain approval for all hazardous materials brought onto the  
15 Installation (Fort Hood 2009a). A Hazardous Material Authorization Request form and MSDS  
16 conforming to Federal Standard 313d must be submitted to the DPW-Environmental office.  
17 Additionally, the contractor must store and dispose of these products as mandated in Fort Hood  
18 Regulation 200-1. UFC 1-900-01 "Selection of Methods for the Reduction, Reuse, and Recycling of  
19 Demolition Waste" provides guidance for the recovery and recycling of building demolition waste.  
20 Material containing polychlorinated biphenyls, asbestos, and lead may not be introduced on military  
21 installations.

### **3.11.2 Environmental Consequences**

#### **Alternative 4: Preferred Alternative**

24 **Construction.** Construction of the Proposed Action at the preferred site would necessitate the  
25 use of heavy machinery that requires maintenance and fuel. Although maintenance would most likely  
26 be performed off-site and within an authorized service shop, the use of construction machinery could  
27 potentially introduce small quantities of solvents, cleaning agents, greases, oils, hydraulic fluids, and  
28 fuel (e.g., gasoline and diesel). Paints and adhesives also would be used on the site during project  
29 construction. Hazardous materials and wastes would be stored and disposed of in accordance with all  
30 local, state, and federal laws and regulations, and Fort Hood's HMMP. Therefore, impacts from  
31 hazardous materials and wastes during construction would be minor.

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1           **Operation.** No large quantities of hazardous materials are anticipated to be used during the  
2 operation phase of the Proposed Action; most hazardous materials used would be of small quantity  
3 and considered household hazardous materials (e.g., cleaning solutions, paints). Therefore, impacts  
4 from hazardous materials and waste from operation would be minor since storage and disposal of all  
5 hazardous materials and wastes would be in compliance with current laws and regulations.

#### **No Action Alternative**

7           Implementation of the No Action Alternative would not require the construction of a new  
8 facility and would result in the continued use of the existing facilities. No additional hazardous  
9 materials would be stored and no hazardous wastes would be generated. Therefore, no change to  
10 existing conditions would be anticipated under the No Action Alternative.

### **3.12 Protection of Children**

12           EO 13045 “Protection of Children from Environmental Health Risks and Safety Risks”  
13 directs federal agencies to identify and assess environmental health and safety risks that may  
14 disproportionately affect children and ensure that policies, programs, activities, and standards address  
15 disproportionate risks to children that result from environmental health and safety risks. Children are  
16 more vulnerable to environmental and health safety risks since their body systems are still  
17 developing. Safety measures would be implemented during construction in order to prevent or  
18 mitigate any negative impacts to the safety of children. These safety measures would include: adult  
19 supervision, the requirement that construction vehicles and equipment be secured when not in use,  
20 and the placement of barriers such as fencing as well as “No Trespassing” signs around the  
21 construction site in order to limit access and deter children from playing in this area. In addition,  
22 safety measures stated at 29 CFR Part 1926 “Safety and Health Regulations for Construction” and AR  
23 385-10 “Army Safety Program” will be followed during construction to protect the health and safety  
24 of all residents on Fort Hood, as well as construction workers.

25           The Preferred Alternative site is located approximately 0.26 mile (3,173 feet) southeast of the  
26 nearest edge of the Comanche Village II family housing area. Clark Elementary School is located  
27 within the Comanche Village II housing area, approximately 0.71 mile (3,749 feet) northwest of the  
28 Preferred Alternative site location. Smith Middle School is the closest school, located about 0.49 mile  
29 (2,587 feet) west of the Preferred Alternative site on Tank Destroyer Boulevard.

30           Given the distances between the Preferred Alternative site and the nearest family housing  
31 area and schools, coupled with the safety mitigation measures described previously, it is not

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1 anticipated that children would experience any disproportionately significant adverse environmental  
2 health or safety impacts from construction or operation of the Proposed Action; therefore,  
3 implementation of the Proposed Action at the Preferred Alternative site would not result in any  
4 disproportionate risks to children from environmental health risks or safety risks.

5 **3.13 Environmental Justice**

6 In accordance with EO 12898 “Federal Actions to Address Environmental Justice in Minority  
7 Populations and Low-Income Populations” federal agencies must ensure that their actions do not  
8 disproportionately impose adverse effects on minority or low-income populations. Environmental  
9 justice analyses are performed to identify disproportionately high and adverse health or  
10 environmental impacts from proposed federal actions on minority or low-income populations and to  
11 identify alternatives that could mitigate these impacts.

12 As demonstrated in Table 3-7, Bell and Coryell Counties have a lower percentage of White,  
13 Hispanic or Latino, and Asian residents and a higher percentage of Black or African American  
14 residents as well as American Indian or other Pacific Islanders than the State of Texas.

**Table 3-7  
Ethnic Profile**

	<b>Bell County, Texas</b>	<b>Coryell County, Texas</b>	<b>State of Texas</b>	<b>United States</b>
White	69.7%	72.9%	82.1%	79.6%
Black or African American	22.1%	19.9%	12.0%	12.9%
American Indian and Alaska Native	1.1%	1.3%	0.8%	1.0%
Asian	2.8%	1.8%	3.6%	4.6%
Native Hawaiian or other Pacific Islander	0.6%	0.6%	0.1%	0.2%
Hispanic or Latino origin	20.2%	14.2%	36.9%	15.8%

Source: U.S. Census Bureau: State and County QuickFacts 2009

15 While there are small isolated areas of low-income and minority populations within areas  
16 adjacent to Fort Hood (Fort Hood 2009d), only authorized users can pass through the gate and access  
17 the proposed facility. The construction and operation of the proposed shopping center would likely  
18 create some additional job opportunities resulting in a positive impact on minority and low-income  
19 populations in the area; therefore, implementation of the Proposed Action at the Preferred Alternative  
20 site would not disproportionately affect minority or low-income communities nor cause the  
21 displacement of any residents, eliminate jobs, or negatively impact wages.

1 **3.14 Cumulative Impacts**

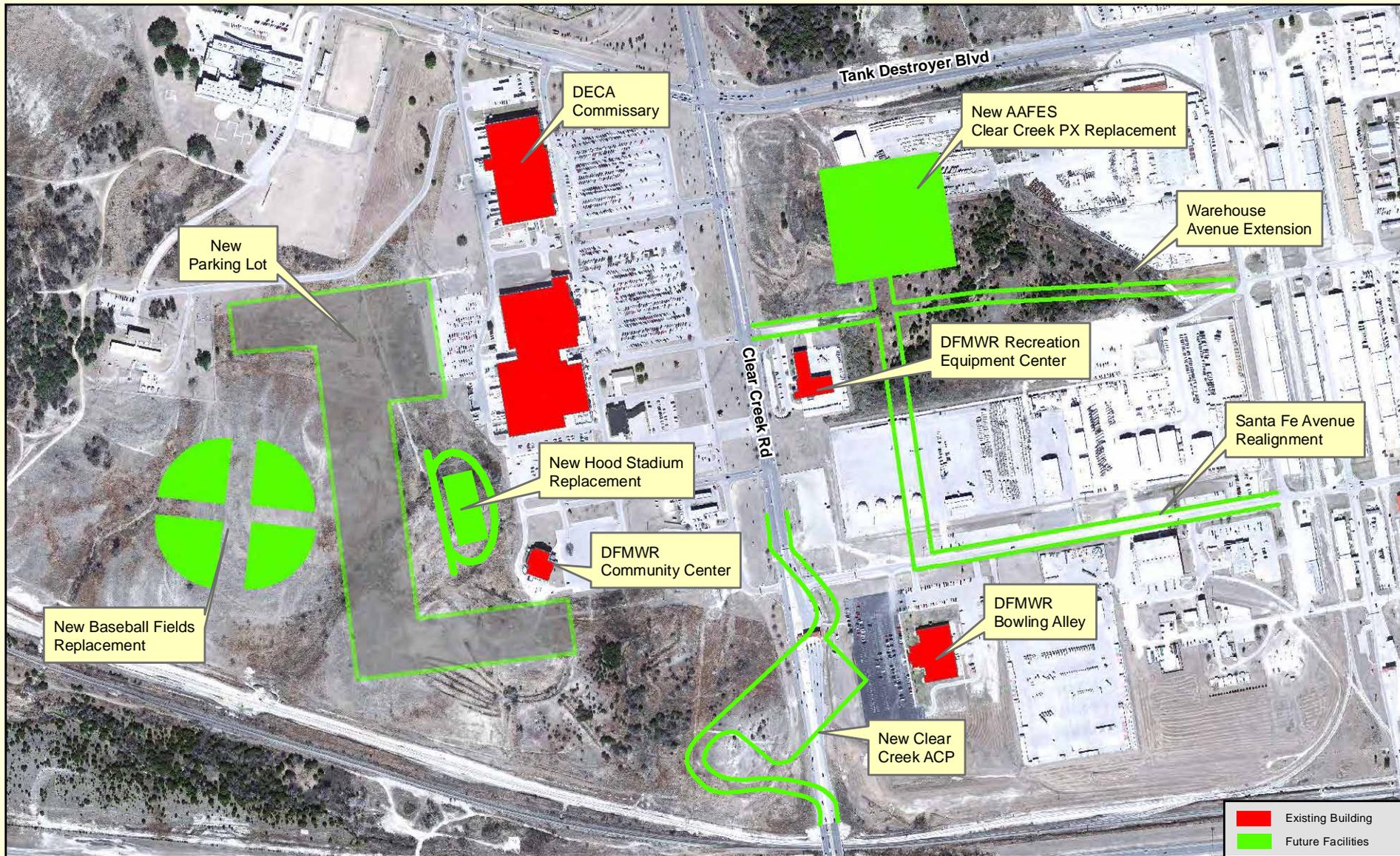
2 A cumulative impact as defined in 40 CFR 1508.7 is the effect on the environment that could  
3 result from the incremental impact of a Proposed Action when added to other past, present, or  
4 reasonably foreseeable future actions. Cumulative impacts may result from individually minor but  
5 collectively significant actions that can take place over time. The boundary for this cumulative  
6 impacts analysis includes the Clear Creek Development Plan area (Figure 3-3). Resource areas that  
7 were evaluated include temporary construction impacts such as an increase in air emissions, soil  
8 erosion and sedimentation, and noise. Permanent impacts considered include changes to land use  
9 designation and clearing of vegetation. The following is a list of major projects that are either recently  
10 completed, undergoing construction, or are planned for the near future in the vicinity of Fort Hood.

11 **Access Control Point Improvements to Clear Creek Gate**

12 Access control point (ACP) improvements to the Clear Creek Gate, almost immediately south  
13 of the Preferred Alternative site location, are reasonably foreseeable, though they have not been  
14 programmed or funded. Improvements would include replacing the existing ACP with a new one that  
15 would contain five lanes in and two lanes out. This change would require the relocation of utilities  
16 currently under the footprint of the ACP. Additionally, this project would demolish the existing Santa  
17 Fe/Clear Creek intersection and realign Santa Fe Avenue from the bowling center north to the  
18 Warehouse Avenue extension (Alexander 2010). The realignment of Santa Fe Avenue would require  
19 the construction of approximately 1,250 feet of new roadway that would be approximately 30 feet  
20 wide (Erwin 2010). Though this project would be located within the area considered for this  
21 cumulative impacts analysis, construction timeframes likely would not coincide. However, this  
22 project would result in the conversion of some measure of open land to a developed state, resulting in  
23 the potential for cumulative impacts to land use. Additionally, this project would serve to alleviate  
24 traffic and make it easier to gain access to the Installation, resulting in positive impacts to traffic.

25 **Relocation of Hood Stadium and Ball Fields**

26 Under the July 2009 *Environmental Assessment for the Replacement of the Medical Center at*  
27 *Fort Hood, Texas* (Fort Hood 2009a), the environmental impacts of relocating the Hood Stadium and  
28 Ball Fields were analyzed and the preferred site for the relocation of these facilities was determined to  
29 be the site immediately west and south of the existing PX. This project is necessitated by the  
30 replacement of Carl R. Darnall Army Medical Center. This project is anticipated to begin  
31 construction by 2012 (Alexander 2010). Increased sedimentation and land disturbance is expected



Scale

0 400 800 Feet



NORTH

**Figure 3-3**  
**Clear Creek Area Development Plan**  
**Proposed AAFES Shopping Center**  
**Fort Hood, Texas**

Source:

Map prepared by



September 2009

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1 with this expansion, which will be mitigated through the implementation of BMPs (Fort Hood  
2 2008b). This action has a signed FNSI.

### **3 Clear Creek Child Development Center**

4 Under the December 2008 *Environmental Assessment for the Construction of Two Child*  
5 *Development Centers on Fort Hood, Texas* (Fort Hood 2008b) the environmental impacts were  
6 analyzed for the construction of a new child development center on the east side of the intersection of  
7 Dakota Drive and Clear Creek Road, north of Tank Destroyer Boulevard. Potential impacts from this  
8 project may include erosion and vegetation removal, and impacts to surface waters which will be  
9 mitigated through BMPs and design considerations (Fort Hood 2008b). As of September 2010, site  
10 work has begun and completion is anticipated in 2011 (Alexander 2010). This action has a signed  
11 FNSI.

### **12 Continued Operation of Existing Clear Creek PX**

13 After completion of the proposed shopping center, the existing Clear Creek PX building  
14 (Building 50004) would be given to the Installation for re-use, capacity unknown. This building may  
15 be renovated and/or may become an MWR facility, though its future use has not been decided  
16 (Alexander 2010). If deemed appropriate, the renovation and re-use of this facility would be analyzed  
17 under separate NEPA documentation.

### **18 Demolition of Existing DRMO Tire Barn**

19 The existing DRMO Tire Barn facility (Building No. 4287) located in the northeast corner of  
20 the Preferred Alternative parcel is being demolished. The Installation will be responsible for  
21 relocating the existing tire storage facility items, ‘rubblizing’ the asphalt parking lot, removing the  
22 existing metal canopy, and removing the existing overhead electric lines. As part of the removal of  
23 the Tire Barn, the driveway crossing the creek would be removed (Omniplan 2009).

24 The DRMO Tire Barn is a TCEQ-registered facility authorized to stage used tires for disposal  
25 and recycling at Fort Hood. The demolition of the onsite structures would require the use of heavy  
26 machinery, would temporarily increase traffic in the vicinity, and would create C&D debris for  
27 disposal at the Fort Hood landfill and/or the Inert Material Management Unit. Removal of the existing  
28 driveway may result in a short-term increase in sedimentation, which would be mitigated through  
29 BMPs as deemed necessary.

**1 Widening of State Highway 195 from Fort Hood to Georgetown, Texas**

2 The Texas Department of Transportation (TxDOT) has embarked on an initiative to widen  
3 State Highway 195 from Fort Hood south to Georgetown in Williamson County. This expansion  
4 would provide an uninterrupted, four-lane, interstate-quality highway from Fort Hood to Interstate 35  
5 and on to the state’s Gulf Coast ports (Fort Hood 2009b). The three segments of this project total  
6 approximately 12.5 miles in length, have received environmental, utility, and right-of-way clearance,  
7 and should complete the bidding process by early 2011 (TxDOT 2010). While this project is  
8 important in the regional context, it is not located within the area considered by this cumulative  
9 impacts analysis. Portions of the construction of this project may coincide with construction of the  
10 Proposed Action, and may result in a cumulative impact to air emissions. Environmental impacts of  
11 this proposed project would be analyzed by TxDOT under separate NEPA documentation.

**12 Highway 190 Expansion from Copperas Cove to TJ Mills Blvd**

13 The recently completed expansion of US 190 from Copperas Cove to Fort Hood’s Main Gate  
14 at T.J. Mills Boulevard is another in a series of TxDOT projects in the area aimed at reducing  
15 congestion. The project began in October 2005 to reduce congestion and accidents along this heavily  
16 traveled highway. The expansion of this portion of the highway is only one part of a wider plan to  
17 eventually add lanes to US 190 all the way to the Interstate 35 interchange. This approximately  
18 6.4-mile portion of the project is expanding the highway from four to six lanes (O’Brien 2009). While  
19 regionally important, this project is not located within the boundary established for this cumulative  
20 impact analysis.

**21 State Highway 9 Northeast Bypass**

22 The TxDOT is planning to construct a new bypass road connecting US 190 to FM 116 in  
23 Copperas Cove approximately 4 miles west of the Clear Creek Gate. This new bypass would be  
24 approximately 3.2 miles in length, would cost a total of about \$38.5 million, and is estimated to be let  
25 out for bid in December 2010 (TxDOT 2010). While regionally important, this project is not located  
26 within the boundary considered by this cumulative impact analysis, and environmental impacts of this  
27 proposed project would be analyzed by TxDOT under separate NEPA documentation.

**28 Kouma Village Expansion**

29 Fort Hood and Fort Hood Family Housing (FHFH) would construct approximately 100 units  
30 of family housing on a 67-acre parcel of undeveloped/vacant land within a phased construction.  
31 Future development might include approximately 20 additional units as a second phase for this  
32 specific location. The 67-acre parcel is located east of Kouma Village on the south side of US 190

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### **Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

1 and east of the existing PX. FHFH would construct, operate, and maintain approximately 100 new  
2 family housing and ancillary supporting facilities on the parcel. An EA is currently being prepared for  
3 this Proposed Action. Construction could potentially be expected within the next five years  
4 (Alexander 2010). This project is not located within the boundary established for this cumulative  
5 impact analysis, and impacts will be analyzed under separate NEPA documentation.

#### **6 Summary**

7 Although various construction activities are planned, the use of BMPs and adherence to Fort  
8 Hood's established programs aimed at natural resource protection such as the Integrated Natural  
9 Resources Management Plan, Integrated Cultural Resources Management Plan, Installation Design  
10 Guide, and Sustainable Range Program would ensure that cumulative effects on any resource area  
11 would be less than significant. Therefore, the projects listed above, in conjunction with the Proposed  
12 Action, are not anticipated to have a significant, adverse effect on the environment.

### **13 3.15 Unavoidable Adverse Environmental Impacts**

14 Some unavoidable adverse impacts would result from the implementation of the Proposed  
15 Action. Short-term impacts associated with construction would include an increase in noise levels,  
16 fugitive dust emissions, as well as increased stormwater runoff from the construction site. However,  
17 these effects would be short-term and localized.

18 Unavoidable, long-term negative environmental effects would include the permanent  
19 conversion of approximately 25 acres of land to developed property resulting in habitat loss for  
20 species that would otherwise inhabit that land. Additionally, the development of the shopping center  
21 would include a slight increased demand on the local infrastructure and utility systems, including  
22 water supply, sewage treatment, electrical services, solid waste, and natural gas. These effects would  
23 be insignificant and other projected beneficial impacts associated with the Proposed Action would  
24 offset any negative effects. Such beneficial impacts include providing a quality-of-life nucleus for the  
25 Installation, providing a consolidated facility with multiple services for customer support and  
26 convenience, potential for additional job creation, and increased energy efficiencies and reduced  
27 travel through the consolidation of facilities and services.

1 **3.16 Irreversible and Irretrievable Commitment of**  
2 **Resources**

3 Implementation of the Proposed Action would result in irreversible and irretrievable  
4 commitments of resources by AAFES and Fort Hood. Committed resources would include building  
5 materials and supplies and their cost, labor, planning and engineering costs, infrastructure capacity,  
6 funds used for construction, and federally owned property. Other committed resources would include  
7 water, natural gas, fossil fuels, and electricity used for the construction of the Proposed Action as well  
8 as for the continued operation and maintenance of the proposed facility.

9 **3.17 Conclusion**

10 The conclusion of this EA is that the Proposed Action would not result in significant  
11 environmental impacts. A FNSI is recommended for the Preferred Alternative and an Environmental  
12 Impact Statement is not required. This EA and supporting documentation have been prepared in  
13 accordance with NEPA, 42 USC 4321 et seq. and as implemented by EOs 11514 and 11991; AR  
14 200-2 “Environmental Analysis of Army Actions,” as promulgated by 32 CFR Part 651; and the  
15 CEQ, 40 CFR §§ 1500-1508.

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1 **4 Organizations and Individuals**  
2 **Contacted, Reviewers, and**  
3 **Preparers**

4 **4.1 Individuals Contacted and Reviewers**

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28 Additionally, the following individuals from the Army and Air Force Exchange Service were  
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### Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas

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13

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**Appendix A**  
**Finding of No Significant Impact**  
**(FNSI)**

**Environmental Assessment**

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

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**DRAFT FINDING OF NO SIGNIFICANT IMPACT  
FOR THE CONSTRUCTION AND OPERATION OF THE NEW CLEAR CREEK  
SHOPPING CENTER AT FORT HOOD, TEXAS**

**1 Name of the Action**

This document is the Finding of No Significant Impact (FNSI) for the Environmental Assessment for the Construction and Operation of the New Clear Creek Shopping Center at Fort Hood, Texas.

**2 Description of the Proposed Action and Alternatives**

The Army and Air Force Exchange Service proposes to construct and operate a new Shopping Center at Fort Hood, Texas. Completion of the Proposed Action would better serve the needs of the military community and relieve overcrowding experienced at the current outdated facility; expand the number of shopping, dining, and service opportunities for authorized patrons; increase customer convenience by collocating existing services; and meet future demand based on expected troop growth. The need for the action is to provide an updated, expanded and consolidated facility where authorized customers can obtain multiple services at a single location. Six alternative locations for the Proposed Action were considered and are presented in the Environmental Assessment, including the renovation and expansion of the existing PX. Under the No Action Alternative, the replacement would not occur and the existing PX would continue to operate under the existing crowded, undersized, and outdated conditions. The lack of adequate retail facilities would compound as expected troop growth increases demand and need for retail facilities, thus negatively impacting authorized patrons.

**3 Summary of Environmental Effects of the Proposed Action**

As a result of implementing the Proposed Action at the preferred alternative site, no adverse impacts are anticipated to occur to cultural resources and protection of children, while positive impacts are anticipated to occur to socioeconomics, transportation, and environmental justice. The Proposed Action at the preferred alternative site is anticipated to have minor adverse impacts to land use, infrastructure and utilities, water and biological resources, and hazardous materials and waste. Minor, short-term negative impacts associated with construction would be anticipated to air quality, noise, and topography, geology, and soils. Avoidance, minimization, mitigation measures, and best management practices (BMPs) would be implemented to ensure the impacts either do not occur or are not significant.

**4 Conclusion**

The public comment period will be held for 30 days beginning the date that the notice of availability is printed in the *Killeen Daily Herald*. This EA and draft Finding of No Significant Impact (FNSI) are available for review at the Killeen Public Library located at 205 E. Church St., Killeen, TX 78544 and through the Environmental Division, Directorate of Public Works, Fort Hood, TX. The documents are also available online through the Fort Hood Directorate of Public Works website at <http://www.dpw.hood.army.mil/> (Public Notices).

On the basis of the findings of this EA, no significant impacts are anticipated from the Proposed Action on human health or the natural environment. A FNSI is warranted, and an Environmental Impact Statement is not required.

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BRIAN L. DOSA  
Director of Public Works

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Date

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**Appendix B**

**Federal Emergency  
Management Agency (FEMA)  
Flood Insurance Rate Map**

**Environmental Assessment**

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

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**NOTES TO USERS**

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The **community map repository** should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the **Flood Profiles and Floodway Data** and/or **Summary of Stillwater Elevations** tables contained within the Flood Insurance Study (FIS) report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

**Coastal Base Flood Elevations** shown on this map apply only landward of 0.0' North American Vertical Datum of 1989 (NAVD 89). Users of this FIRM should be aware that coastal flood elevations are also provided in the Summary of Stillwater Elevations table in the Flood Insurance Study report for this jurisdiction. Elevations shown in the Summary of Stillwater Elevations table should be used for construction and floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the Flood Insurance Study report for this jurisdiction.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Texas State Plane central zone (FIPSZONE 4203). The **horizontal datum** was NAD83, GRS1980 spheroid. Differences in datum, spheroid, projection or State Plane zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of the FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same **vertical datum**. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov/> or contact the National Geodetic Survey at the following address:

NGS Information Services  
NOAA, NNGS12  
National Geodetic Survey  
SSMC-3, #9202  
1315 East-West Highway  
Silver Spring, MD 20910-3282

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov/>.

**Base map** information shown on this FIRM was provided in digital format by Texas Natural Resource Information System (TNRIS). This information was photogrammetrically compiled at a scale of at least 1:24,000 from aerial photography dated 2004.

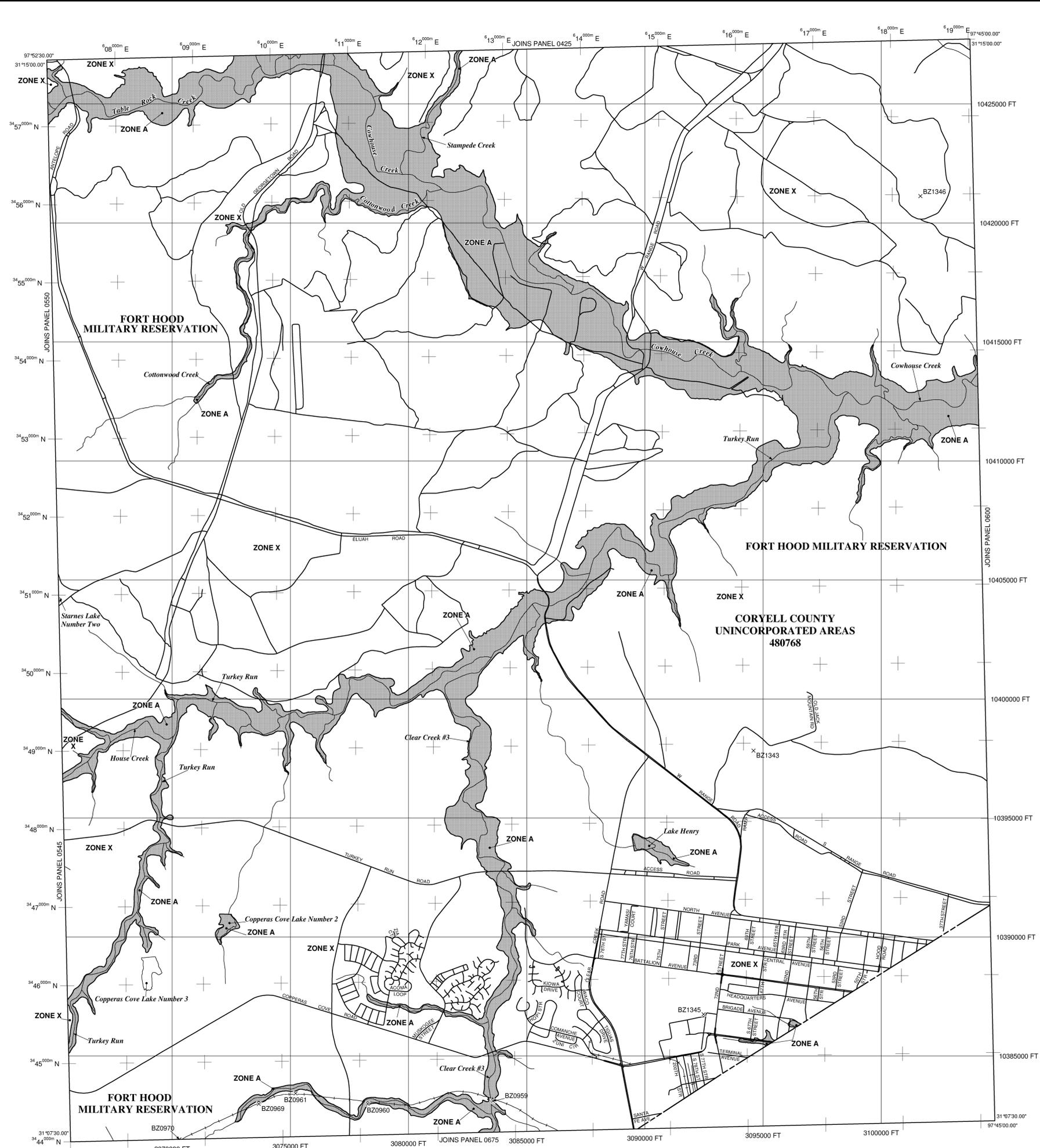
This map reflects more detailed and up-to-date **stream channel configurations** than those shown on the previous FIRM for this jurisdiction. The floodplains and floodways that were transferred from the previous FIRM may have been adjusted to conform to these new stream channel configurations. As a result, the Flood Profiles and Floodway Data tables in the Flood Insurance Study report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on this map.

**Corporate limits** shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

Contact the **FEMA Map Service Center** at 1-800-358-9616 for information on available products associated with this FIRM. Available products may include previously issued Letters of Map Change, a *Flood Insurance Study report*, and/or digital versions of this map. The FEMA Map Service Center may also be reached by Fax at 1-800-358-9620 and its website at <http://www.msc.fema.gov/>.

If you have **questions about this map** or questions concerning the National Flood Insurance Program in general, please call 1-877-FEMA MAP(1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/>.



**LEGEND**

**SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD**

The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equaled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of siluvial flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Area formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

**FLOODWAY AREAS IN ZONE AE**

The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

**OTHER FLOOD AREAS**

**ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.

**OTHER AREAS**

**ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.  
**ZONE D** Areas in which flood hazards are undetermined, but possible.

**COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS**

**OTHERWISE PROTECTED AREAS (OPAs)**

CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- Floodplain boundary
- Floodway boundary
- Zone boundary
- Zone D boundary
- CBRS and OPA boundary
- Boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths or flood velocities

513 Base Flood Elevation line and value; elevation in feet\*  
(EL 987) Base Flood Elevation value where uniform within zone; elevation in feet\*

\* Referenced to the North American Vertical Datum of 1988 (NAVD 88)

(A) Cross section line

(23) Transsect line

97°07'30" 32°22'30" Geographic coordinates referenced to the North American Datum of 1983 (NAD 83)

42°5'00"N 1000-meter Universal Transverse Mercator grid ticks, zone 14

6000000 FT 5000-foot grid values; Texas State Plane coordinate system, central zone (FIPSZONE 4203), Lambert Conformal Conic

DX5510 Bench mark (see explanation in Notes to Users section of this FIRM panel)

M1.5 River Mile

MAP REPOSITORIES Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP February 17, 2010

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.

To determine if flood insurance is available in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 2000'

1000 0 2000 4000 FEET

600 0 600 1200 METERS

**NATIONAL FLOOD INSURANCE PROGRAM**

**PANEL 0575F**

**FIRM FLOOD INSURANCE RATE MAP CORYELL COUNTY, TEXAS AND INCORPORATED AREAS**

**PANEL 575 OF 675**  
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

**CONTAINS:**

COMMUNITY	NUMBER	PANEL	SUFFIX
CORYELL COUNTY	480768	0575	F

Notice to User: The Map Number shown below should be used when placing map orders; the Community Number shown above should be used on insurance applications for the subject community.

**MAP NUMBER 48099C0575F**

**EFFECTIVE DATE FEBRUARY 17, 2010**

Federal Emergency Management Agency

**Appendix C**  
**Engineer's Statement**  
**Regarding Drainage Analyses**

**Environmental Assessment**

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

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## CIVIL DESIGN CRITERIA AND ANALYSIS

### PROJECT OVERVIEW & APPLICABLE STANDARDS:

All civil engineering design work performed for roads, storm drainage systems, water mains, and sewer mains must generally conform to one or all of the following documents:

- Fort Hood DPW and TxDOT standards for paving design with specific input and recommendations from the geotechnical engineering firm for the project design.
- Fort Hood DPW, ARMY TM 5-8204, and City of Killeen standards for drainage design.
- Fort Hood DPW, Fort Hood Installation Design Guidelines, Unified Facilities Criteria, American Water Military Services Group (American Water) and the Texas Commission on Environmental Quality for wastewater collection systems and water system expansion and modifications.

This work will include their respective standard detail drawings that are included in the latest version thereof. Final construction documents shall reference and include all appropriate provisions of these standard specifications and drawings.

Reviews of drawings, specifications and document will be done by AAFES, Fort Hood Directorate of Public Works (DPW), and other privatized utility providers. Design of privatized utility services (water and wastewater) will be reviewed by American Water.

Any communications required by the Fort Hood Directorate of Information Management will need to be communicated to the team as to their needs so that communication ducts can be provided to buildings as required.

#### A. Erosion Control

All proposed site construction will be performed in accordance with the minimum standards of the Fort Hood DPW and TCEQ erosion and sediment control regulations as applicable. The construction will be performed in a manner that will minimize disturbance to area vegetation and soils to the amount necessary to accommodate the improvements as proposed. Each separate area of development will require a written site-specific erosion and sediment control plan, which will detail the design aspects, locations, and features of the measures to be implemented during the site construction program. Specific control facilities that may be incorporated into the program may include the following:

Required elements:

- **Silt Fencing** located around the low sides of the construction site perimeters as a general rule that may also be located at specified upstream locations to reduce runoff velocities and corresponding erosion and scour in the construction areas
- **Stabilized Construction Entrances** incorporating gravel driveways with staging and wash down facilities as necessary to prevent the tracking of soils and debris off the construction site areas
- **Inlet Protection** on all existing and proposed inlets within the construction area to prevent sediment from entering the stormsewer system.

Optional elements:

- **Rock Berms** oriented along drainage swales and other surface features that have the potential to carry sediments off of the property during periods of accumulated runoff discharge
- **Drainage Channel and Slope Protection** facilities to minimize sluffing and scour of soils on inclined areas. Specific measures may include geotextiles and anchored grass sods.

Erosion control facilities will be sized to accommodate storm water flow concentrations approximately associated with the 2-year-event storm. Such facilities will be adapted for use at

each specific site.

## **B. Proposed Streets and Site Paving**

CAD layouts for the proposed expansion area have been created in AutoCAD format that we will build our civil infrastructure layouts upon. The concepts prepared by the architect and landscape architect will be respected to maintain the form and relationship of proposed site elements.

Streets will be constructed with concrete curbs and gutters with approximately 2 to 4-inch thick asphalt on aggregate base on compacted subgrade. This will be further defined based on expected use and loading conditions of the site paved areas. Some areas may need to be a rigid concrete pavement due to truck loading (at trash dumpsters, loading docks, motorcycle parking, etc.).

Street and paving design will be generally performed in accordance with Fort Hood DPW, TxDOT, or the City of Killeen criteria for both materials of construction, but based on recommendations from the geotechnical engineering report. The program will begin with a geotechnical study to evaluate existing soil conditions and design requirements. The analyses to be performed with the study include particle size analysis (ASTM D 422), Atterberg limits (ASTM D 4318), California bearing ratio (ASTM D 1883), and moisture-density relations (ASTM D 1557). Results from the geotechnical study will be utilized in determining the design requirements of proposed pavements and corresponding subgrade. The data is also used to determine earthwork criteria for site grading, slope stability, and cost estimation.

Driveways and low-speed streets will have a minimum width of 24 feet, as measured from face of curb to face of curb. Some streets will have adjacent angle or parallel parking, but emergency vehicle access will be provided at all times. As noted, all streets and parking areas are proposed to incorporate a 4 to 6-inch-high curb section, unless site grading dictates otherwise.

Minimal improvements, if any, are proposed for the existing streets bordering the new areas of development. Pavement conditions for these peripheral roadways are generally good. Further, the new developments are not anticipated to add a traffic load in excess of existing thoroughfare capacities once the Tank Destroyer Boulevard driveway approach improvements are completed. A deceleration lane will be added to the south side of Tank Destroyer Boulevard. Approximately 9 feet of pavement will be added to the southerly edge of pavement to create an additional traffic lane between the two proposed driveway approaches.

Street and driveway pavements are proposed to consist of asphalt pavement and may vary from approximately 2 to 4-inches thick depending upon expected loading and use. Paving areas will also be bordered with concrete curb or curb and gutters. The asphalt pavement section will be built over a granular aggregate base. A minimum compressive strength of 3,000 psi will be used for the concrete material. Pavement subgrade will be graded and built in accordance with the recommendations of a geotechnical study that will be commissioned for the project. Concrete curb and gutters will be built on granular base.

In addition to the street and parking pavements, pedestrian sidewalks are also proposed along Clear Creek Road. Sidewalks along streets will typically be at least 4 feet in width, consisting of 4-inch-thick reinforced 3,000-psi concrete paving set over a compacted subgrade. Lead walks to the proposed building will vary in width depending upon the expected pedestrian traffic and the level of amenity and streetscape being provided as determined by the architect's concept plans.

## **C. Proposed Water Service**

There are existing water transmission mains to the north, on Tank Destroyer Boulevard, to the south, and to the west, on Clear Creek Road. However, the existing mains to the south and west

will be replaced due to proposed grading which will reduce cover over the pipes. A new water main will be constructed on the easterly side of the site and will tie in to the existing system on in Tank Destroyer Boulevard and the replaced main to the south to create a looped system. With the exception of replacing the existing water mains as described previously and the addition of several fire hydrants, no major upgrades to the existing system in the form of off-site pipe replacements are planned with the development of the AAFES expansion project. The proposed retail center development will include new piping and appurtenances, with direct connections to the existing peripheral piping network. Connections will be made using standard tapping sleeves and valves appropriate for tying to the existing pipe size and material. The tapping operation will allow the existing mains to remain in operation, with no interruptions to existing service on the post during the work.

The new potable water system will be designed in accordance with Fort Hood and American Water design criteria, as required by Fort Hood DPW, Fort Hood Installation Design Guidelines, Unified Facilities Criteria, American Water and the Texas Commission on Environmental Quality. Water pipe sizes will be based on the maximum anticipated peak hour demand flow rate, including the application of fire demands to the proposed retail building. The building will have three connections to the water distribution mains, one for potable water, and two for fire suppression.

In general, the minimum allowable pipe size shall be 6 inches in diameter while other areas may be built with 12-inch diameter water mains as dictated by potable water and fire service demands. The pipe network will incorporate a series of cutoff valves (gate valves) in order to efficiently isolate individual areas for maintenance requirements, while keeping service available to other areas. The system will be independently tied to the main post transmission mains and not impose any adverse impacts to the service of adjacent post facilities.

The proposed water mains will be either outside of pavement areas where possible and along or under street pavements where space is limited or inaccessible. The mains shall be spaced a minimum distance of 10 feet (measured horizontally) from sanitary sewer lines, where space allows. Pipe material will be C-900 PVC DR-14 Class 200 high-pressure water pipe. Ductile iron pipe may be substituted in areas where excessive surface loadings are anticipated, at crossings under other utilities, where point loadings may be applied. Fire hydrants will be placed in strategic locations throughout the development at intervals not exceeding 300 linear feet. Fire hydrants will need to be located within 150 feet of proposed fire department connections (FDC) for the building. All exterior portions of the building will be within 300 linear feet (hose length alignment) of a fire hydrant in accordance with the above noted design criteria.

The two service laterals described previously will be appropriately sized for potable use and fire service use, respectively. These lines will be extended to within 5-feet of the building perimeter at locations coordinated with the architect and the building MEP engineers.

#### **D. Proposed Sanitary Sewer Service**

Design of the sewage collection system relocation and modifications shall be performed in accordance with the criteria of Fort Hood DPW, Fort Hood Installation Design Guidelines, Unified Facilities Criteria, and the Texas Commission on Environmental Quality. The system shall be designed to provide for total containment thereby eliminating any potential for combining sanitary sewage with storm water runoff flow.

The new sanitary sewer network will be designed on the basis of an average design flow (ADF). Minimum peak design flow (PDF) for lateral and sub-main lines shall be four times the ADF. Minimum PDF for main, trunk, and interceptor sewer lines shall be two and one-half times the ADF.

Eight-inch-diameter pipe is the minimum size for trunk, interceptor main, and sub-main lines

except that 6-inch-diameter lines may be used for short sub-mains serving areas, -where no more than six residential equivalent service connections are to be supported. Minimum 4-inch diameter pipe with two-way cleanout boxes will be utilized for individual building connections. All piping will be composed of PVC SDR 35 or SDR 26, depending on the depth of cover and surface loadings anticipated.

New sanitary sewer lines will be incorporated as required. The sewer line network will typically be constructed under street or driveway paving. Sewer lines will typically be laid in straight horizontal and vertical alignments between manholes. A minimum separation of 10 feet (measured horizontally) will be maintained between sanitary sewer mains and parallel water or storm drainage piping where space allows. Manhole spacing will typically be set at a maximum spacing of 400 linear feet and otherwise at pipe intersections, changes in pipe size, and changes in horizontal and/or vertical alignments. Horizontal curves are allowed within the allowable ability of joint deflection in pipes.

The point of connection to the base collection system is proposed to be in the south westerly portion of the site. The sanitary sewage collection network will be designed to operate as a gravity-flow system to deliver the effluent to a future lift station provided by Fort Hood (not in the scope of this project). Connections with existing gravity mains will be made through tapping into an existing manhole structure or through the installation of a new manhole or wye connection. Manholes will be constructed of either reinforced pre-cast or cast-in-place concrete. Connection operations are not expected to interrupt service to other areas of the post. All lift stations will be retained by the Army including long-term operation and maintenance.

No separate metering of sewage flows from the building will be provided, unless indicated by the installation. Sewage flow will be calculated based upon water usage rates under a formula agreed to between AAFES and the U.S. Army.

Projected water demand and sewer loadings are shown in the following chart.

<b>Clear Creek Shopping Center Ft Hood, Texas</b>		<b><u>WATER DEMANDS AND SEWER LOADS</u></b>			
		<u>Sq. Ft.</u>	<u>Water Demands</u>		<u>Sewer Loads</u>
		<u>gpd</u>	<u>gpm</u>	<u>gpd</u>	<u>gpm</u>
R1 - Retail (10 gpd/100sf)	251,525	25,153	17.47	20,122	13.97
R5 - Food Court(150 gpd/100sf)	16,675	25,013	17.37	20,010	13.90
<b>Total Average Day Demands</b>		<b>50,165</b>	<b>34.84</b>	<b>40,132</b>	<b>27.87</b>
Peak Hour (1.5xADD)			70		56
Peak Day (2.0xPHD)			139		111

Note: Sewer based on 80% of Water Demands

### **E. Site Drainage**

The existing site currently drains generally from the west to east to a watercourse located to the east of the project site. The existing water course flows south to north, away from the City of Killeen, where it discharges to larger water courses.

An existing culvert conveys runoff from the west side of Clear Creek Road and discharges it on to the site. From that point, the runoff mingles with runoff generated on-site, and flows overland to

the watercourse east of the site. The proposed drainage system will directly intercept the water coming from under Clear Creek Road through means of a storm drain that will discharge into a proposed retention facility. This same stormsewer system will also convey on-site runoff from the northeast portion of the site to the proposed retention facility. A separate storm drain will convey water from the south and east portions of the site to the same retention facility. The retention facility will convey overflow from larger storm events directly to the watercourse to the east of the site.

Under existing conditions the watercourse to the east of the site crosses under Tank Destroyer Boulevard through two 9-foot by 6-foot box culverts (approximate dimensions). During certain storm events, the culvert's capacity is exceeded, and Tank Destroyer Boulevard acts as a dam and causes the culvert's tail water to inundate the watercourse and adjacent overbank areas. The proposed site encroaches into this existing area of inundation. Proposed grading will elevate the developed area above that inundation level while providing an equivalent storage volume such that there is no increase in water surface elevation or discharge rate through the existing culverts. See **Attachment A** for the existing and proposed inundation areas. Our drainage analysis demonstrates that the proposed grading mitigates any loss of storage volume in the inundation area by creating additional storage volume adjacent to the watercourse. The drainage study also shows that there are no adverse impacts from water levels caused by the proposed grading. See **Attachment B** for the preliminary drainage analysis results.

Proposed grading and earthwork adjacent to the watercourse will largely avoid any impact to the Waters of the United States, or associated wetland areas. There is a small amount of grading required to achieve proper drainage to the existing culverts that will be within the defined Waters of the US. That work will be covered by Fort Hood's existing USACE Nationwide Permit 39. This permit allows up to 300-feet of stream bed to be impacted, and up to one-half acre of disturbance to the wetlands. The proposed grading will impact only about 60 feet on the stream

#### **F. Low Impact Development**

The project will comply with the EPA Section 438 requirements for Low Impact Development to the greatest extent feasible. Section 438 requires new development projects exceeding 5,000 square feet to restore predevelopment hydrology with regard to volume, peak flow, duration, pollutant loading, and temperature. One method of meeting these criteria is to retain the 95<sup>th</sup> percentile rainfall event onsite through various methods utilizing infiltration, evaporation, or other onsite re-use of the stormwater. We have chosen this metric for the evaluation of this project.

Based on rainfall data obtained from the National Climatic Data Center (NCDC), the 95<sup>th</sup> percentile rainfall in the Killeen area between 1978 and 2003 was calculated to be 2.0 inches which is roughly equivalent to a 1-2 year storm event. See **Attachment C** for the NCDC data. Therefore the volume required to be retained for the 27-acre site is approximately 200,000 cu. ft. The proposed method for retaining this volume is through a retention / re-irrigation system or rainwater harvesting facility.

The proposed retention facility is designed as an open pond with an irrigation pump system and overflow structure for larger storm events. Since we are accepting offsite water into the basin (runoff from the west side of Clear Creek Road), we are proposing to discharge an equal volume of site-generated runoff from the storm drain on the southeasterly side of the site directly into the existing watercourse. A stepped weir structure will regulate flow leaving the system to balance with the volume of off-site water that we are accepting in the basin. Water retained in the basin will be used for landscape irrigation when possible. An emergency spillway will discharge excess runoff directly to the watercourse.

#### **G. Proposed Stormsewer Facilities**

Storm water collection, control, and discharge for the site will be accomplished through a series of drainage facilities, including surface sheet-flow drainage, drainage swales, street and area drain inlets, subsurface piping, and open channels. These facilities will be designed to protect the building from flooding and to maintain the required level of service for public facilities and emergency traffic. Fort Hood has indicated the use of UFC design criteria for drainage facilities. UFC criteria require that storm drainage facilities for be sized to accommodate the 25-year-event rainfall event without interruption to the above noted facilities. However, standard practice in central Texas is to design drainage facilities for the 2, 10, 25, and 100-year storm event. Runoff calculations for drainage areas less than 200 acres in size may be accomplished through use of the "rational method". The typical coefficient of runoff for commercial development of the types proposed for the posts ranges from 0.9, depending on the area of impervious cover established with the final construction.

Curb inlets will be positioned along the drive aisles and parking areas where the capacity limitations are reached in order to siphon off the excess flow volumes to the subsurface pipe network. Curb inlets and area drains will be constructed of reinforced pre-cast or cast-in-place concrete. Area drains placed in parking lots or other areas subject to traffic will incorporate a steel grate cover designed to accommodate H-20 traffic loads. Area drains in landscaped areas will include a raised top with side openings or a steel grate. Reinforced concrete pipe will be used for portions of the storm drain network located under paved streets. Exterior corrugated plastic HDPE or PVC storm drain piping, will be used in open landscaped areas where there is no potential for high traffic loads. Multi-pipe connection points will be made through the installation of reinforced concrete junction manholes with access openings for the provision of maintenance operations. Junction manholes will also be employed for the connection of the new pipe networks to existing subsurface storm drain systems.

Pipe discharge points to open channels or the retention facility will be provided with appropriate erosion control facilities to reduce water velocities and the potential for scour. Improvements include the provision of reinforced concrete headwalls and concrete and rock riprap. Geotextile liners may also be employed to stabilize channel banks and flow lines and to promote the establishment of vegetative covers. All channel grading and modifications will be performed in accordance with the erosion control requirements, as established in the site-specific erosion and sediment control plan.

## **DETAILED DESIGN CRITERIA FOR SITE WORK ELEMENTS**

### **Site Grading**

The following criteria will be considered in preparing grading plans for the AAFES expansion project:

- a) Grading transitions onto adjacent Army land may be allowed, but we should try to keep all grading within parcel boundaries. Retaining walls are not desirable, but may be required in certain limited applications.
- b) The desired minimum slope in landscape and turf areas is 1%. Where necessary, a minimum of 0.5% may be used.
- c) Maximum slope will be 3:1. Where space permits, a more gradual 4:1 to 10:1 slope is preferred for ease of long term maintenance.
- d) The grading plan should identify all grade breaks necessary to perform final grading. As a minimum, this will include finished pad or finish floor elevation and spot grades as necessary to provide positive drainage away from the buildings.

- e) Provide flow directional arrows on the grading plan to identify the intended sheet flow pattern.
- f) Care will need to be taken in placement of open swales near or around pedestrian paths so as not to create undesirable conditions or impede pedestrian movements.
- g) No part of the proposed site is located at or near streams with 100-year floodplain issues.
- h) Grading to ADA / UFAS entries and parking stalls need particular care in that all routes into those units from parking spaces and the front sidewalk will not be able to exceed 5.0%, and that at doorways and at loading/unloading areas the maximum slopes can not exceed 2%. Curb ramps will be provided as required and as appropriate.

**Storm Drainage:**

An overall drainage area map will be prepared for the development. This map must be reviewed prior to design. Any variance from the overall drainage plan must be coordinated through the project manager. The 25 and 100-year design storm will be used as the basis of design. Additional storm drainage criteria are as follows:

- a) Prepare a drainage area map showing all contributing drainage areas and identify drainage area and 25 and 100-year flows for each sub-area.

The rational method ( $Q=CiA$ ) will be used for determining storm runoff with collection and conveyance capacity based on the 100-year storm.

- b) Provide hydraulic grade lines and hydraulic calculations on storm drain profiles for the 25 and 100-year flows. The hydraulic grade line for the 25-year storm should be contained within the pipe where possible. The hydraulic grade line for the 100-year storm should be a minimum of 1' below top-of-curb at the inlet where possible. Calculations will include pipe size, design discharge, slope, and velocity.

- c) Minimum storm drain pipe size will be 12 inches. All storm drainage pipe will be RCP Class III minimum (other pipe materials, such as ribbed HDPE pipe with appropriate bedding, may be considered). Minimum cover is 2 feet as measured from the top of pipe to pavement sub grade. Increased pipe strength or special pipe bedding may be necessary where cover conditions will exceed 10 feet. Culverts may be either precast concrete or cast-in-place; use of TxDOT standards for culverts is suggested.

- d) The location of storm drain pipe will be beneath parking lots, drives, or streets where possible.

- e) Storm drain manholes will be located at a maximum of 500 feet apart. Maximum manhole spacing may be increased for pipe sizes greater than 36 inches. Manholes may be precast or cast-in-place, and shall be sized as follows:

<u>MH Diameter</u>	<u>Pipe Size</u>
4'	18"-30"
5'	36"-42"
6'	48"-60"
8'	66"-78"

- f) Match pipe soffit elevations at pipe size changes. Match pipe centerline elevations at wye connections.

- g) Avoid pipe bends in storm drain pipe alignments where possible. Curved pipe alignments are encouraged where deflections are necessary. Laterals will be constructed with 45° factory wye connections, where and if installed.
- h) Inlets will be designed to limit gutter flow depth to 6" and to capture the 100-year design flow. Bypass flow is allowed for on-grade inlets. Standard curb inlet widths are 3 feet to 10 feet. Standard inlet depth is 4 feet as measured from top-of-curb to inlet flow line.
- i) Inlets should be located a minimum of 10 feet from intersection curb returns. Where practical, inlets should be centered on lot lines to avoid driveway conflicts.
- j) All sag inlets will have positive overflow for ponding exceeding the top-of-curb. Positive overflow swales must be contained within a drainage overflow corridor.
- k) Prepare plan/profile sheets for storm trunk lines as needed. Identify the 100-year flow capture and bypass at all inlets on the plan view. Identify the 100-year flow at all points of discharge.
- l) Show and identify elevations of all utility, ductwork and other pipe crossings on storm drain plan and profiles.
- m) Provide coordinate points on the centerline alignments in plan view and a coordinate list containing point number, northing and easting on each plan/profile sheet. Refer to the attached coordinate point format for point number ranges.

#### **Sanitary Sewer:**

Design criteria for wastewater collection systems will meet the requirements of the Fort Hood DPW, Fort Hood Installation Design Guidelines, Unified Facilities Criteria, and the Texas Commission on Environmental Quality. Additional design criteria for sanitary sewer design are as follows:

- a) The minimum size sanitary sewer will be 8" with a minimum slope of 0.40%. Where this size or slope is not sufficient, it may be required to use a 10" pipe on 0.30% minimum grade or a 12" pipe on 0.22% minimum grade.
- b) Pipe material for sanitary sewer mains will be PVC-SDR 26 unless cover conditions dictate use of lighter pipe. Bedding will be a Class "B" or better consisting of compacted crushed stone to the pipe spring line and select or granular material compacted to 90% Standard Proctor to 1 foot above the pipe. Remaining trench backfill shall be compacted to 95% Standard Proctor in areas to be paved and 90% Standard Proctor in other areas.
- c) Minimum cover for sanitary sewer will be 5 feet. Verify adequate depth to provide a minimum 2% lateral grade to an elevation of 3.5 feet below pad elevation at the right-of-way line.
- d) Manholes will be located at all horizontal and vertical P.I.'s with spacing to not exceed 400 feet. Provide for a minimum of 0.1' of fall across the manhole. Standard manholes may be either precast or cast-in-place.
- e) Manholes located in areas subject to flooding or in floodplains shall be pressure-type consisting of a monolithic cast-in-place manhole with a sealed frame and cover.
- f) Terminal clean-outs may be used at the up-stream end of sanitary sewer lines within 300 feet of a manhole.
- g) No vertical curves are allowed.

- h) Minimum lateral size is 4" to buildings. Larger buildings will be provided with a 6" or 8" lateral as required. Laterals will be extended to a point 5 feet from the building perimeter. The typical lateral location will be 10' from the midpoint of the building frontage on the down-stream side of the water service, if the water service is in close proximity to the sewer lateral.
- i) Prepare plan/profile drawings for sanitary sewer mains as needed. Show and identify elevations of all utility, ductwork and other crossings in profile.

**Water Distribution Systems:**

Design criteria for water distribution systems will meet the requirements of the Fort Hood DPW, Fort Hood Installation Design Guidelines, Unified Facilities Criteria, American Water and the Texas Commission on Environmental Quality, and on this project is as follows:

- a) Water distribution mains will be 8" unless a larger size has been dictated by service area or for fire protection demands. A 6" water main may be used for dead-end lines of 500 feet or less and serving no fire hydrants.
- b) Pipe material for water mains 12" and smaller will be PVC C900 DR 14 Class 200.
- c) Minimum cover for 12" and smaller water mains will be 4 feet above top of pipe.
- d) Valves should be placed such that a section of line can be isolated without interrupting service to more than one fire hydrant. Valve spacing should not exceed 1,000 feet.
- e) The location of water distribution mains will be beneath pavement areas in street and drives where possible.
- f) Fire Hydrants will be located 3 feet behind the curb. Maximum hydrant spacing is 600 feet as measured along the street curb. Maximum hose lay length to any portion of the building is 300 feet.

**Paving:**

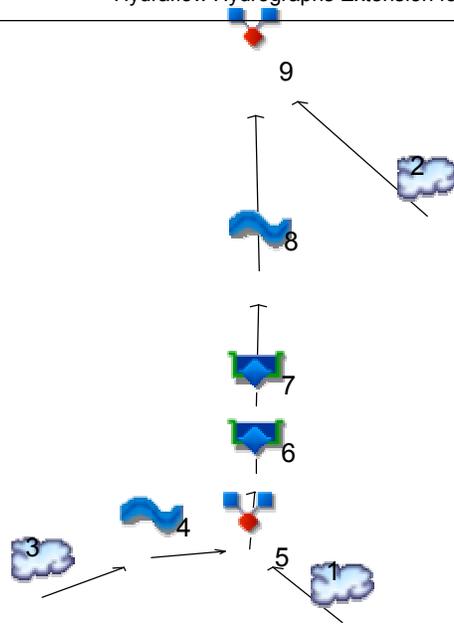
Pavements for streets, driveways, and parking areas are planned to be asphalt on a granular base or reinforced concrete surrounded by concrete curb and gutter or concrete curb. Additional criteria are as follows:

- a) Sidewalks are proposed along Clear Creek Road, and in the interior of the site. Interior sidewalks will be placed to direct people from parking areas to building entrances. Sidewalks will be constructed of 3,000 psi concrete, 4" thick and located adjacent to the curb. Sidewalks will be of varying widths as determined by the architect and landscape architect. Maximum longitudinal grade along sidewalks will be limited to 5% so that all sidewalk routes may be accessible.
- b) Minimum longitudinal pavement grade is 0.50% for drainage, when the drainage is concentrated and on concrete, and 1% concentrated in asphalt, unless site specific conditions dictate a lesser slope.
- c) Barrier-free ramps and curb transitions will be provided at all intersections where sidewalks will be constructed.
- d) Minimum radius on minor-minor and minor-collector intersection curb returns is 20 feet (measured to back of curb). Minimum radius on collector-major intersections is 30 feet. Wider radii may be provided at intersections as determined by specific site configurations to accommodate truck turning movements for fire trucks and delivery trucks.



# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25



## Legend

<u>Hyd. Origin</u>	<u>Description</u>
1	SCS Runoff DA-1
2	SCS Runoff DA-2
3	SCS Runoff DA-3
4	Reach Channel DA-1
5	Combine Channel Fork
6	Reservoir RailRoad
7	Reservoir Tank Destroyer
8	Reach Existing channel
9	Combine Clear Creek Raod

# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	-----	236.59	-----	363.72	456.40	581.91	689.97	789.24	DA-1
2	SCS Runoff	-----	-----	367.86	-----	609.39	789.63	1035.88	1248.74	1444.49	DA-2
3	SCS Runoff	-----	-----	82.28	-----	122.18	151.16	190.39	224.21	255.31	DA-3
4	Reach	3	-----	73.26	-----	109.47	135.84	171.72	202.89	231.61	Channel DA-1
5	Combine	1, 4	-----	302.62	-----	461.85	577.85	734.88	870.09	994.30	Channel Fork
6	Reservoir	5	-----	226.48	-----	265.38	284.77	306.15	321.57	333.83	RailRoad
7	Reservoir	6	-----	226.48	-----	265.38	284.77	306.15	321.57	333.83	Tank Destroyer
8	Reach	7	-----	192.77	-----	241.85	265.34	289.93	307.26	321.08	Existing channel
9	Combine	2, 8	-----	500.88	-----	771.89	969.57	1234.49	1461.56	1669.41	Clear Creek Raod

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	581.91	2	748	3,855,065	-----	-----	-----	DA-1
2	SCS Runoff	1035.88	2	748	6,655,418	-----	-----	-----	DA-2
3	SCS Runoff	190.39	2	732	910,578	-----	-----	-----	DA-3
4	Reach	171.72	2	738	910,574	3	-----	-----	Channel DA-1
5	Combine	734.88	2	746	4,765,637	1, 4	-----	-----	Channel Fork
6	Reservoir	306.15	2	780	4,765,638	5	938.87	1,049,376	RailRoad
7	Reservoir	306.15	2	780	4,765,640	6	927.69	3,343	Tank Destroyer
8	Reach	289.93	2	820	4,765,618	7	-----	-----	Existing channel
9	Combine	1234.49	2	750	11,421,020	2, 8	-----	-----	Clear Creek Raod
20101124-EX.gpw					Return Period: 25 Year			Thursday, Jan 6, 2011	

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

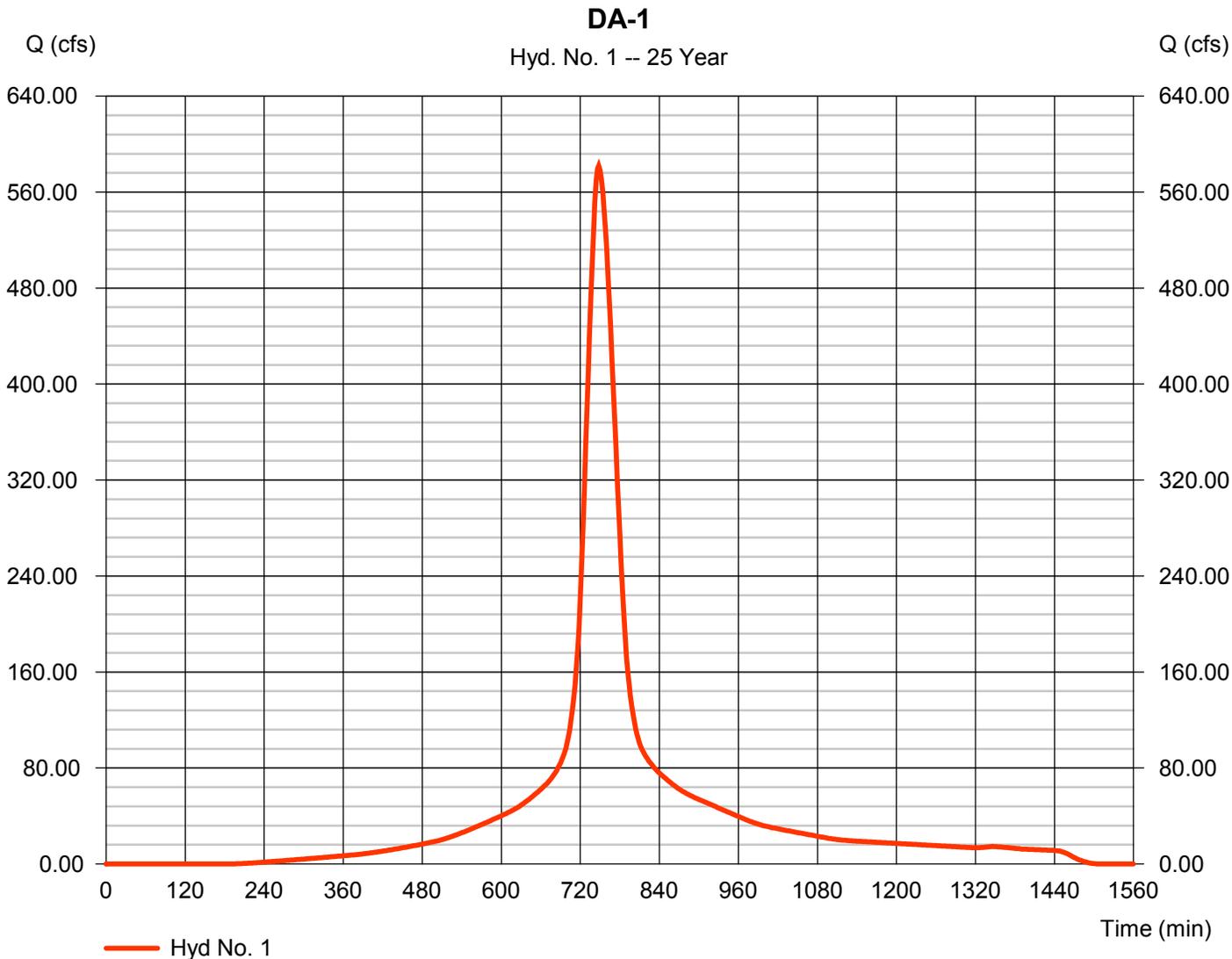
Thursday, Jan 6, 2011

## Hyd. No. 1

DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 581.91 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,855,065 cuft
Drainage area	= 161.570 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.40 min
Total precip.	= 7.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(81.930 x 98) + (79.640 x 82)] / 161.570



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

## Hyd. No. 1

DA-1

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.60	3.60	3.60	
Land slope (%)	= 0.50	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 23.42</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 23.42</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 308.00	0.00	0.00	
Watercourse slope (%)	= 0.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.14	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 4.50</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 4.50</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 6.00	22.00	200.00	
Wetted perimeter (ft)	= 9.00	17.00	100.00	
Channel slope (%)	= 0.50	0.40	0.50	
Manning's n-value	= 0.030	0.015	0.015	
Velocity (ft/s)	=2.68	7.47	11.18	
Flow length (ft)	1378.0	1342.0	1305.0	
<b>Travel Time (min)</b>	<b>= 8.58</b>	<b>+ 3.00</b>	<b>+ 1.95</b>	<b>= 13.52</b>
<b>Total Travel Time, Tc</b> .....				<b>41.40 min</b>

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

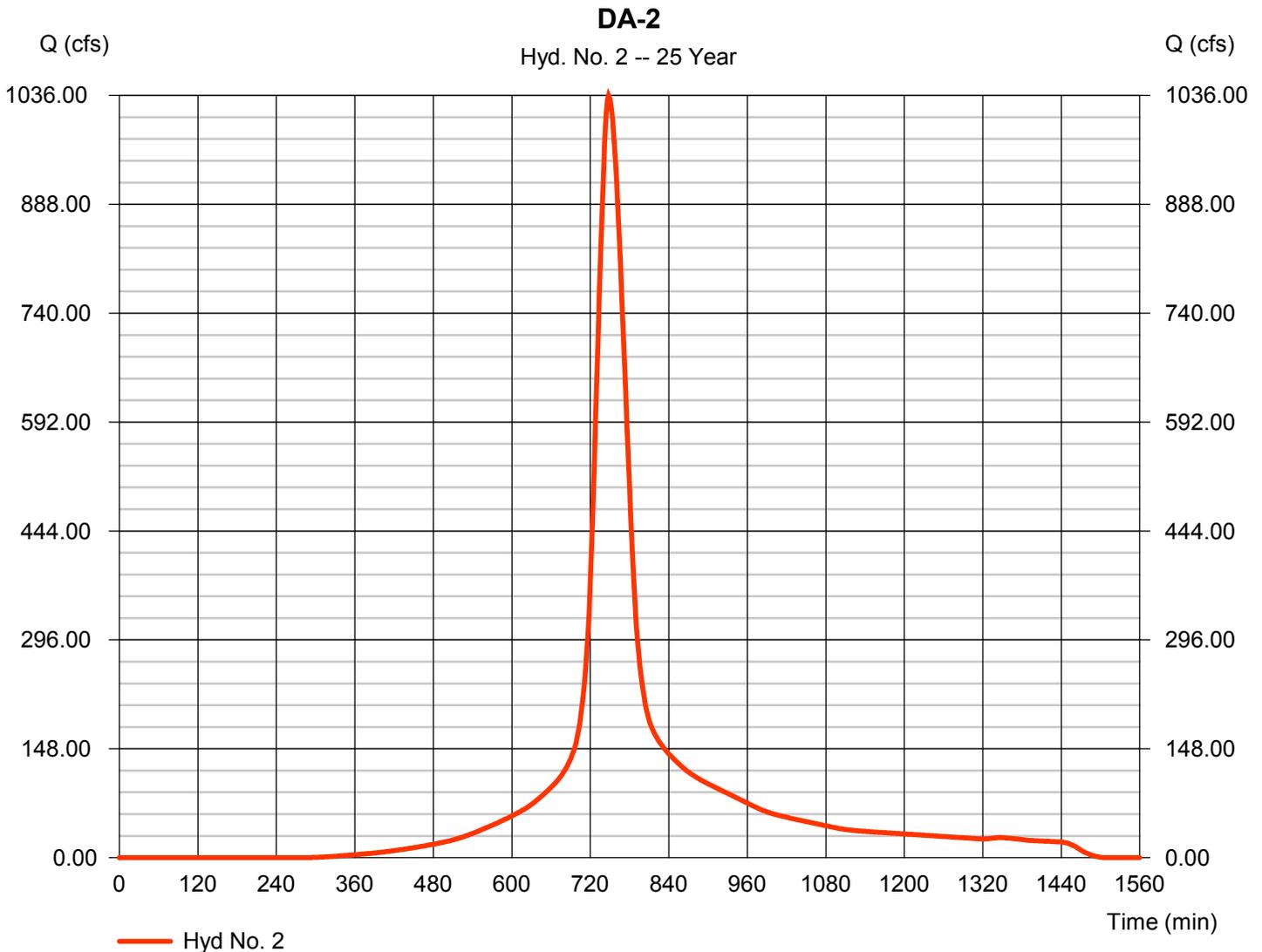
Thursday, Jan 6, 2011

## Hyd. No. 2

DA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1035.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 6,655,418 cuft
Drainage area	= 312.690 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.60 min
Total precip.	= 7.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(93.380 x 98) + (219.310 x 78)] / 312.690



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

## Hyd. No. 2

DA-2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.60	0.00	0.00	
Land slope (%)	= 0.75	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 19.92</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 19.92</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 265.00	0.00	0.00	
Watercourse slope (%)	= 0.75	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.40	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 3.16</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 3.16</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 6.00	200.00	0.00	
Wetted perimeter (ft)	= 12.00	100.00	0.00	
Channel slope (%)	= 0.90	0.42	0.00	
Manning's n-value	= 0.030	0.030	0.015	
Velocity (ft/s)	=2.96	5.12	0.00	
Flow length (ft)	1222.5	3588.0	0.0	
<b>Travel Time (min)</b>	<b>= 6.88</b>	<b>+ 11.68</b>	<b>+ 0.00</b>	<b>= 18.56</b>
<b>Total Travel Time, Tc</b> .....				<b>41.60 min</b>

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

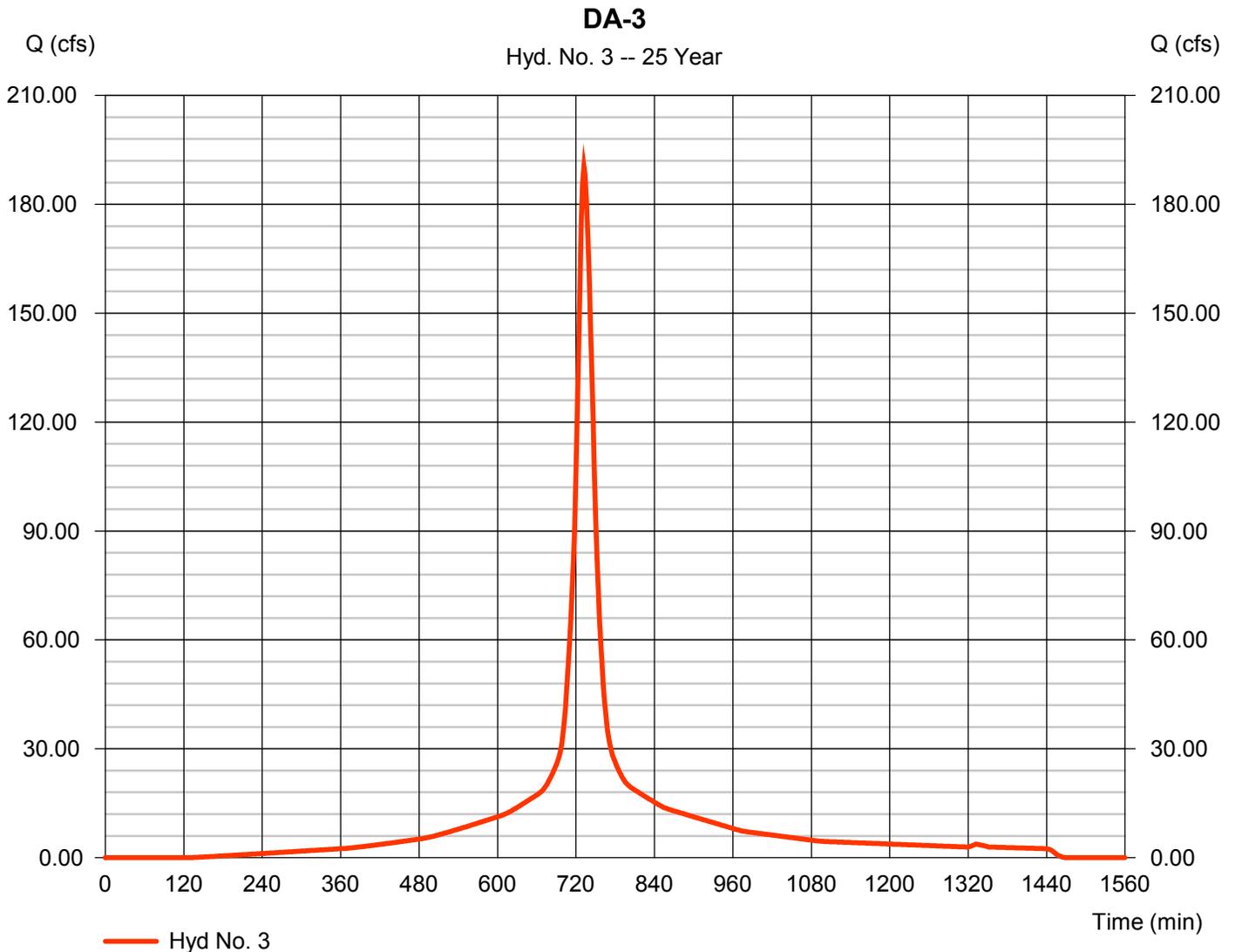
Thursday, Jan 6, 2011

## Hyd. No. 3

DA-3

Hydrograph type	= SCS Runoff	Peak discharge	= 190.39 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 910,578 cuft
Drainage area	= 36.540 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.40 min
Total precip.	= 7.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) =  $[(22.000 \times 98) + (14.540 \times 86)] / 36.540$



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

## Hyd. No. 3

DA-3

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 10.0	90.0	0.0	
Two-year 24-hr precip. (in)	= 3.60	3.60	0.00	
Land slope (%)	= 2.00	0.50	0.00	
<b>Travel Time (min)</b>	<b>= 0.18</b>	<b>+ 1.83</b>	<b>+ 0.00</b>	<b>= 2.01</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 200.00	0.00	0.00	
Watercourse slope (%)	= 0.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.14	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 2.92</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 2.92</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 3.14	6.00	25.00	
Wetted perimeter (ft)	= 6.28	9.00	100.00	
Channel slope (%)	= 0.50	0.50	0.50	
Manning's n-value	= 0.015	0.030	0.030	
Velocity (ft/s)	=4.41			
		2.68		
			1.39	
Flow length (ft)	200.0	564.0	680.0	
<b>Travel Time (min)</b>	<b>= 0.76</b>	<b>+ 3.51</b>	<b>+ 8.17</b>	<b>= 12.44</b>
<b>Total Travel Time, Tc</b> .....				<b>17.40 min</b>

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

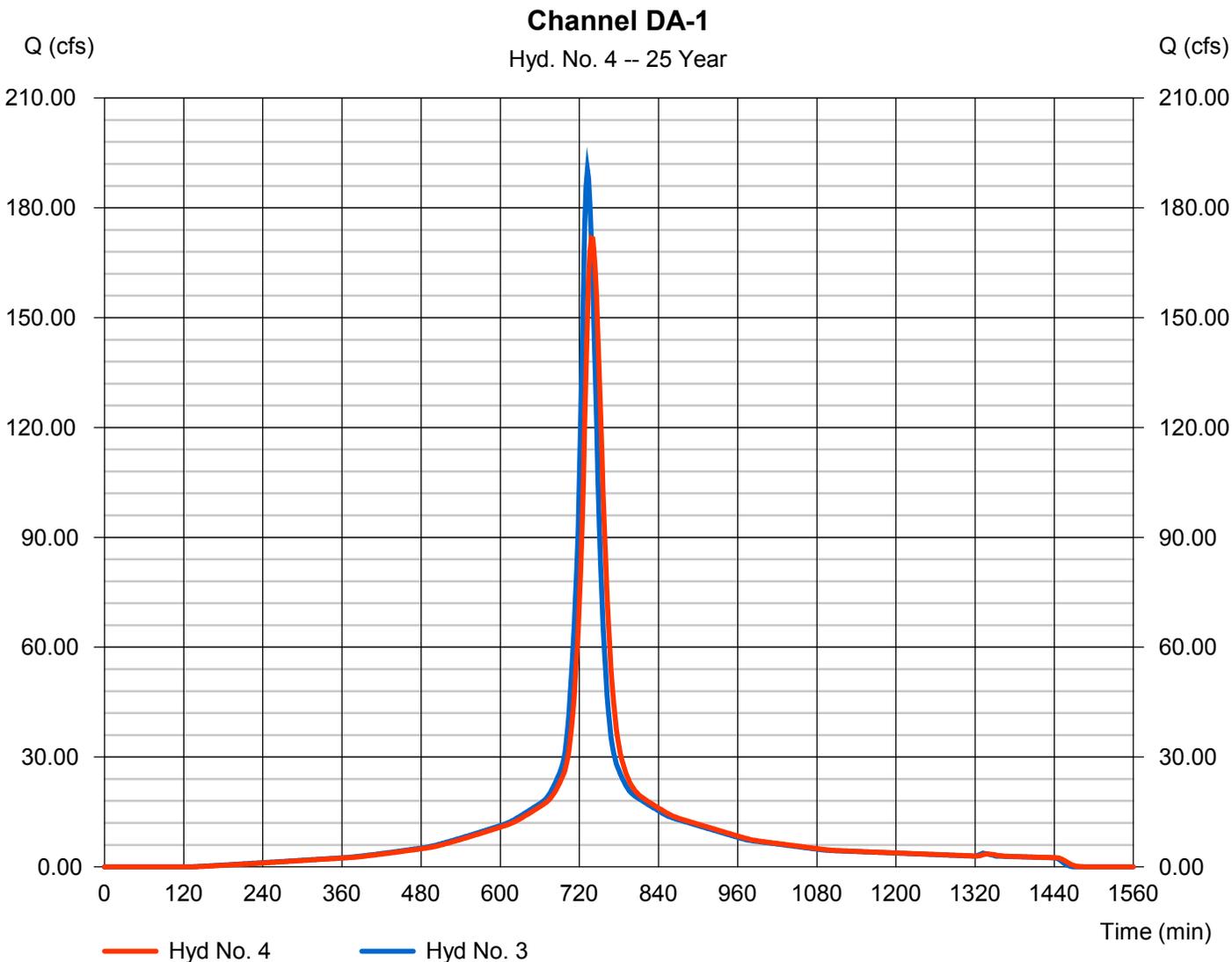
Thursday, Jan 6, 2011

## Hyd. No. 4

Channel DA-1

Hydrograph type	= Reach	Peak discharge	= 171.72 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 910,574 cuft
Inflow hyd. No.	= 3 - DA-3	Section type	= Trapezoidal
Reach length	= 2183.0 ft	Channel slope	= 1.8 %
Manning's n	= 0.040	Bottom width	= 2.0 ft
Side slope	= 8.0:1	Max. depth	= 3.0 ft
Rating curve x	= 3.148	Rating curve m	= 1.135
Ave. velocity	= 5.13 ft/s	Routing coeff.	= 0.2760

Modified Att-Kin routing method used.



# Hydrograph Report

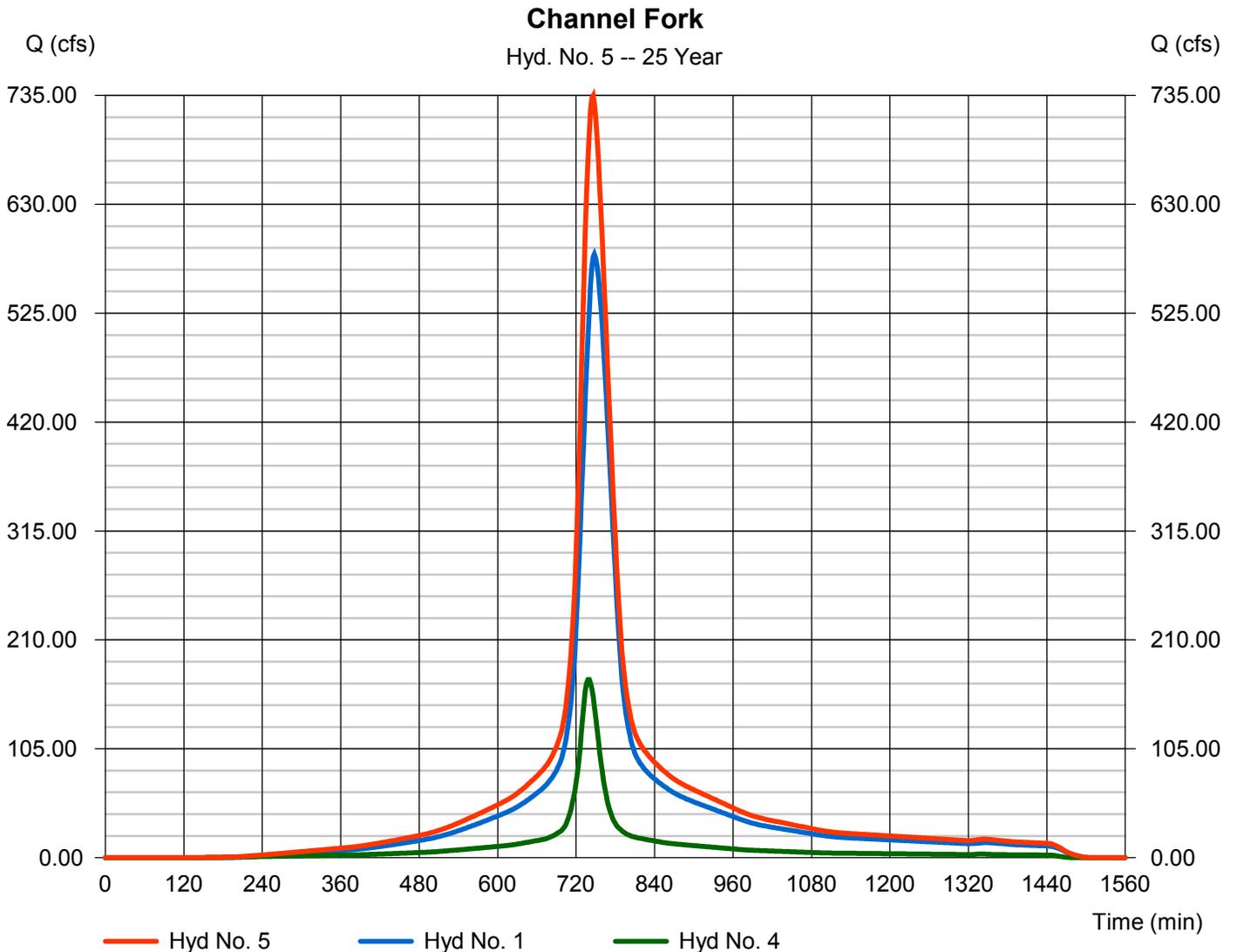
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 5

Channel Fork

Hydrograph type	= Combine	Peak discharge	= 734.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 4,765,637 cuft
Inflow hyds.	= 1, 4	Contrib. drain. area	= 161.570 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

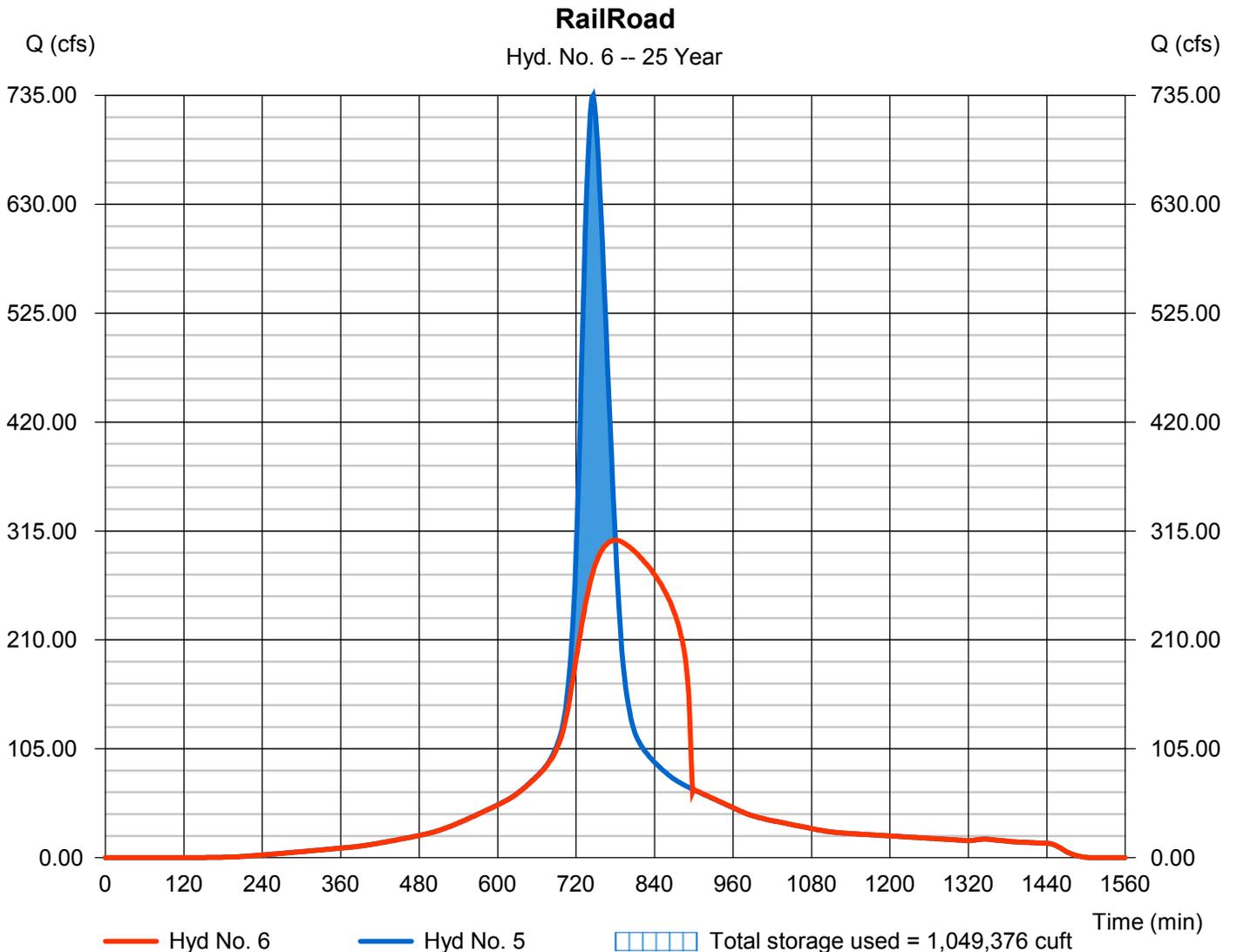
Thursday, Jan 6, 2011

## Hyd. No. 6

RailRoad

Hydrograph type	= Reservoir	Peak discharge	= 306.15 cfs
Storm frequency	= 25 yrs	Time to peak	= 780 min
Time interval	= 2 min	Hyd. volume	= 4,765,638 cuft
Inflow hyd. No.	= 5 - Channel Fork	Max. Elevation	= 938.87 ft
Reservoir name	= Railroad Pond	Max. Storage	= 1,049,376 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

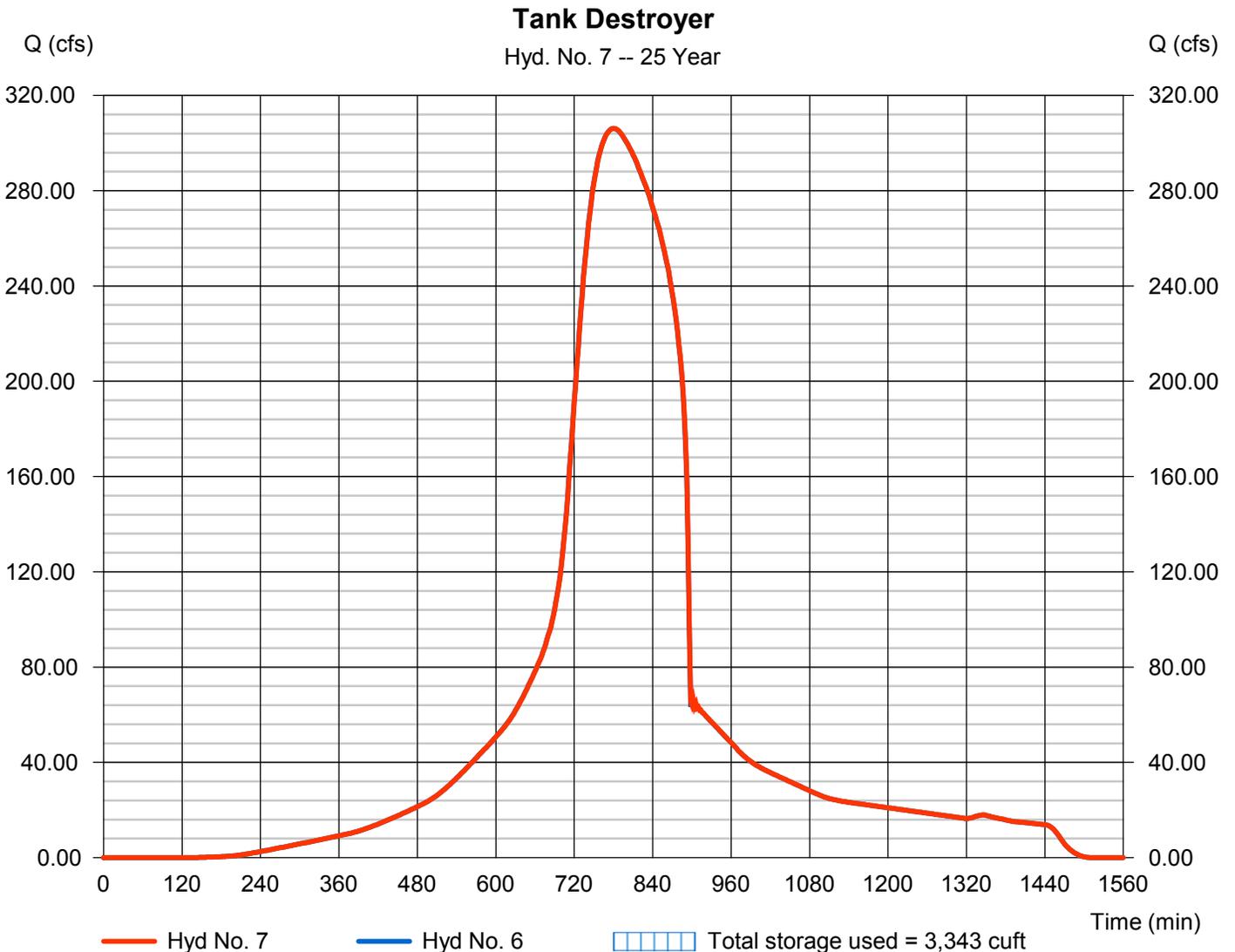
Thursday, Jan 6, 2011

## Hyd. No. 7

Tank Destroyer

Hydrograph type	= Reservoir	Peak discharge	= 306.15 cfs
Storm frequency	= 25 yrs	Time to peak	= 780 min
Time interval	= 2 min	Hyd. volume	= 4,765,640 cuft
Inflow hyd. No.	= 6 - RailRoad	Max. Elevation	= 927.69 ft
Reservoir name	= Tank Destroyer	Max. Storage	= 3,343 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

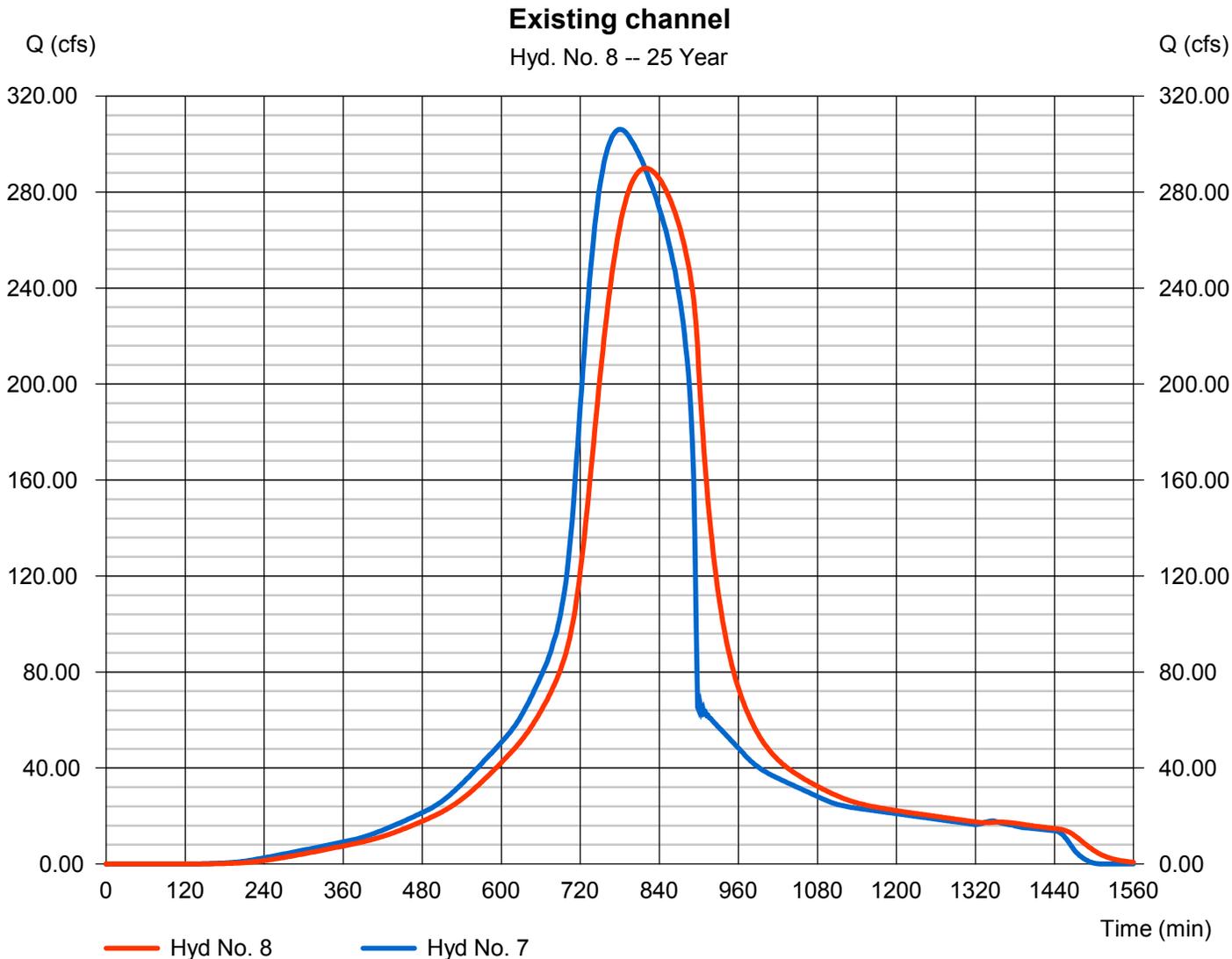
Thursday, Jan 6, 2011

## Hyd. No. 8

Existing channel

Hydrograph type	= Reach	Peak discharge	= 289.93 cfs
Storm frequency	= 25 yrs	Time to peak	= 820 min
Time interval	= 2 min	Hyd. volume	= 4,765,618 cuft
Inflow hyd. No.	= 7 - Tank Destroyer	Section type	= Trapezoidal
Reach length	= 4932.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.030	Bottom width	= 12.0 ft
Side slope	= 15.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.621	Rating curve m	= 1.263
Ave. velocity	= 2.26 ft/s	Routing coeff.	= 0.0670

Modified Att-Kin routing method used.



# Hydrograph Report

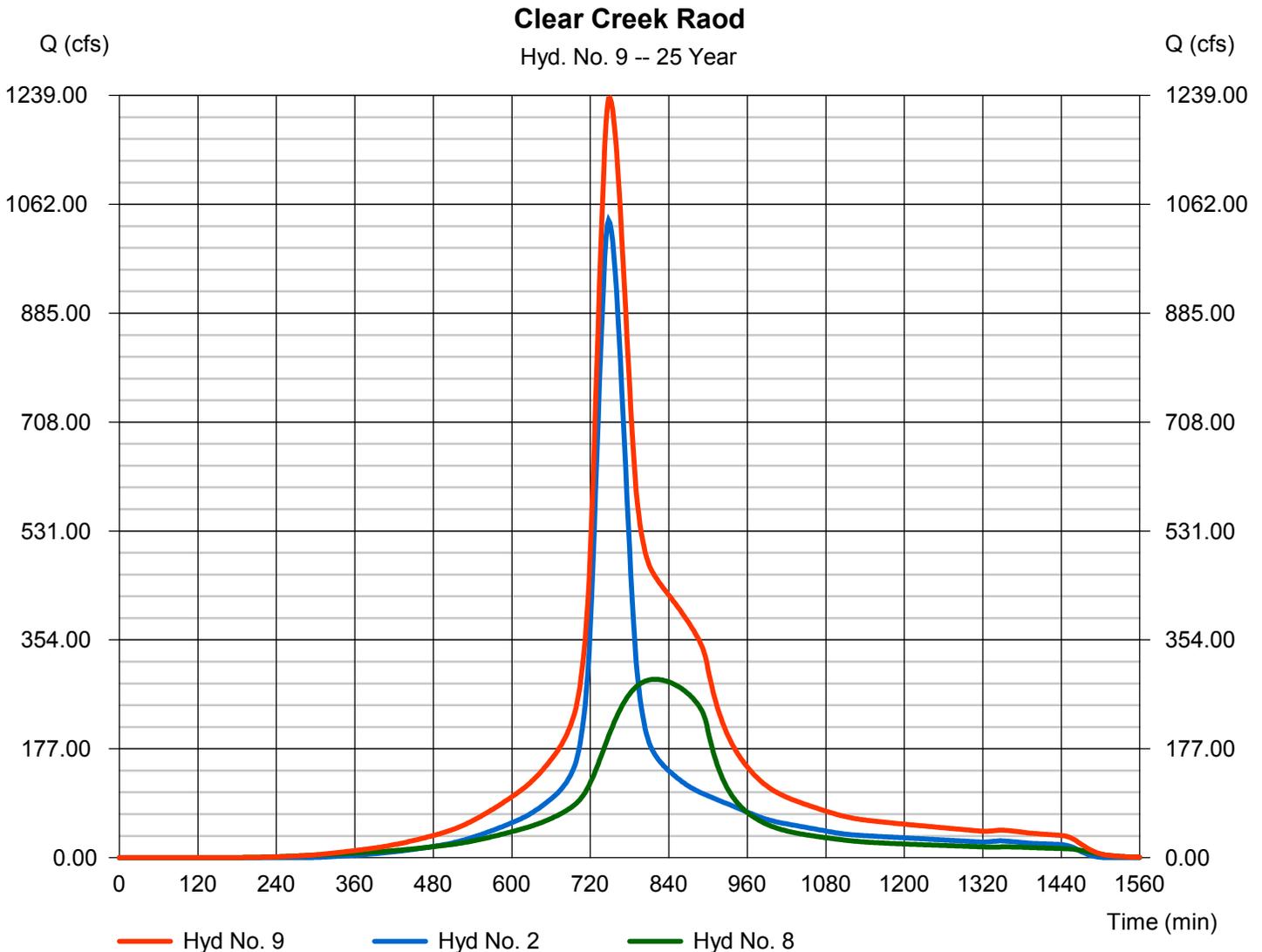
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 9

Clear Creek Raod

Hydrograph type	= Combine	Peak discharge	= 1234.49 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 11,421,020 cuft
Inflow hyds.	= 2, 8	Contrib. drain. area	= 312.690 ac



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description	
1	SCS Runoff	789.24	2	748	5,316,221	-----	-----	-----	DA-1	
2	SCS Runoff	1444.49	2	748	9,424,237	-----	-----	-----	DA-2	
3	SCS Runoff	255.31	2	732	1,240,083	-----	-----	-----	DA-3	
4	Reach	231.61	2	738	1,240,079	3	-----	-----	Channel DA-1	
5	Combine	994.30	2	746	6,556,301	1, 4	-----	-----	Channel Fork	
6	Reservoir	333.83	2	784	6,556,298	5	940.94	1,735,229	RailRoad	
7	Reservoir	333.83	2	786	6,556,302	6	928.00	3,795	Tank Destroyer	
8	Reach	321.08	2	828	6,556,281	7	-----	-----	Existing channel	
9	Combine	1669.41	2	748	15,980,510	2, 8	-----	-----	Clear Creek Raod	
20101124-EX.gpw					Return Period: 100 Year			Thursday, Jan 6, 2011		

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

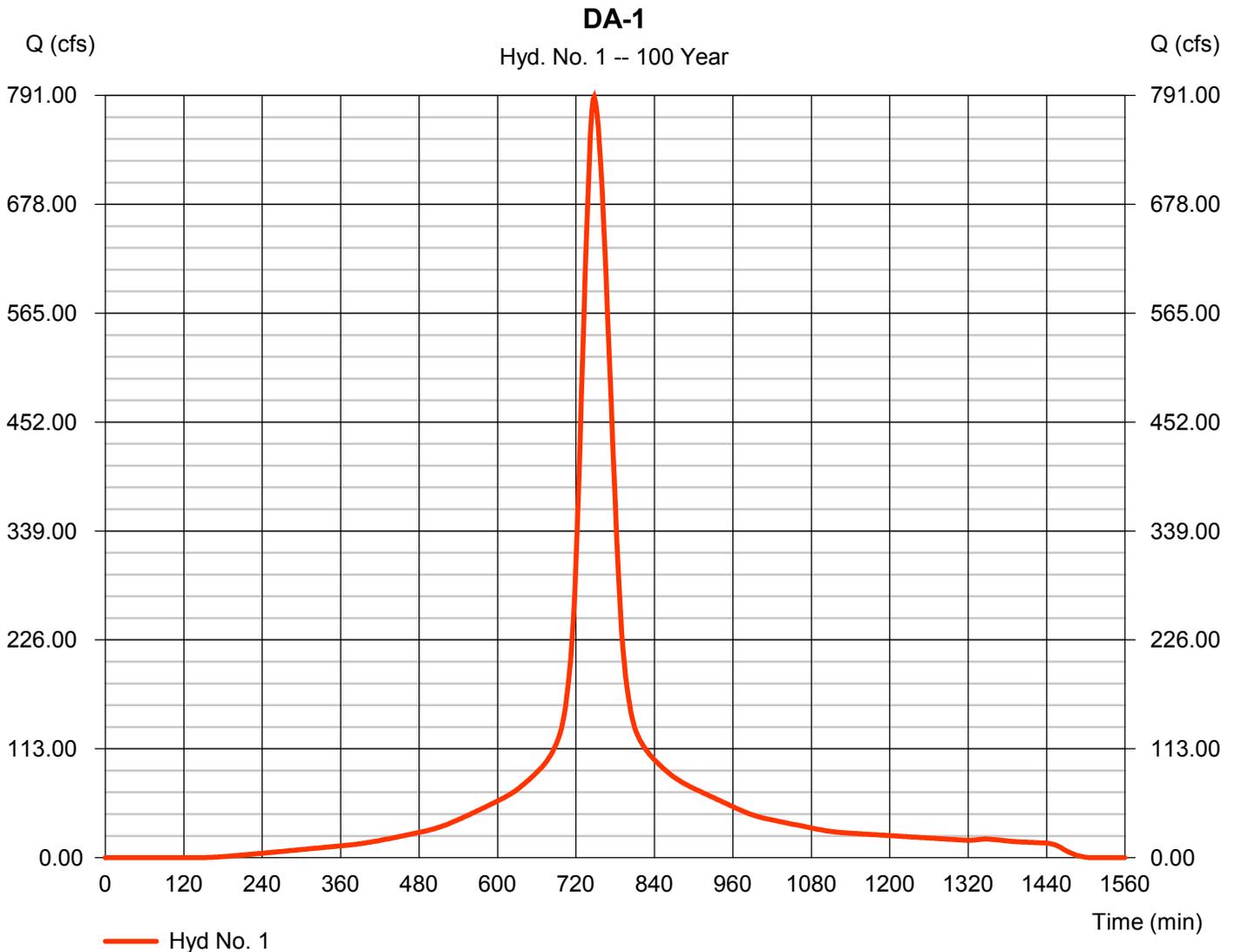
Thursday, Jan 6, 2011

## Hyd. No. 1

DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 789.24 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 5,316,221 cuft
Drainage area	= 161.570 ac	Curve number	= 90*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.40 min
Total precip.	= 10.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(81.930 x 98) + (79.640 x 82)] / 161.570



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

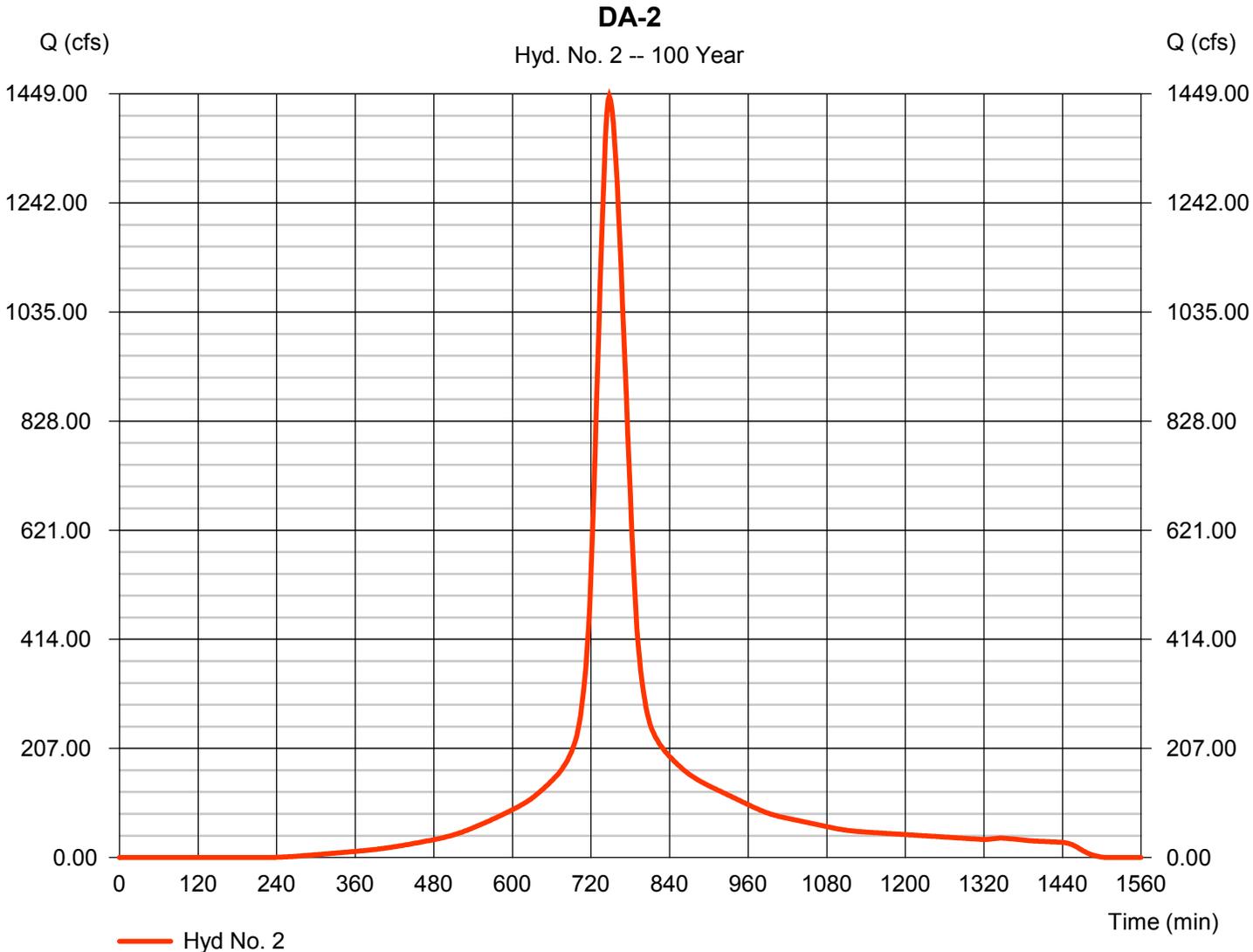
Thursday, Jan 6, 2011

## Hyd. No. 2

DA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1444.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 9,424,237 cuft
Drainage area	= 312.690 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.60 min
Total precip.	= 10.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(93.380 x 98) + (219.310 x 78)] / 312.690



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

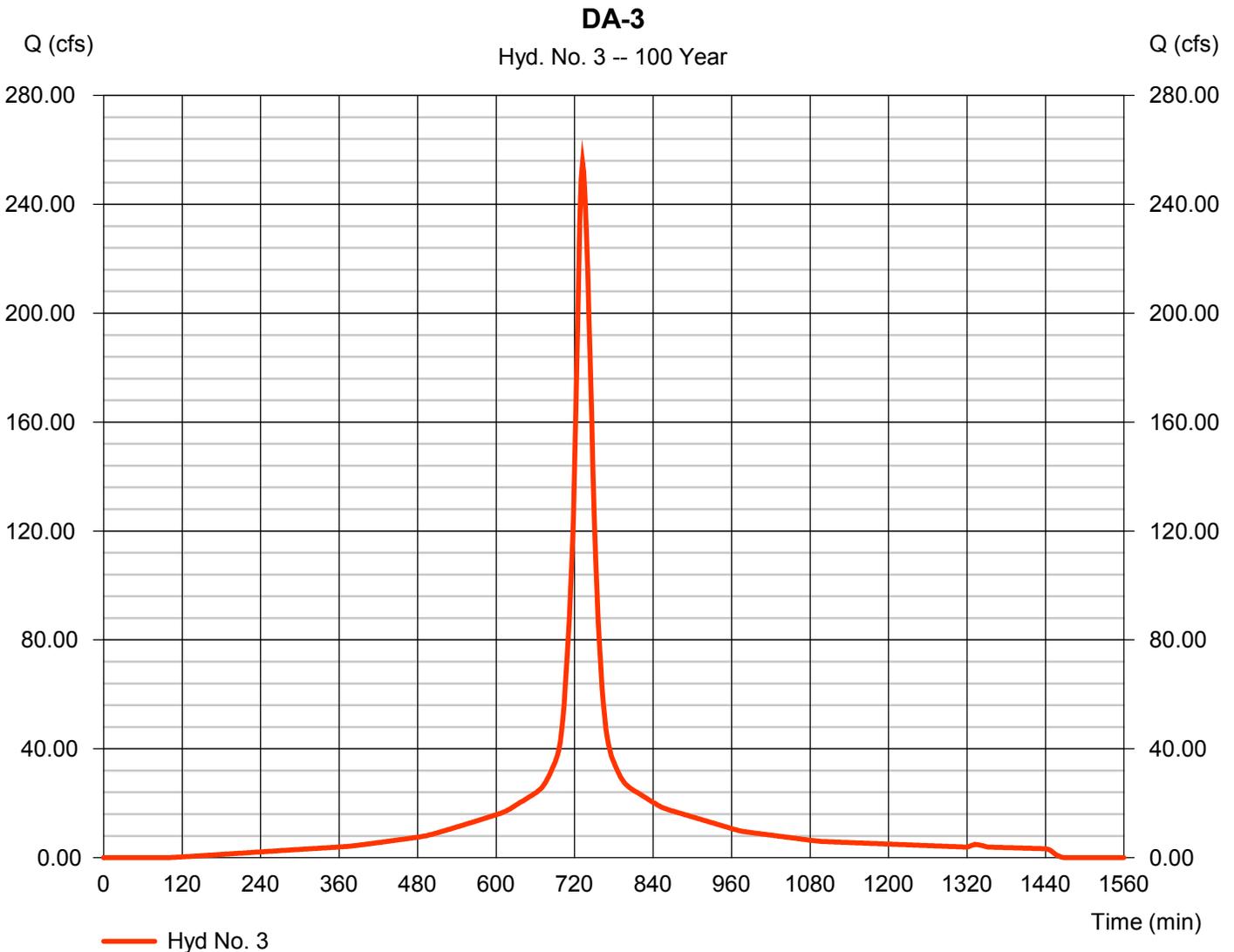
Thursday, Jan 6, 2011

## Hyd. No. 3

DA-3

Hydrograph type	= SCS Runoff	Peak discharge	= 255.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,240,083 cuft
Drainage area	= 36.540 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.40 min
Total precip.	= 10.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(22.000 x 98) + (14.540 x 86)] / 36.540



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

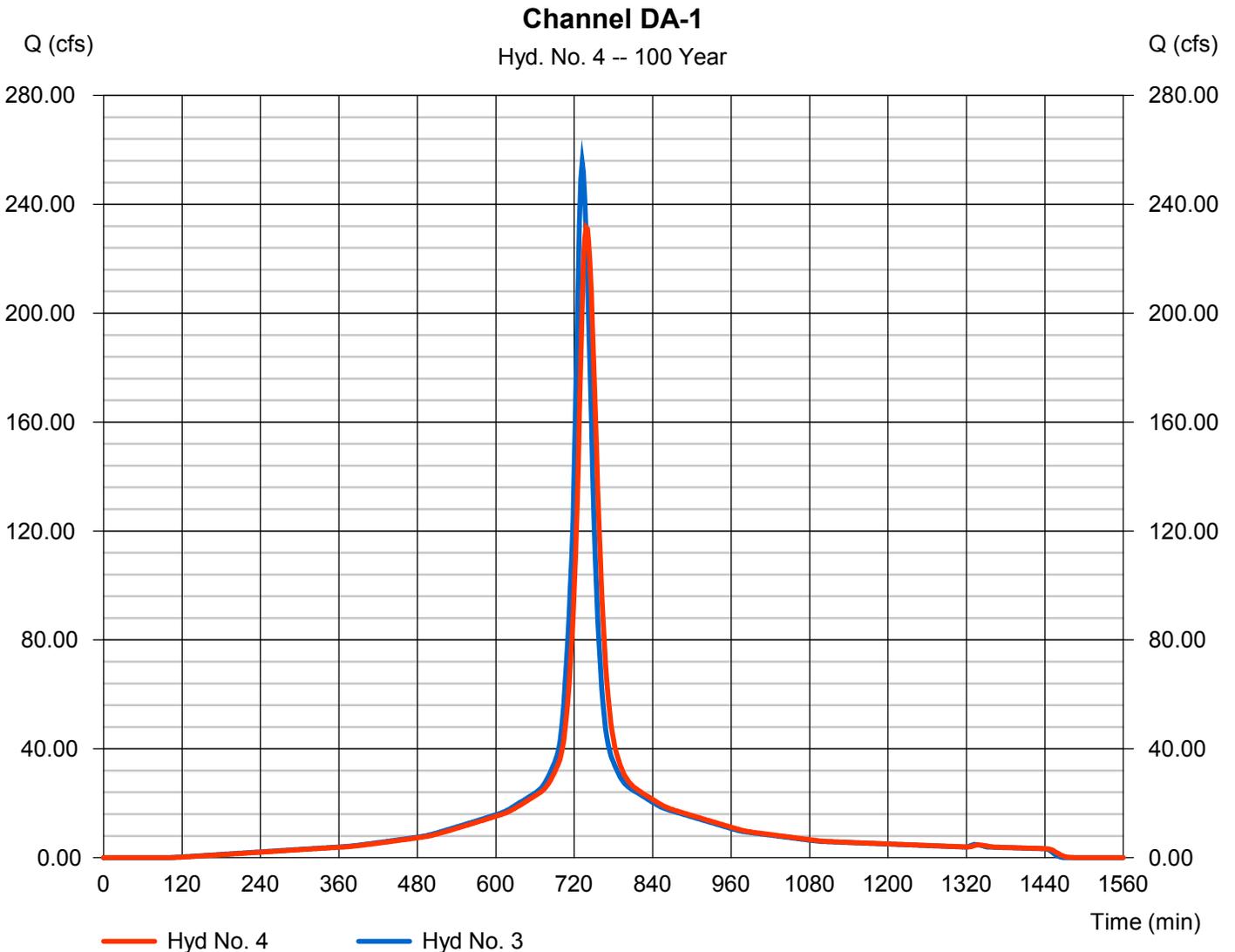
Thursday, Jan 6, 2011

## Hyd. No. 4

Channel DA-1

Hydrograph type	= Reach	Peak discharge	= 231.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 1,240,079 cuft
Inflow hyd. No.	= 3 - DA-3	Section type	= Trapezoidal
Reach length	= 2183.0 ft	Channel slope	= 1.8 %
Manning's n	= 0.040	Bottom width	= 2.0 ft
Side slope	= 8.0:1	Max. depth	= 3.0 ft
Rating curve x	= 3.148	Rating curve m	= 1.135
Ave. velocity	= 5.31 ft/s	Routing coeff.	= 0.2844

Modified Att-Kin routing method used.



# Hydrograph Report

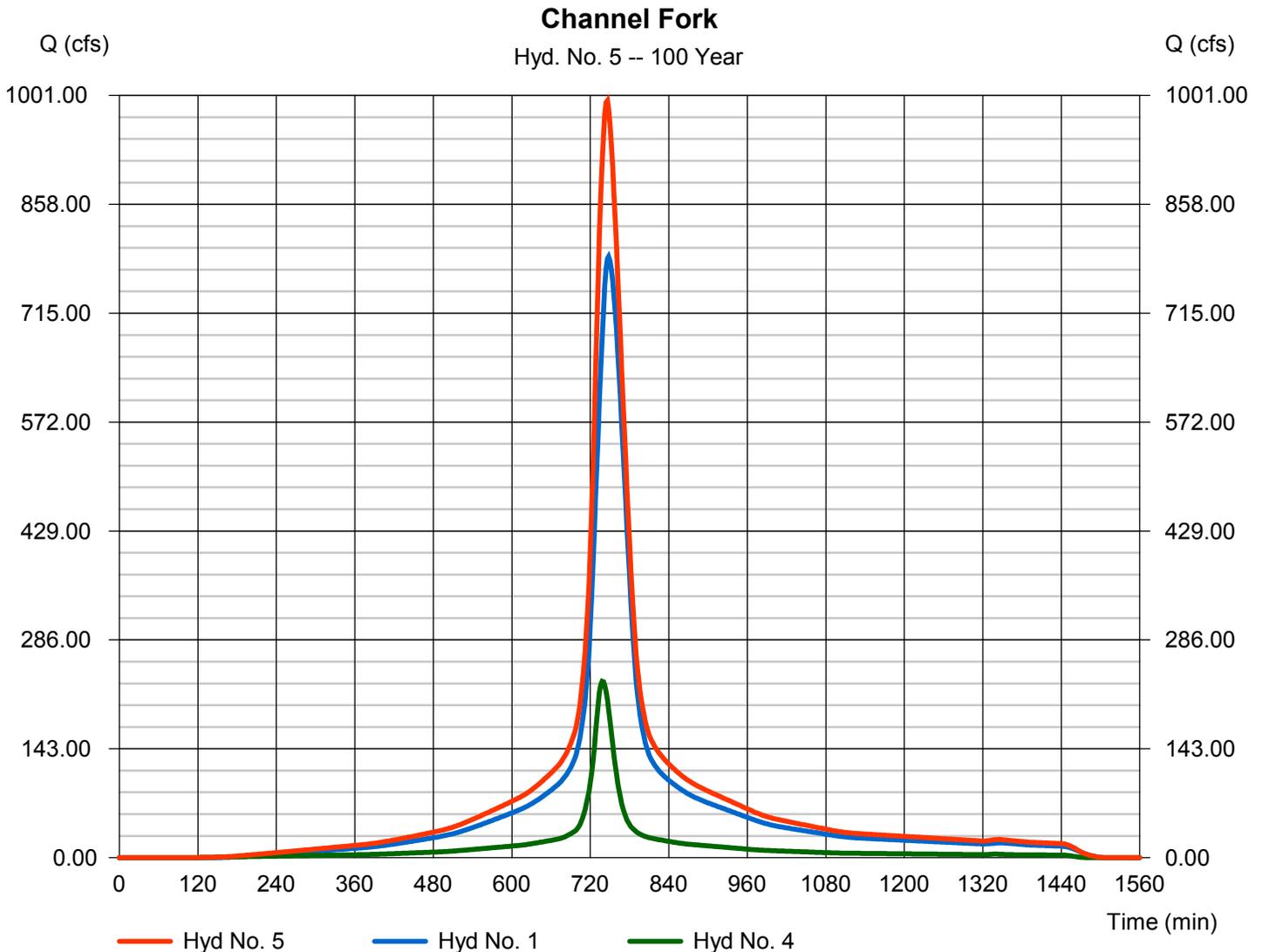
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 5

Channel Fork

Hydrograph type	= Combine	Peak discharge	= 994.30 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 6,556,301 cuft
Inflow hyds.	= 1, 4	Contrib. drain. area	= 161.570 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

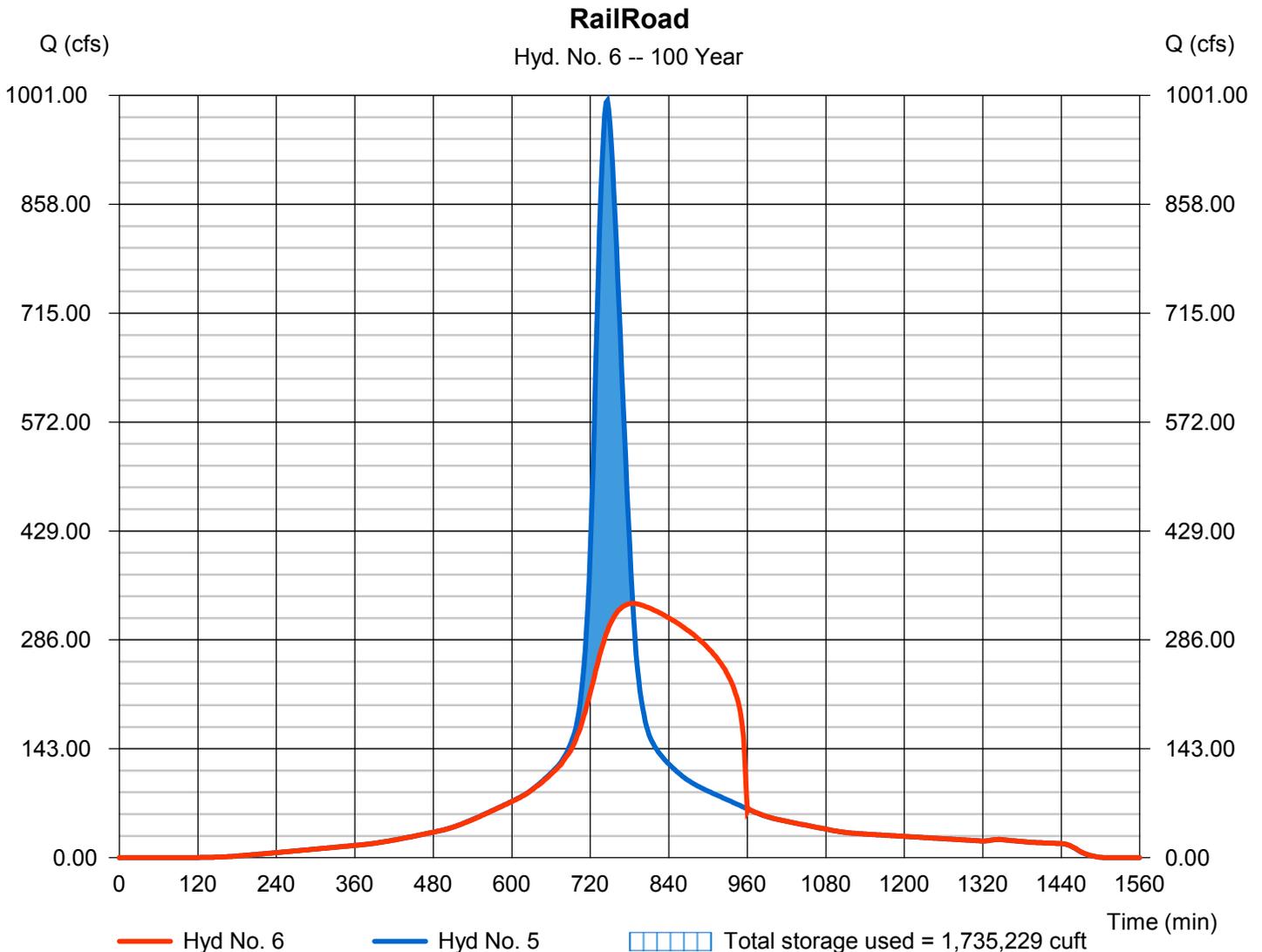
Thursday, Jan 6, 2011

## Hyd. No. 6

RailRoad

Hydrograph type	= Reservoir	Peak discharge	= 333.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 784 min
Time interval	= 2 min	Hyd. volume	= 6,556,298 cuft
Inflow hyd. No.	= 5 - Channel Fork	Max. Elevation	= 940.94 ft
Reservoir name	= Railroad Pond	Max. Storage	= 1,735,229 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

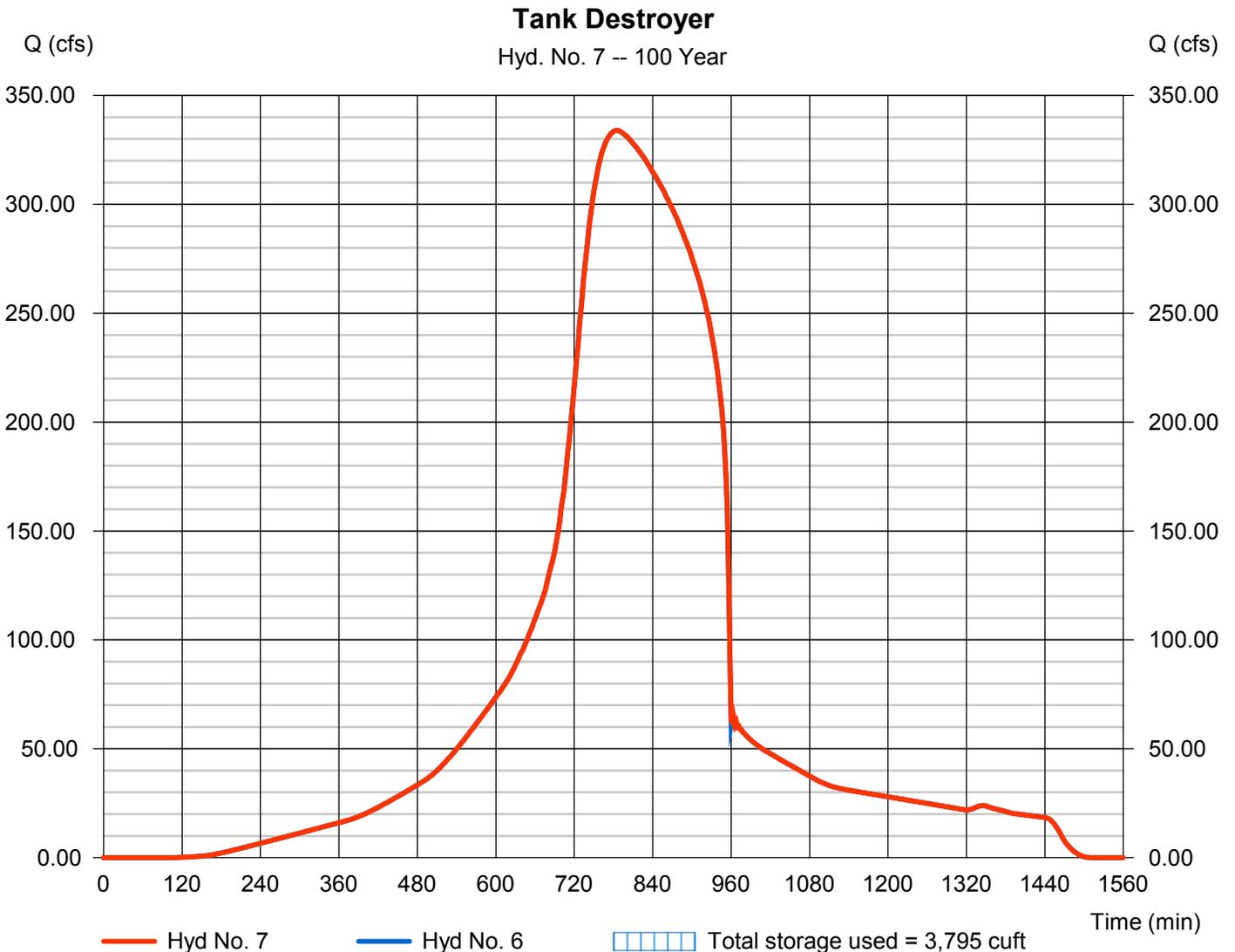
Thursday, Jan 6, 2011

## Hyd. No. 7

Tank Destroyer

Hydrograph type	= Reservoir	Peak discharge	= 333.83 cfs
Storm frequency	= 100 yrs	Time to peak	= 786 min
Time interval	= 2 min	Hyd. volume	= 6,556,302 cuft
Inflow hyd. No.	= 6 - RailRoad	Max. Elevation	= 928.00 ft
Reservoir name	= Tank Destroyer	Max. Storage	= 3,795 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

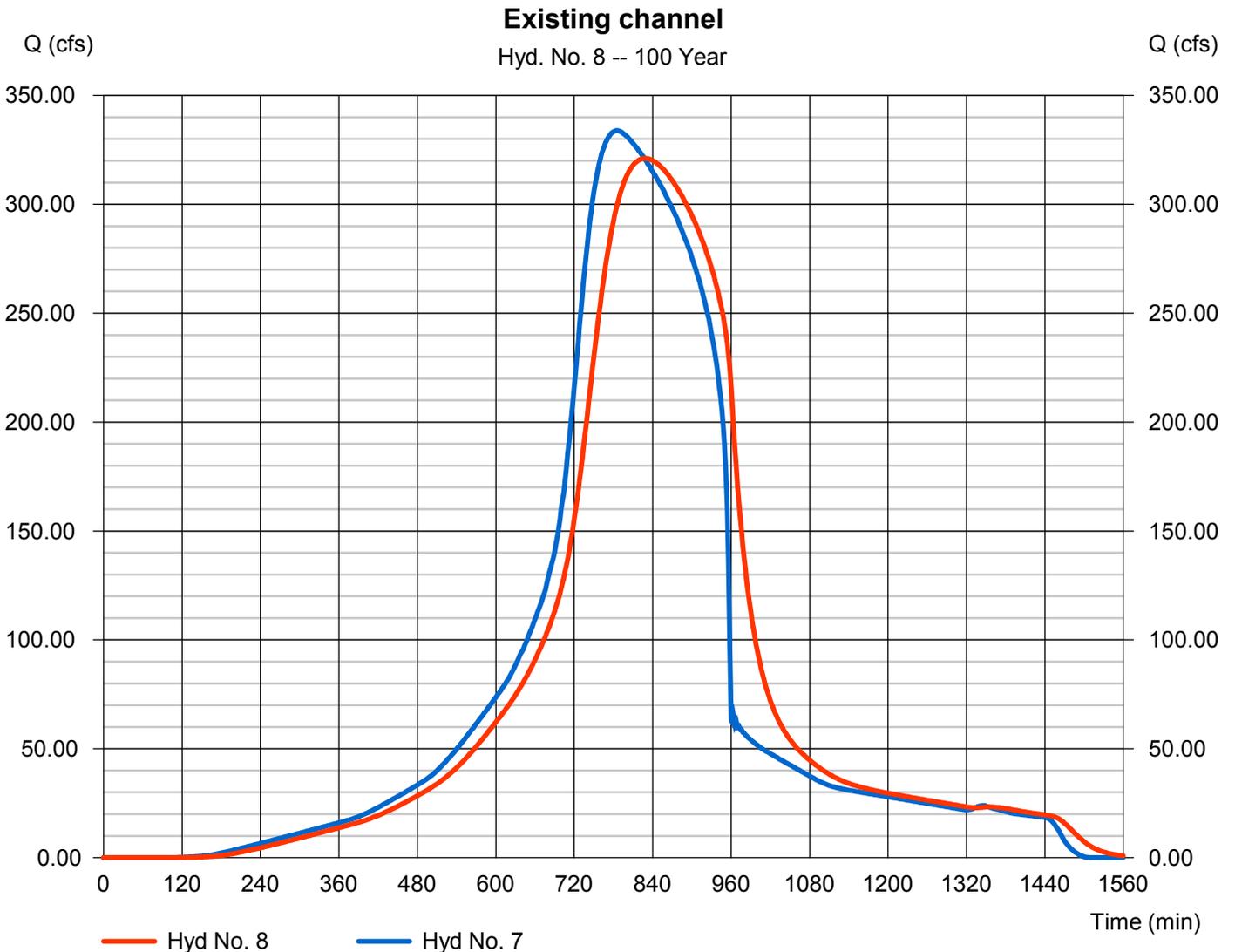
Thursday, Jan 6, 2011

## Hyd. No. 8

Existing channel

Hydrograph type	= Reach	Peak discharge	= 321.08 cfs
Storm frequency	= 100 yrs	Time to peak	= 828 min
Time interval	= 2 min	Hyd. volume	= 6,556,281 cuft
Inflow hyd. No.	= 7 - Tank Destroyer	Section type	= Trapezoidal
Reach length	= 4932.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.030	Bottom width	= 12.0 ft
Side slope	= 15.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.621	Rating curve m	= 1.263
Ave. velocity	= 2.30 ft/s	Routing coeff.	= 0.0682

Modified Att-Kin routing method used.



# Hydrograph Report

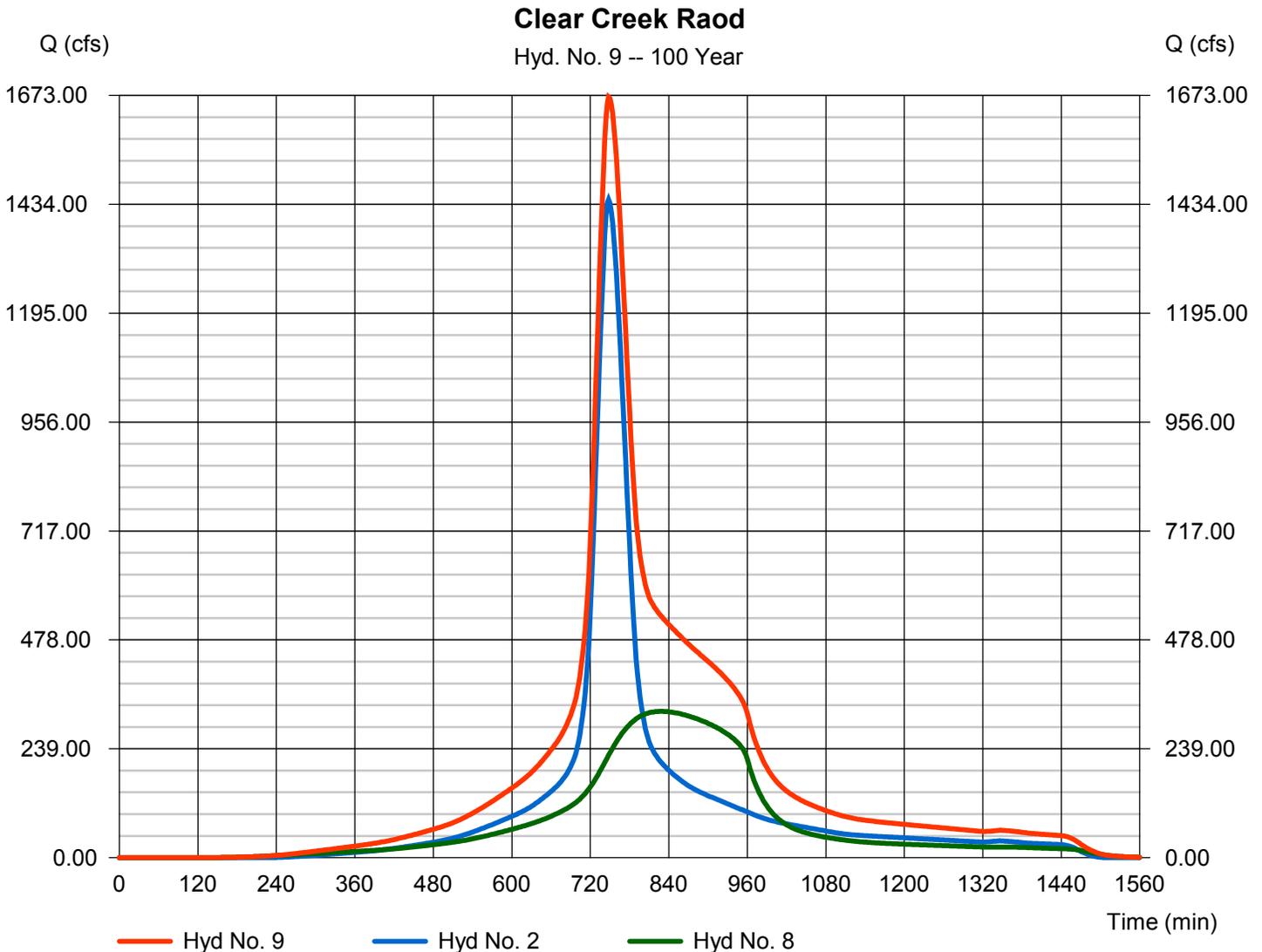
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 9

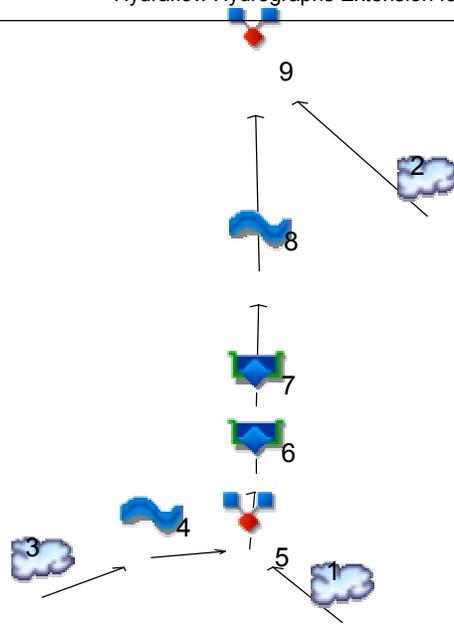
Clear Creek Raod

Hydrograph type	= Combine	Peak discharge	= 1669.41 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 15,980,510 cuft
Inflow hyds.	= 2, 8	Contrib. drain. area	= 312.690 ac



# Watershed Model Schematic

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25



## Legend

<u>Hyd. Origin</u>	<u>Description</u>
1	SCS Runoff DA-1
2	SCS Runoff DA-2
3	SCS Runoff DA-3
4	Reach Channel DA-1
5	Combine Channel Fork
6	Reservoir RailRoad
7	Reservoir Tank Destroyer
8	Reach Existing channel
9	Combine Clear Creek Raod

# Hydrograph Return Period Recap

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Hyd. No.	Hydrograph type (origin)	Inflow hyd(s)	Peak Outflow (cfs)								Hydrograph Description
			1-yr	2-yr	3-yr	5-yr	10-yr	25-yr	50-yr	100-yr	
1	SCS Runoff	-----	-----	251.54	-----	377.99	469.90	594.32	701.50	800.03	DA-1
2	SCS Runoff	-----	-----	367.86	-----	609.39	789.63	1035.88	1248.74	1444.49	DA-2
3	SCS Runoff	-----	-----	82.28	-----	122.18	151.16	190.39	224.21	255.31	DA-3
4	Reach	3	-----	73.26	-----	109.47	135.84	171.72	202.89	231.61	Channel DA-1
5	Combine	1, 4	-----	317.82	-----	476.42	591.65	747.60	881.91	1005.38	Channel Fork
6	Reservoir	5	-----	222.99	-----	262.05	282.06	303.87	320.41	334.15	RailRoad
7	Reservoir	6	-----	222.99	-----	262.06	282.06	303.86	320.41	334.15	Tank Destroyer
8	Reach	7	-----	193.42	-----	239.01	262.65	287.54	305.55	320.47	Existing channel
9	Combine	2, 8	-----	500.77	-----	769.82	966.65	1231.04	1457.95	1665.68	Clear Creek Raod

# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	594.32	2	748	3,994,916	-----	-----	-----	DA-1
2	SCS Runoff	1035.88	2	748	6,655,418	-----	-----	-----	DA-2
3	SCS Runoff	190.39	2	732	910,578	-----	-----	-----	DA-3
4	Reach	171.72	2	738	910,574	3	-----	-----	Channel DA-1
5	Combine	747.60	2	746	4,905,488	1, 4	-----	-----	Channel Fork
6	Reservoir	303.87	2	780	4,905,484	5	938.71	1,109,681	RailRoad
7	Reservoir	303.86	2	780	4,905,487	6	927.67	3,305	Tank Destroyer
8	Reach	287.54	2	820	4,905,467	7	-----	-----	Existing channel
9	Combine	1231.04	2	750	11,560,890	2, 8	-----	-----	Clear Creek Raod
20101130-PRO5.gpw					Return Period: 25 Year			Thursday, Jan 6, 2011	

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

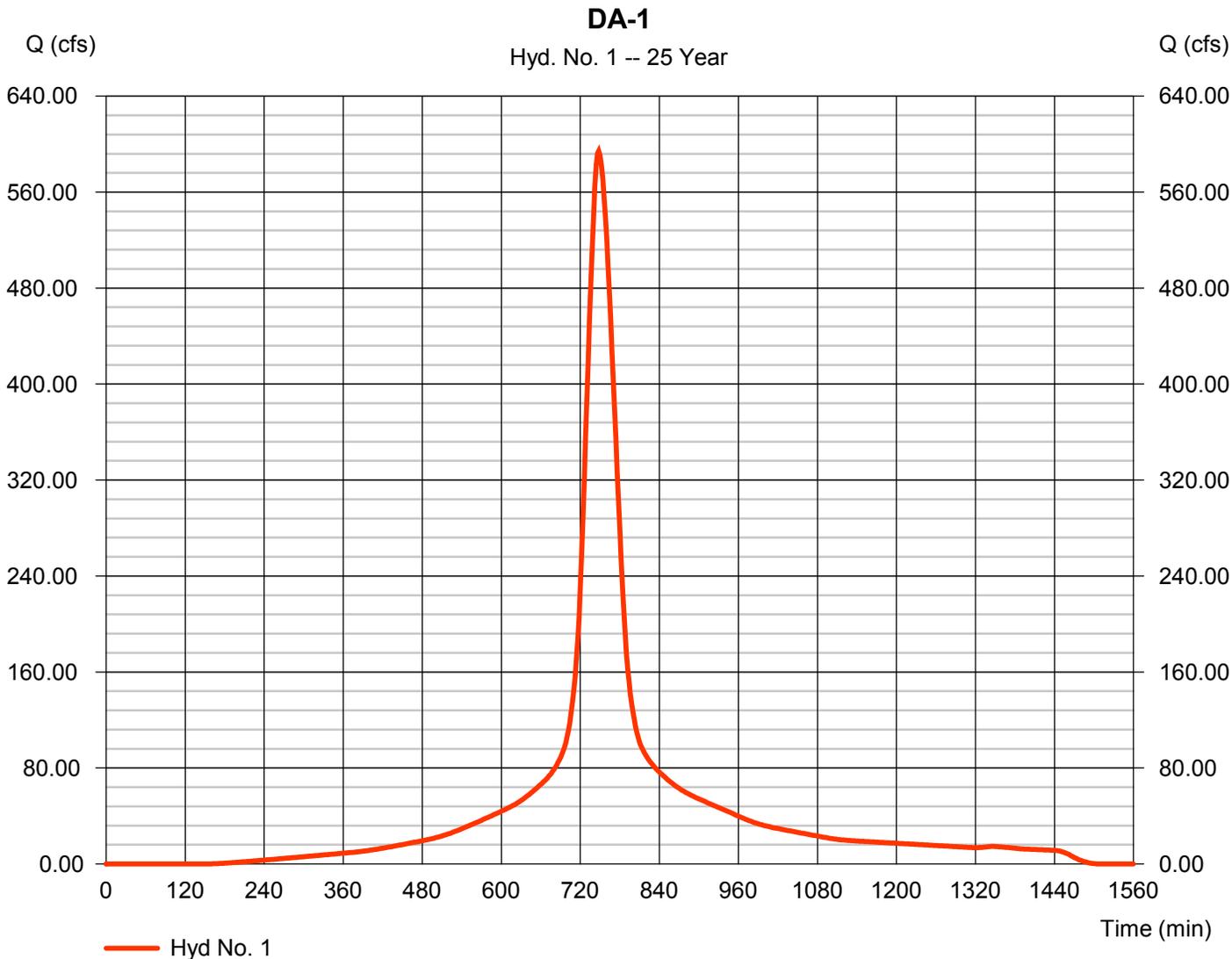
Thursday, Jan 6, 2011

## Hyd. No. 1

DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 594.32 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 3,994,916 cuft
Drainage area	= 161.570 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.40 min
Total precip.	= 7.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(101.690 x 98) + (59.880 x 82)] / 161.570



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

## Hyd. No. 1

DA-1

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.60	3.60	3.60	
Land slope (%)	= 0.50	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 23.42</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 23.42</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 308.00	0.00	0.00	
Watercourse slope (%)	= 0.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.14	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 4.50</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 4.50</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 6.00	22.00	200.00	
Wetted perimeter (ft)	= 9.00	17.00	100.00	
Channel slope (%)	= 0.50	0.40	0.50	
Manning's n-value	= 0.030	0.015	0.015	
Velocity (ft/s)	=2.68	7.47	11.18	
Flow length (ft)	1378.0	1342.0	1305.0	
<b>Travel Time (min)</b>	<b>= 8.58</b>	<b>+ 3.00</b>	<b>+ 1.95</b>	<b>= 13.52</b>
<b>Total Travel Time, Tc</b> .....				<b>41.40 min</b>

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

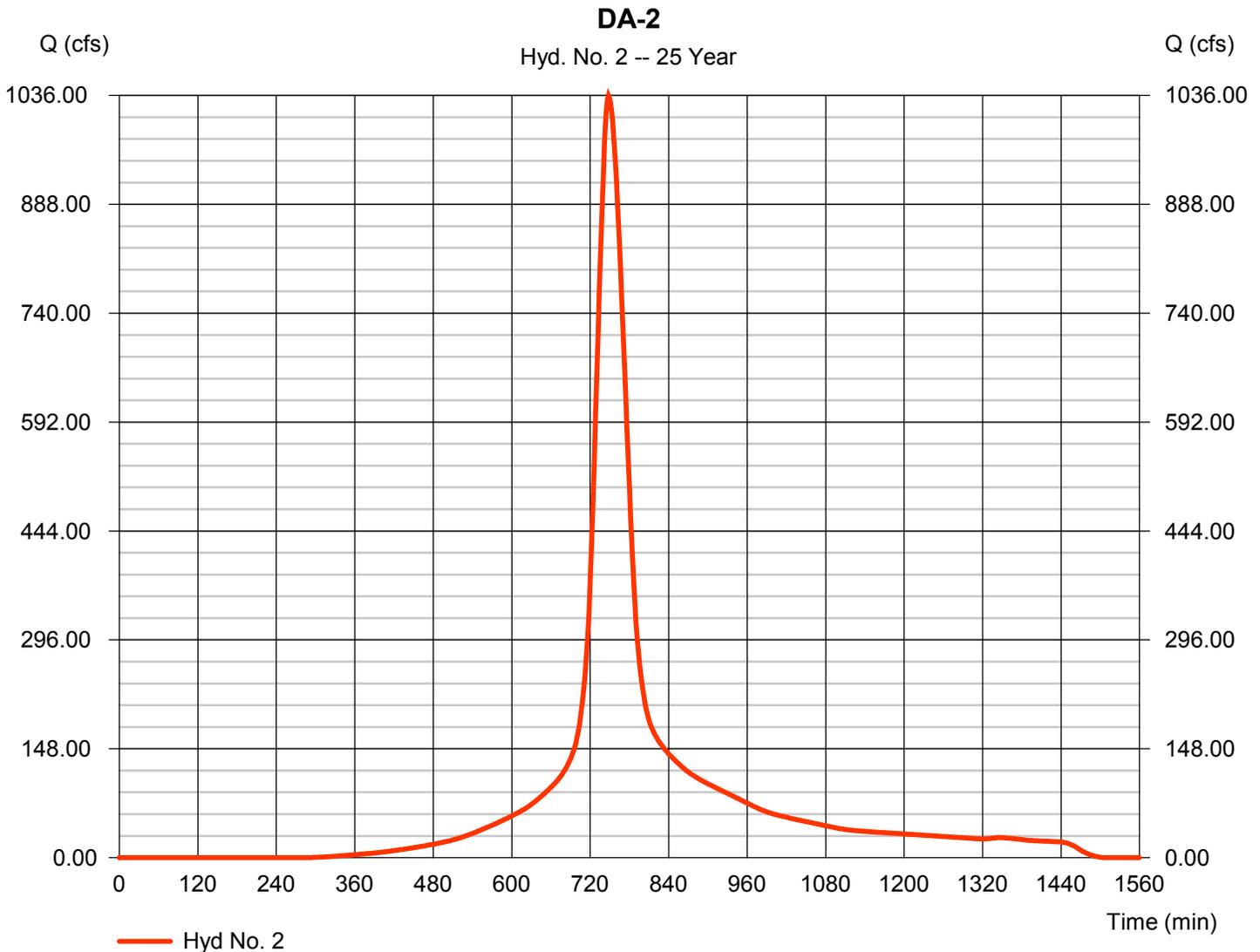
Thursday, Jan 6, 2011

## Hyd. No. 2

DA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1035.88 cfs
Storm frequency	= 25 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 6,655,418 cuft
Drainage area	= 312.690 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.60 min
Total precip.	= 7.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(93.380 x 98) + (219.310 x 78)] / 312.690



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

## Hyd. No. 2

DA-2

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.240	0.011	0.011	
Flow length (ft)	= 100.0	0.0	0.0	
Two-year 24-hr precip. (in)	= 3.60	0.00	0.00	
Land slope (%)	= 0.75	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 19.92</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 19.92</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 265.00	0.00	0.00	
Watercourse slope (%)	= 0.75	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.40	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 3.16</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 3.16</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 6.00	200.00	0.00	
Wetted perimeter (ft)	= 12.00	100.00	0.00	
Channel slope (%)	= 0.90	0.42	0.00	
Manning's n-value	= 0.030	0.030	0.015	
Velocity (ft/s)	=2.96	5.12	0.00	
Flow length (ft)	1222.5	3588.0	0.0	
<b>Travel Time (min)</b>	<b>= 6.88</b>	<b>+ 11.68</b>	<b>+ 0.00</b>	<b>= 18.56</b>
<b>Total Travel Time, Tc .....</b>				<b>41.60 min</b>

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

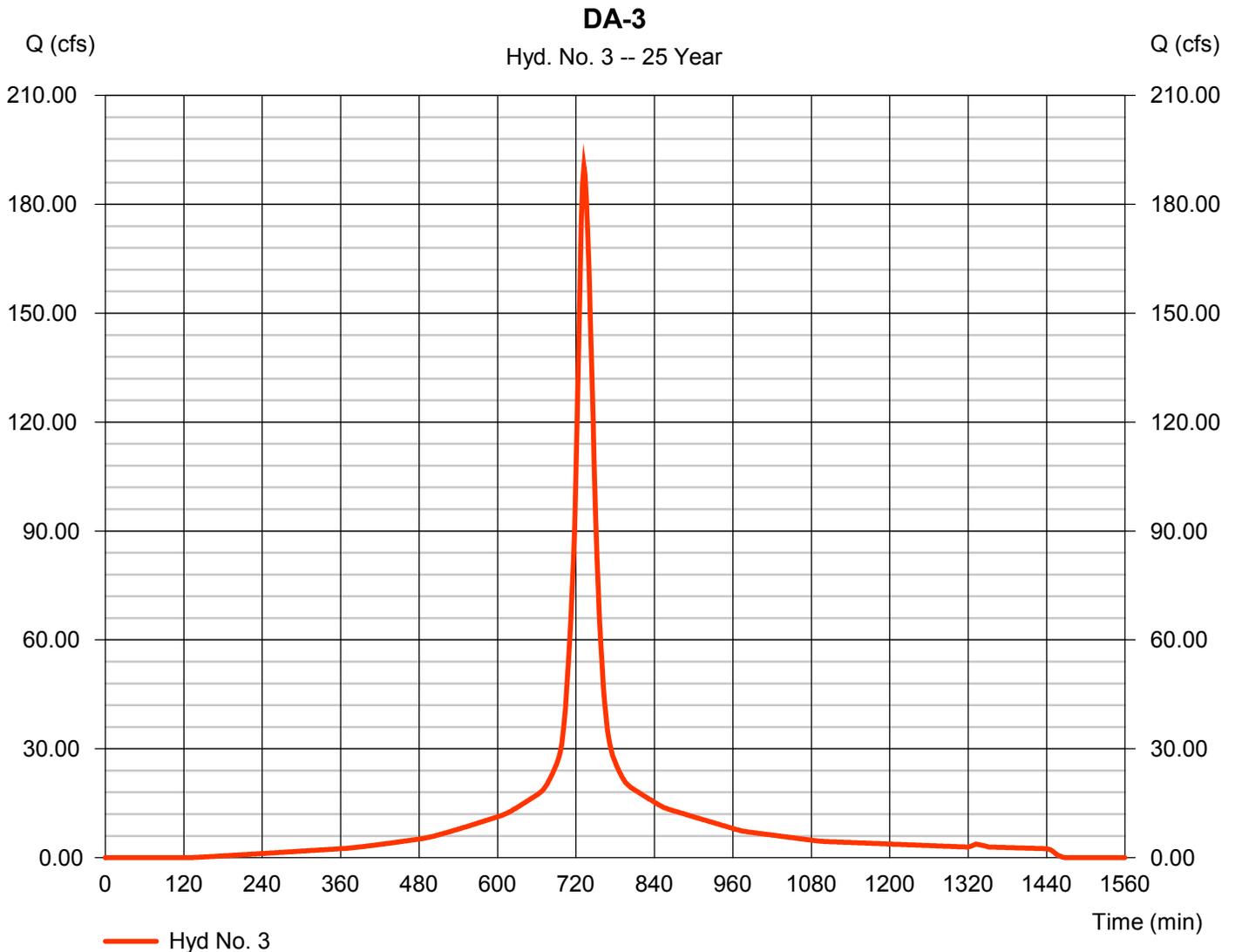
Thursday, Jan 6, 2011

## Hyd. No. 3

DA-3

Hydrograph type	= SCS Runoff	Peak discharge	= 190.39 cfs
Storm frequency	= 25 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 910,578 cuft
Drainage area	= 36.540 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.40 min
Total precip.	= 7.70 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) =  $[(22.000 \times 98) + (14.540 \times 86)] / 36.540$



# TR55 Tc Worksheet

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

## Hyd. No. 3

DA-3

<u>Description</u>	<u>A</u>	<u>B</u>	<u>C</u>	<u>Totals</u>
<b>Sheet Flow</b>				
Manning's n-value	= 0.011	0.011	0.011	
Flow length (ft)	= 10.0	90.0	0.0	
Two-year 24-hr precip. (in)	= 3.60	3.60	0.00	
Land slope (%)	= 2.00	0.50	0.00	
<b>Travel Time (min)</b>	<b>= 0.18</b>	<b>+ 1.83</b>	<b>+ 0.00</b>	<b>= 2.01</b>
<b>Shallow Concentrated Flow</b>				
Flow length (ft)	= 200.00	0.00	0.00	
Watercourse slope (%)	= 0.50	0.00	0.00	
Surface description	= Unpaved	Paved	Paved	
Average velocity (ft/s)	=1.14	0.00	0.00	
<b>Travel Time (min)</b>	<b>= 2.92</b>	<b>+ 0.00</b>	<b>+ 0.00</b>	<b>= 2.92</b>
<b>Channel Flow</b>				
X sectional flow area (sqft)	= 3.14	6.00	25.00	
Wetted perimeter (ft)	= 6.28	9.00	100.00	
Channel slope (%)	= 0.50	0.50	0.50	
Manning's n-value	= 0.015	0.030	0.030	
Velocity (ft/s)	=4.41	2.68	1.39	
Flow length (ft)	200.0	564.0	680.0	
<b>Travel Time (min)</b>	<b>= 0.76</b>	<b>+ 3.51</b>	<b>+ 8.17</b>	<b>= 12.44</b>
<b>Total Travel Time, Tc</b> .....				<b>17.40 min</b>

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

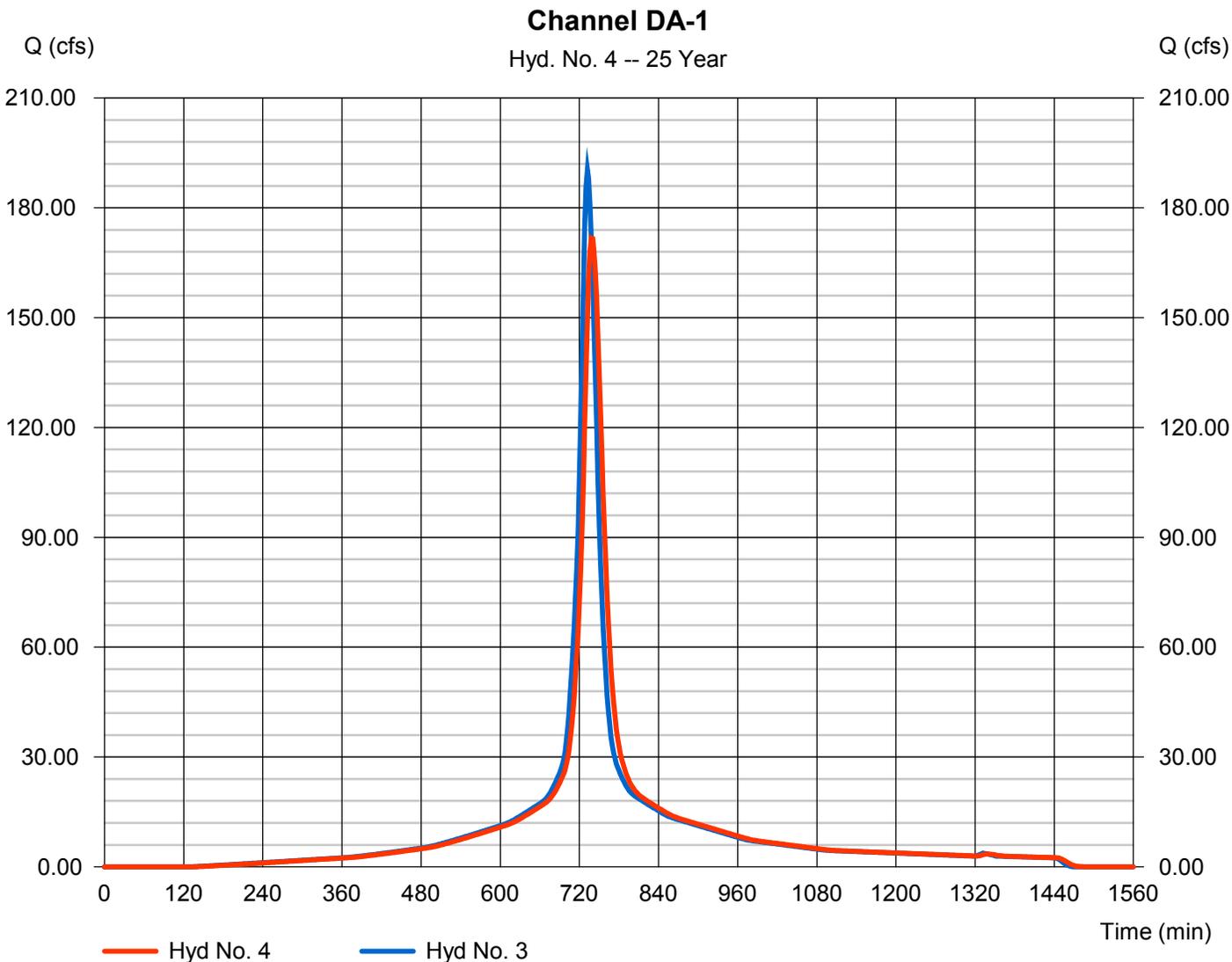
Thursday, Jan 6, 2011

## Hyd. No. 4

Channel DA-1

Hydrograph type	= Reach	Peak discharge	= 171.72 cfs
Storm frequency	= 25 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 910,574 cuft
Inflow hyd. No.	= 3 - DA-3	Section type	= Trapezoidal
Reach length	= 2183.0 ft	Channel slope	= 1.8 %
Manning's n	= 0.040	Bottom width	= 2.0 ft
Side slope	= 8.0:1	Max. depth	= 3.0 ft
Rating curve x	= 3.148	Rating curve m	= 1.135
Ave. velocity	= 5.13 ft/s	Routing coeff.	= 0.2760

Modified Att-Kin routing method used.



# Hydrograph Report

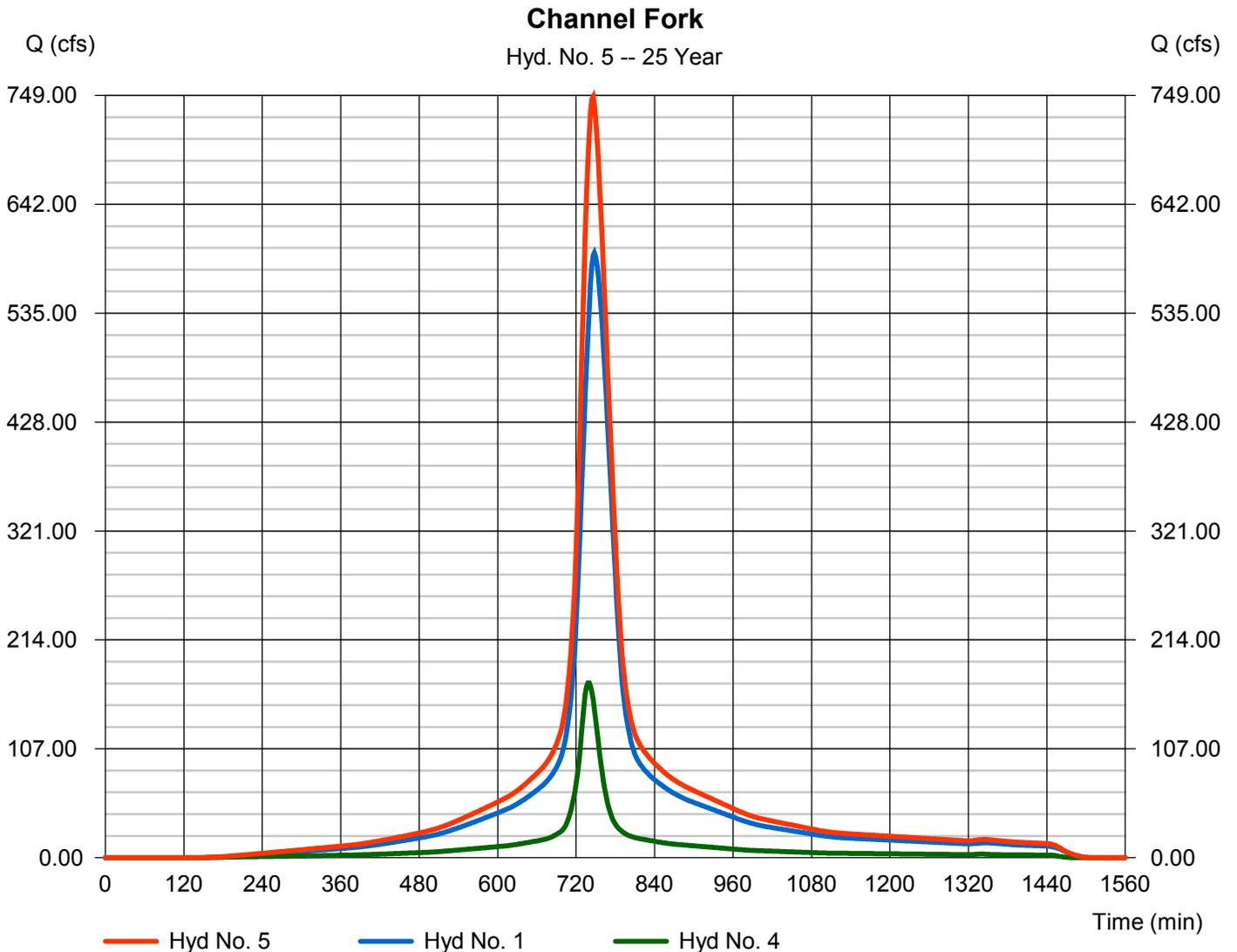
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 5

Channel Fork

Hydrograph type	= Combine	Peak discharge	= 747.60 cfs
Storm frequency	= 25 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 4,905,488 cuft
Inflow hyds.	= 1, 4	Contrib. drain. area	= 161.570 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

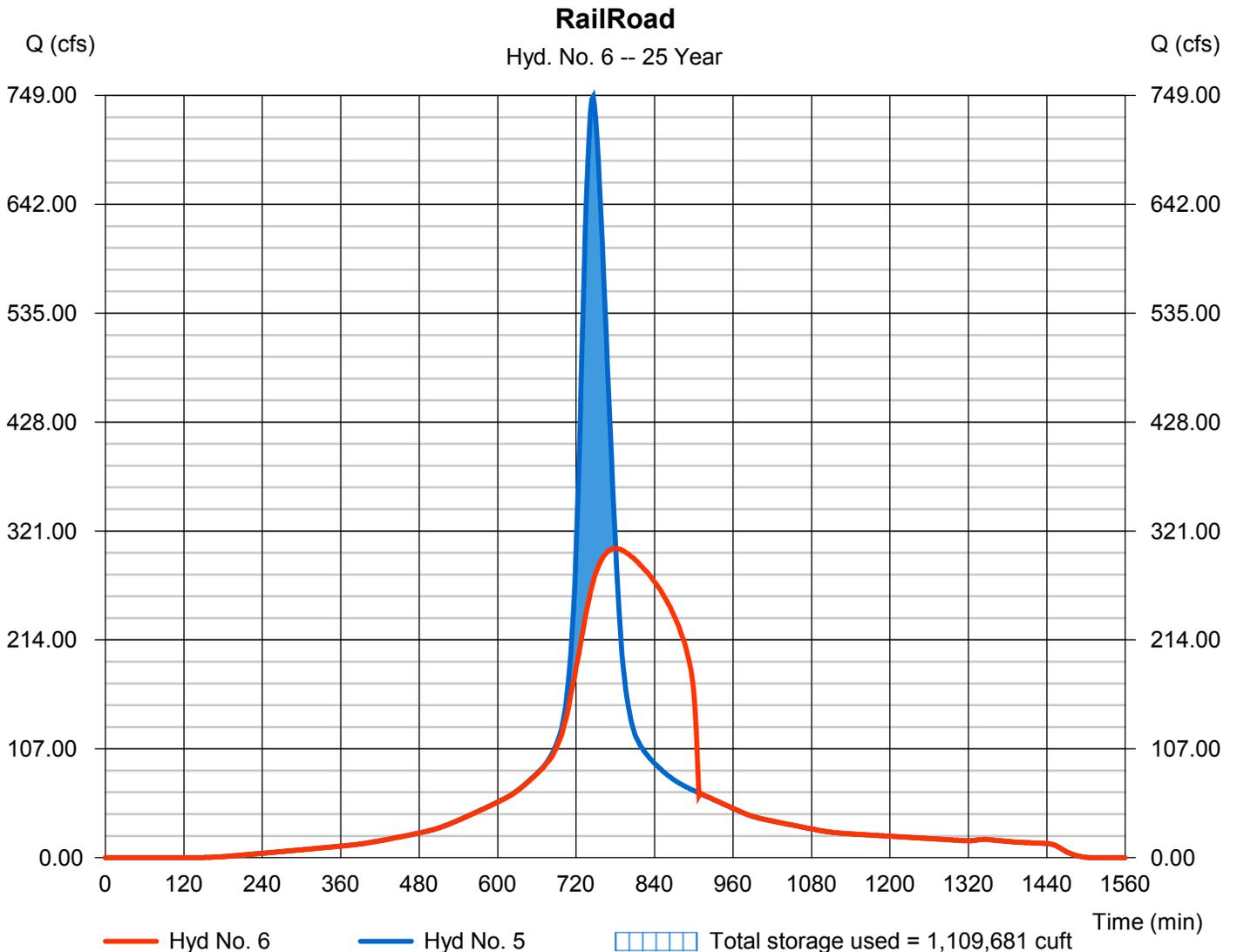
Thursday, Jan 6, 2011

## Hyd. No. 6

RailRoad

Hydrograph type	= Reservoir	Peak discharge	= 303.87 cfs
Storm frequency	= 25 yrs	Time to peak	= 780 min
Time interval	= 2 min	Hyd. volume	= 4,905,484 cuft
Inflow hyd. No.	= 5 - Channel Fork	Max. Elevation	= 938.71 ft
Reservoir name	= Railroad Pond	Max. Storage	= 1,109,681 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

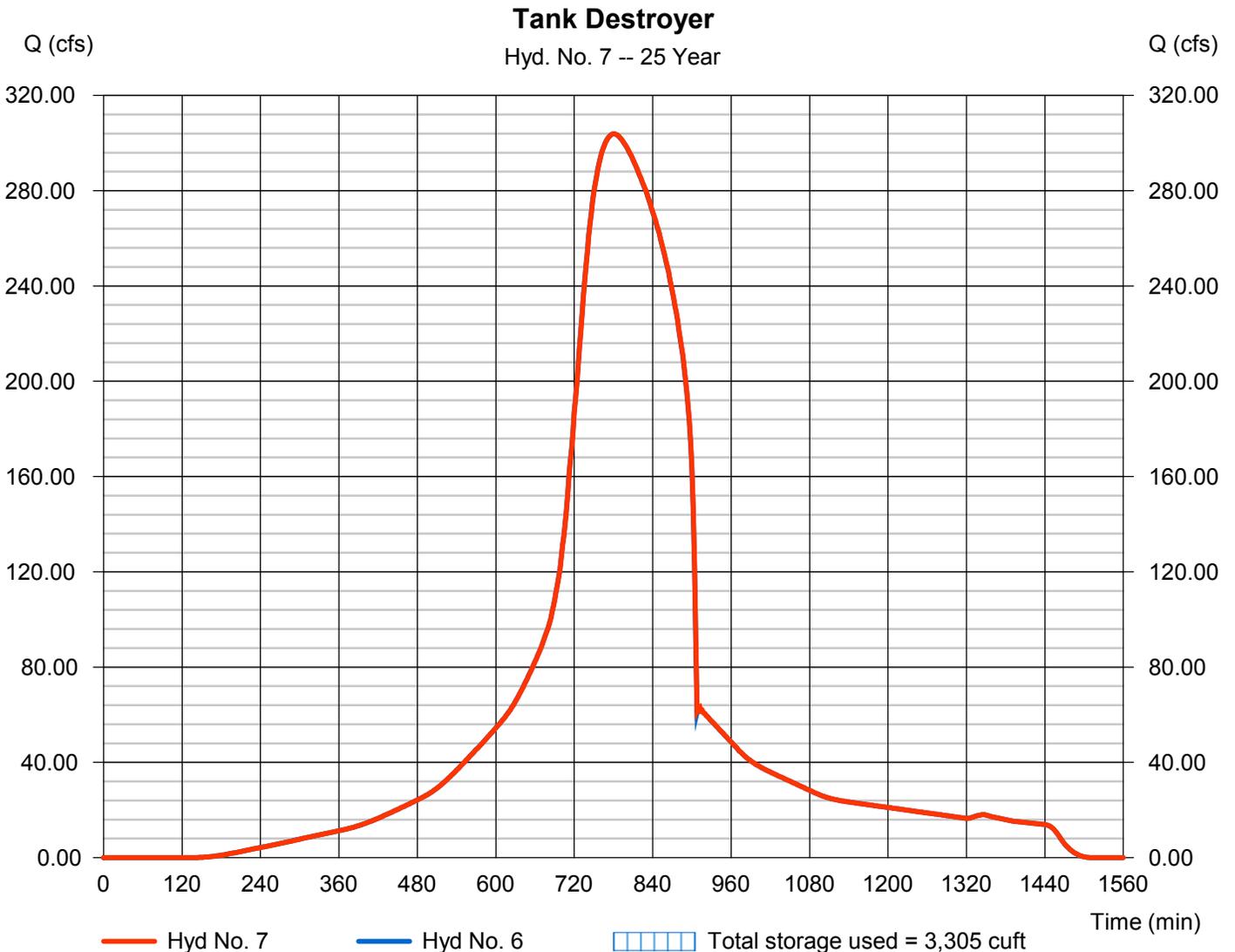
Thursday, Jan 6, 2011

## Hyd. No. 7

Tank Destroyer

Hydrograph type	= Reservoir	Peak discharge	= 303.86 cfs
Storm frequency	= 25 yrs	Time to peak	= 780 min
Time interval	= 2 min	Hyd. volume	= 4,905,487 cuft
Inflow hyd. No.	= 6 - RailRoad	Max. Elevation	= 927.67 ft
Reservoir name	= Tank Destroyer	Max. Storage	= 3,305 cuft

Storage Indication method used.





# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

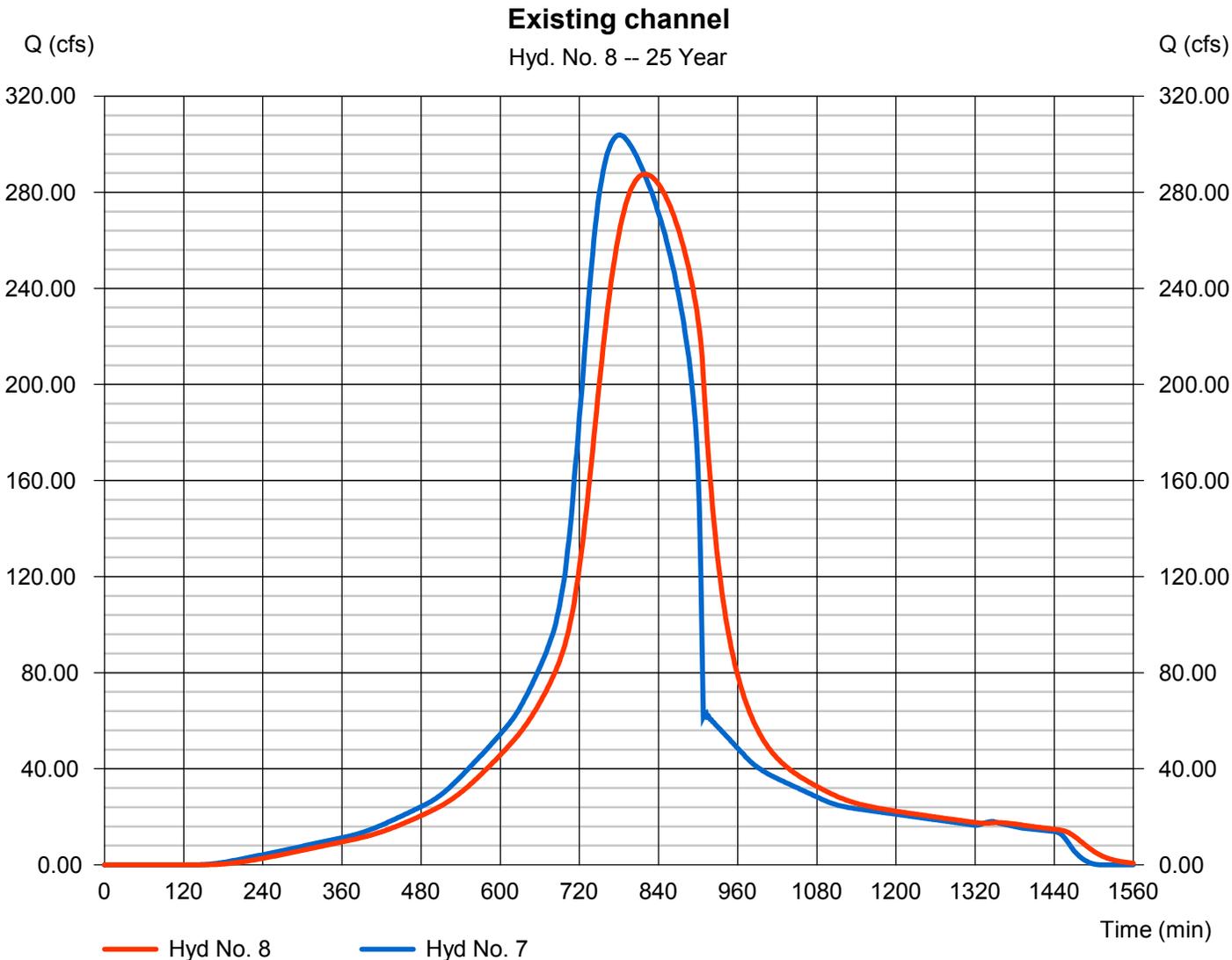
Thursday, Jan 6, 2011

## Hyd. No. 8

Existing channel

Hydrograph type	= Reach	Peak discharge	= 287.54 cfs
Storm frequency	= 25 yrs	Time to peak	= 820 min
Time interval	= 2 min	Hyd. volume	= 4,905,467 cuft
Inflow hyd. No.	= 7 - Tank Destroyer	Section type	= Trapezoidal
Reach length	= 4932.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.030	Bottom width	= 12.0 ft
Side slope	= 15.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.621	Rating curve m	= 1.263
Ave. velocity	= 2.25 ft/s	Routing coeff.	= 0.0669

Modified Att-Kin routing method used.



# Hydrograph Report

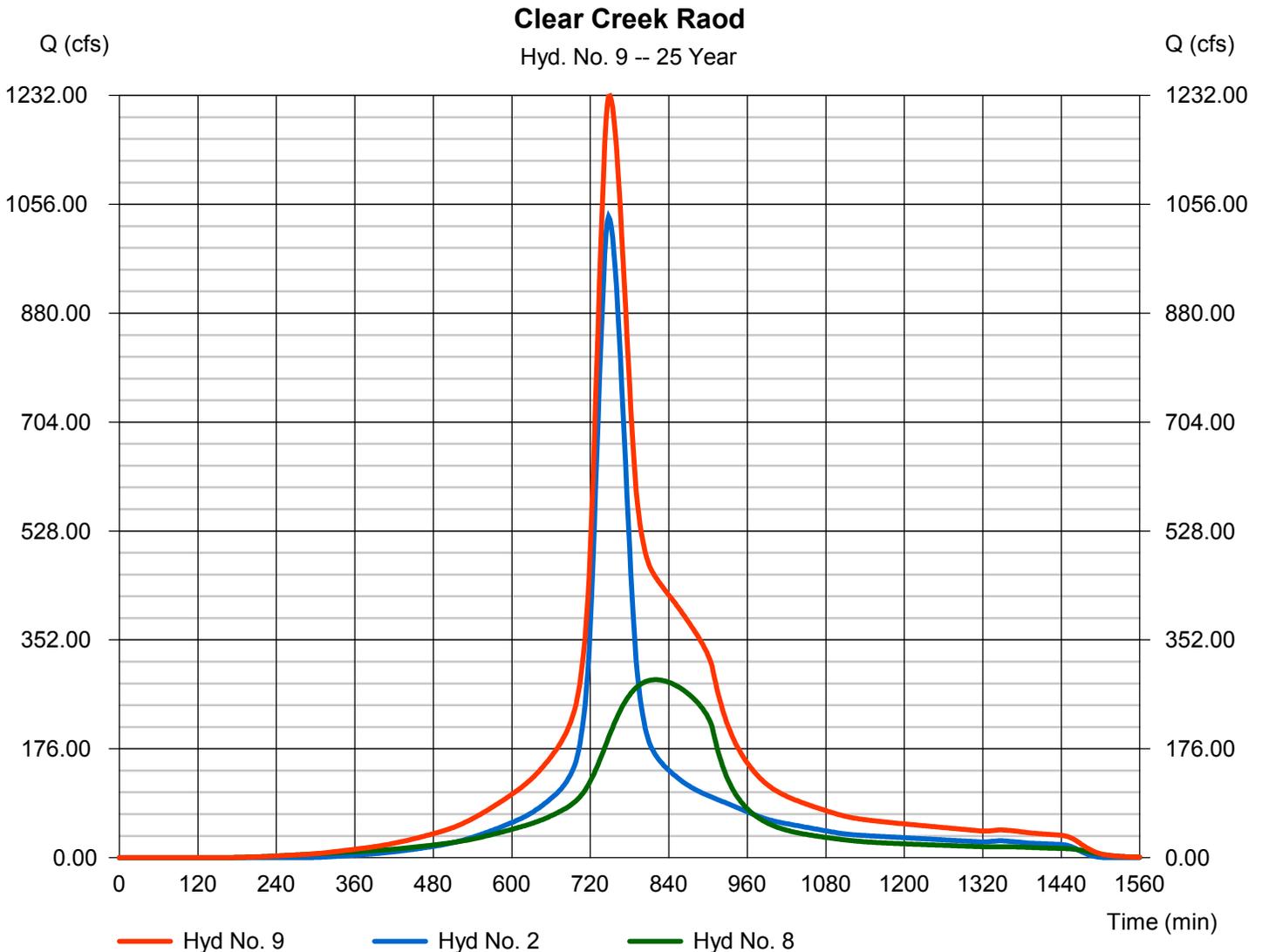
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 9

Clear Creek Raod

Hydrograph type	= Combine	Peak discharge	= 1231.04 cfs
Storm frequency	= 25 yrs	Time to peak	= 750 min
Time interval	= 2 min	Hyd. volume	= 11,560,890 cuft
Inflow hyds.	= 2, 8	Contrib. drain. area	= 312.690 ac



# Hydrograph Summary Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Hyd. No.	Hydrograph type (origin)	Peak flow (cfs)	Time interval (min)	Time to Peak (min)	Hyd. volume (cuft)	Inflow hyd(s)	Maximum elevation (ft)	Total strge used (cuft)	Hydrograph Description
1	SCS Runoff	800.03	2	748	5,463,025	-----	-----	-----	DA-1
2	SCS Runoff	1444.49	2	748	9,424,237	-----	-----	-----	DA-2
3	SCS Runoff	255.31	2	732	1,240,083	-----	-----	-----	DA-3
4	Reach	231.61	2	738	1,240,079	3	-----	-----	Channel DA-1
5	Combine	1005.38	2	746	6,703,101	1, 4	-----	-----	Channel Fork
6	Reservoir	334.15	2	784	6,703,100	5	940.96	1,794,033	RailRoad
7	Reservoir	334.15	2	786	6,703,098	6	928.01	3,801	Tank Destroyer
8	Reach	320.47	2	828	6,703,079	7	-----	-----	Existing channel
9	Combine	1665.68	2	748	16,127,320	2, 8	-----	-----	Clear Creek Raod
20101130-PRO5.gpw					Return Period: 100 Year			Thursday, Jan 6, 2011	

# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

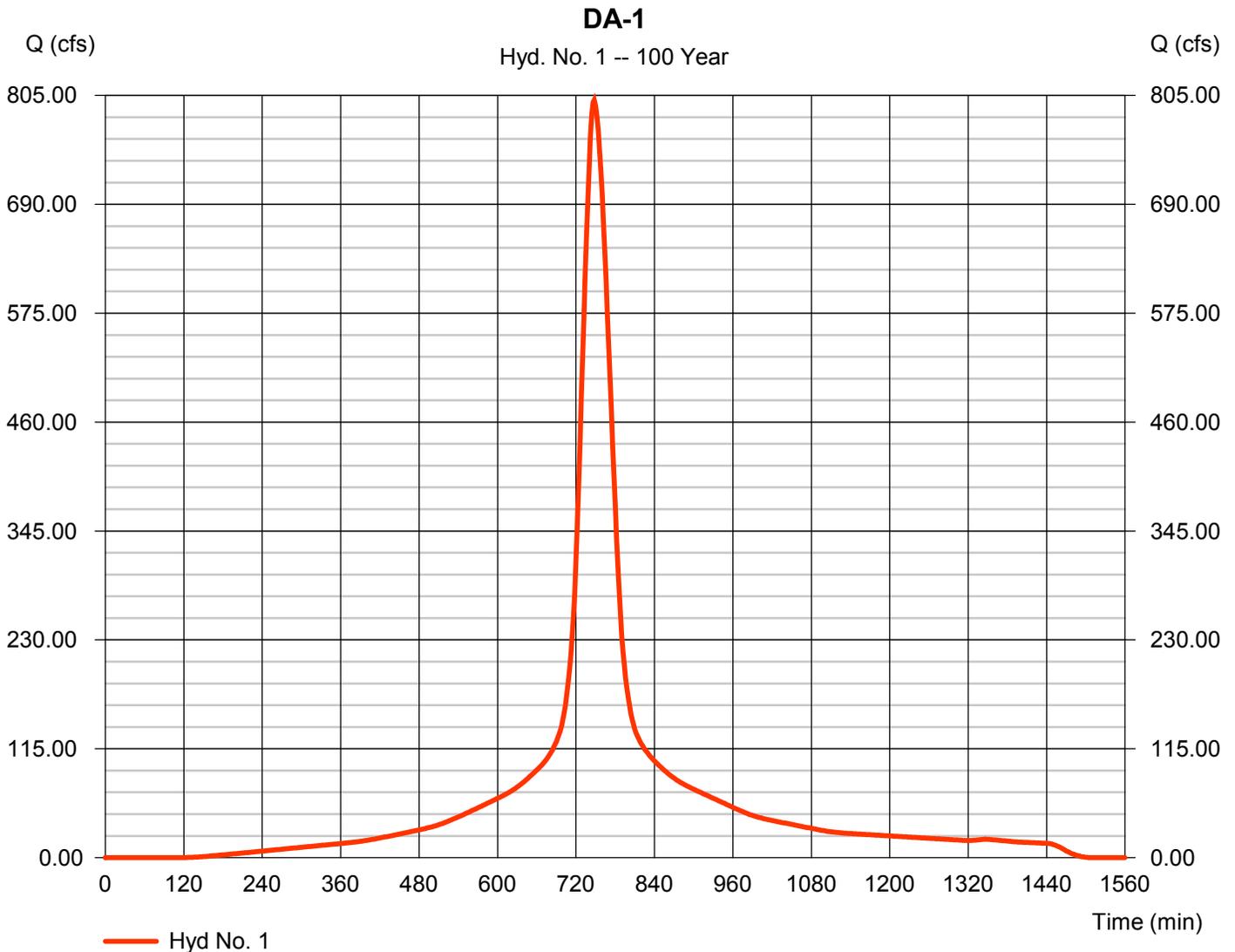
Thursday, Jan 6, 2011

## Hyd. No. 1

DA-1

Hydrograph type	= SCS Runoff	Peak discharge	= 800.03 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 5,463,025 cuft
Drainage area	= 161.570 ac	Curve number	= 92*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.40 min
Total precip.	= 10.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) =  $[(101.690 \times 98) + (59.880 \times 82)] / 161.570$



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

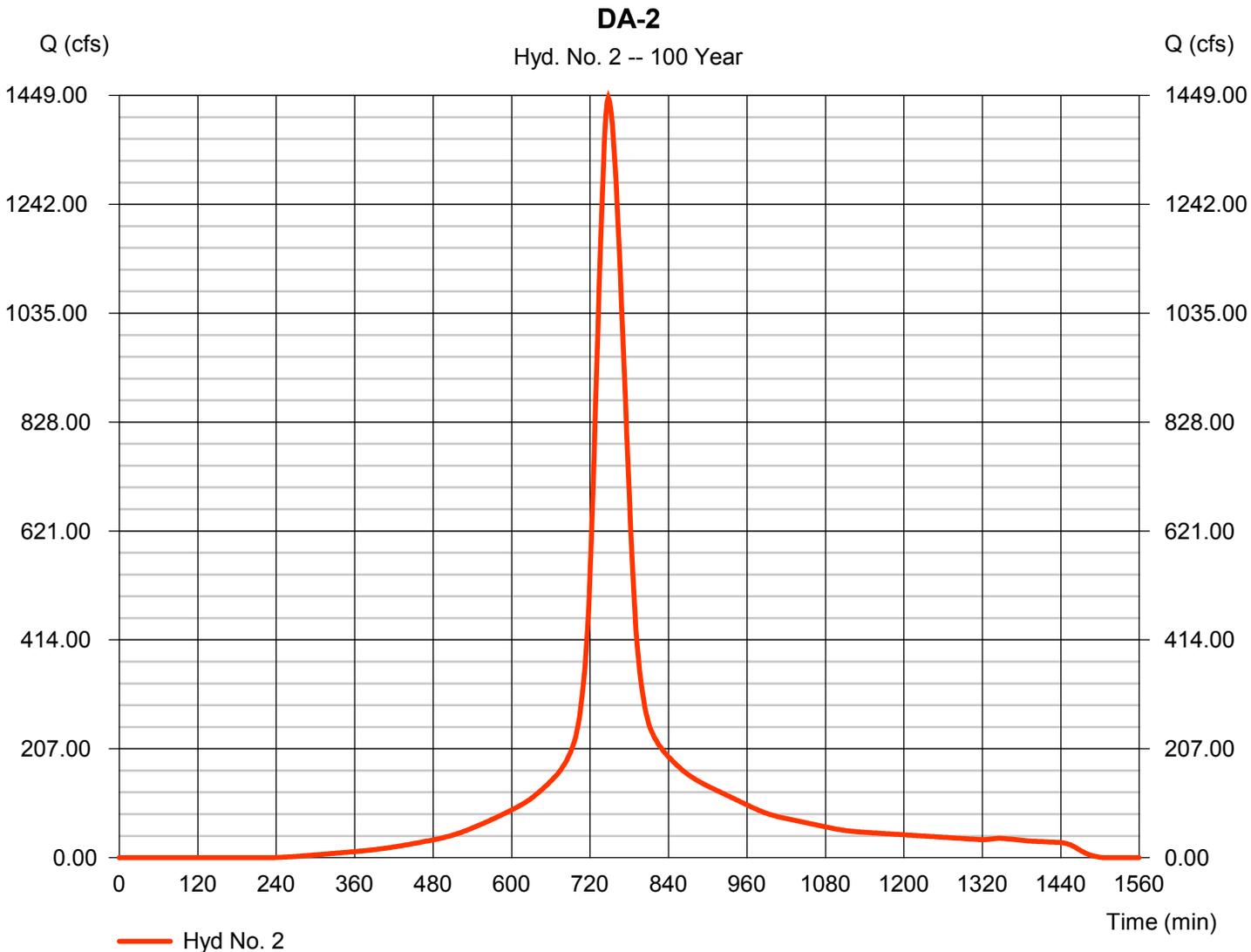
Thursday, Jan 6, 2011

## Hyd. No. 2

DA-2

Hydrograph type	= SCS Runoff	Peak discharge	= 1444.49 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 9,424,237 cuft
Drainage area	= 312.690 ac	Curve number	= 84*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 41.60 min
Total precip.	= 10.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(93.380 x 98) + (219.310 x 78)] / 312.690



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

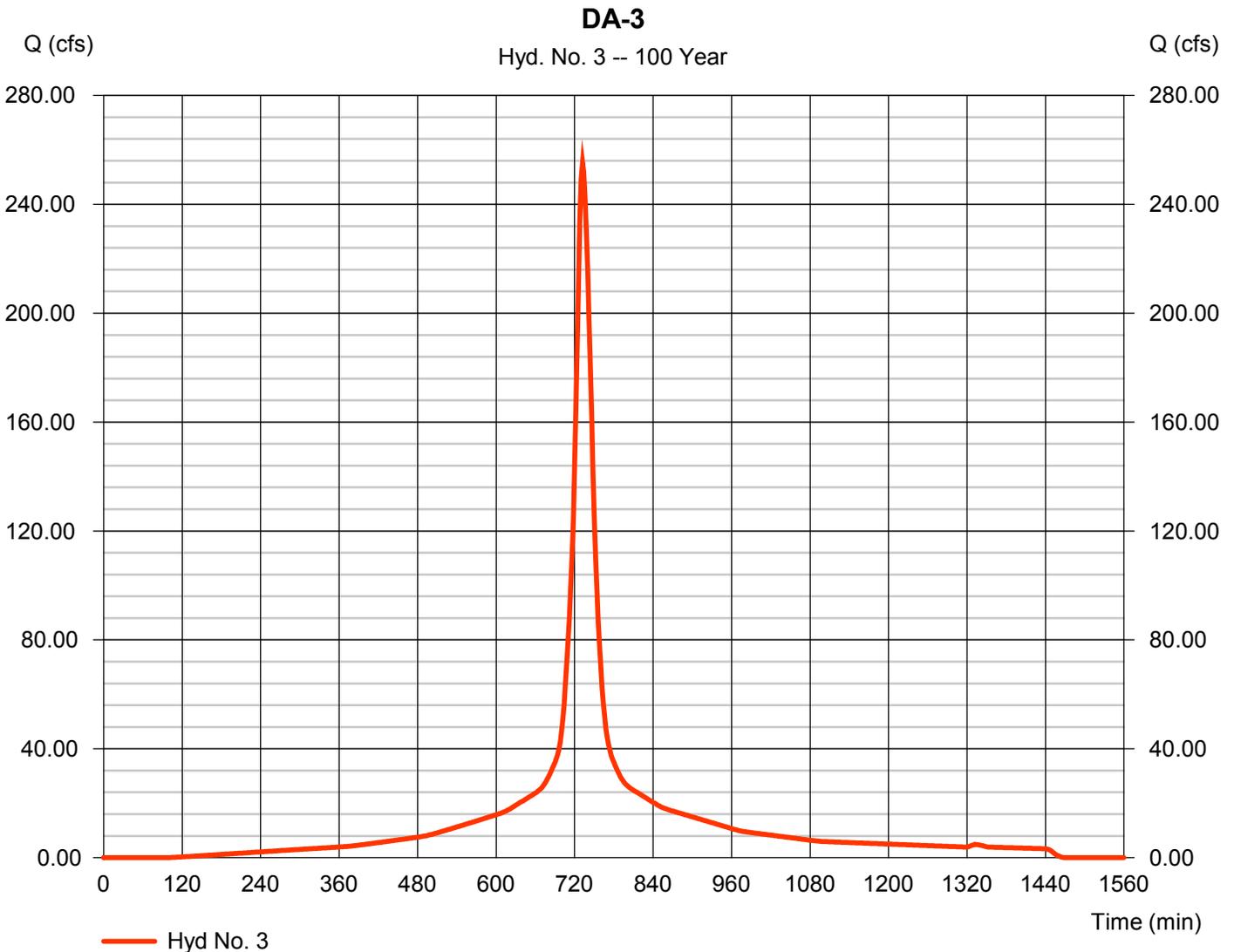
Thursday, Jan 6, 2011

## Hyd. No. 3

DA-3

Hydrograph type	= SCS Runoff	Peak discharge	= 255.31 cfs
Storm frequency	= 100 yrs	Time to peak	= 732 min
Time interval	= 2 min	Hyd. volume	= 1,240,083 cuft
Drainage area	= 36.540 ac	Curve number	= 93*
Basin Slope	= 0.0 %	Hydraulic length	= 0 ft
Tc method	= TR55	Time of conc. (Tc)	= 17.40 min
Total precip.	= 10.20 in	Distribution	= Type III
Storm duration	= 24 hrs	Shape factor	= 484

\* Composite (Area/CN) = [(22.000 x 98) + (14.540 x 86)] / 36.540



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

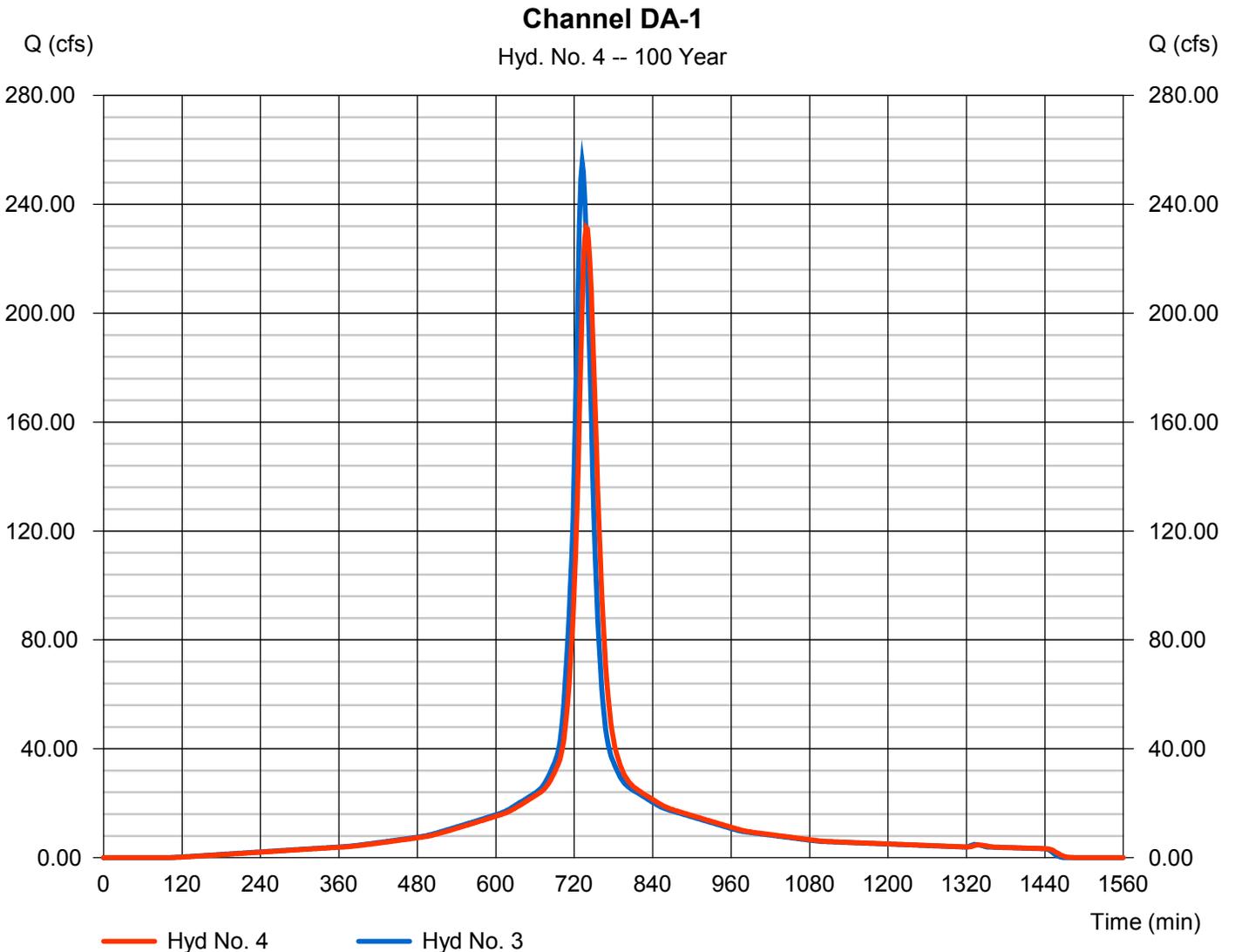
Thursday, Jan 6, 2011

## Hyd. No. 4

Channel DA-1

Hydrograph type	= Reach	Peak discharge	= 231.61 cfs
Storm frequency	= 100 yrs	Time to peak	= 738 min
Time interval	= 2 min	Hyd. volume	= 1,240,079 cuft
Inflow hyd. No.	= 3 - DA-3	Section type	= Trapezoidal
Reach length	= 2183.0 ft	Channel slope	= 1.8 %
Manning's n	= 0.040	Bottom width	= 2.0 ft
Side slope	= 8.0:1	Max. depth	= 3.0 ft
Rating curve x	= 3.148	Rating curve m	= 1.135
Ave. velocity	= 5.31 ft/s	Routing coeff.	= 0.2844

Modified Att-Kin routing method used.



# Hydrograph Report

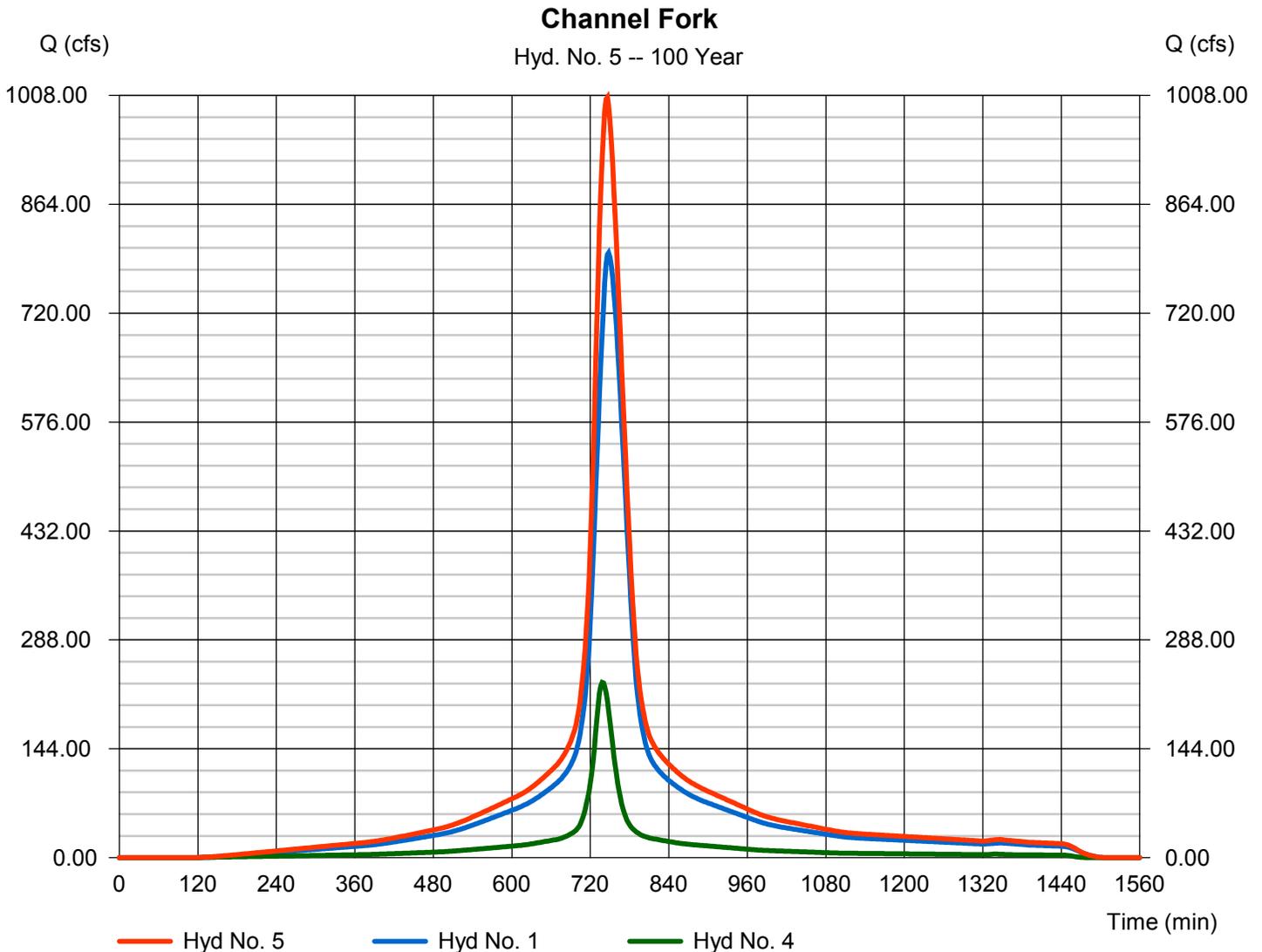
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 5

Channel Fork

Hydrograph type	= Combine	Peak discharge	= 1005.38 cfs
Storm frequency	= 100 yrs	Time to peak	= 746 min
Time interval	= 2 min	Hyd. volume	= 6,703,101 cuft
Inflow hyds.	= 1, 4	Contrib. drain. area	= 161.570 ac



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

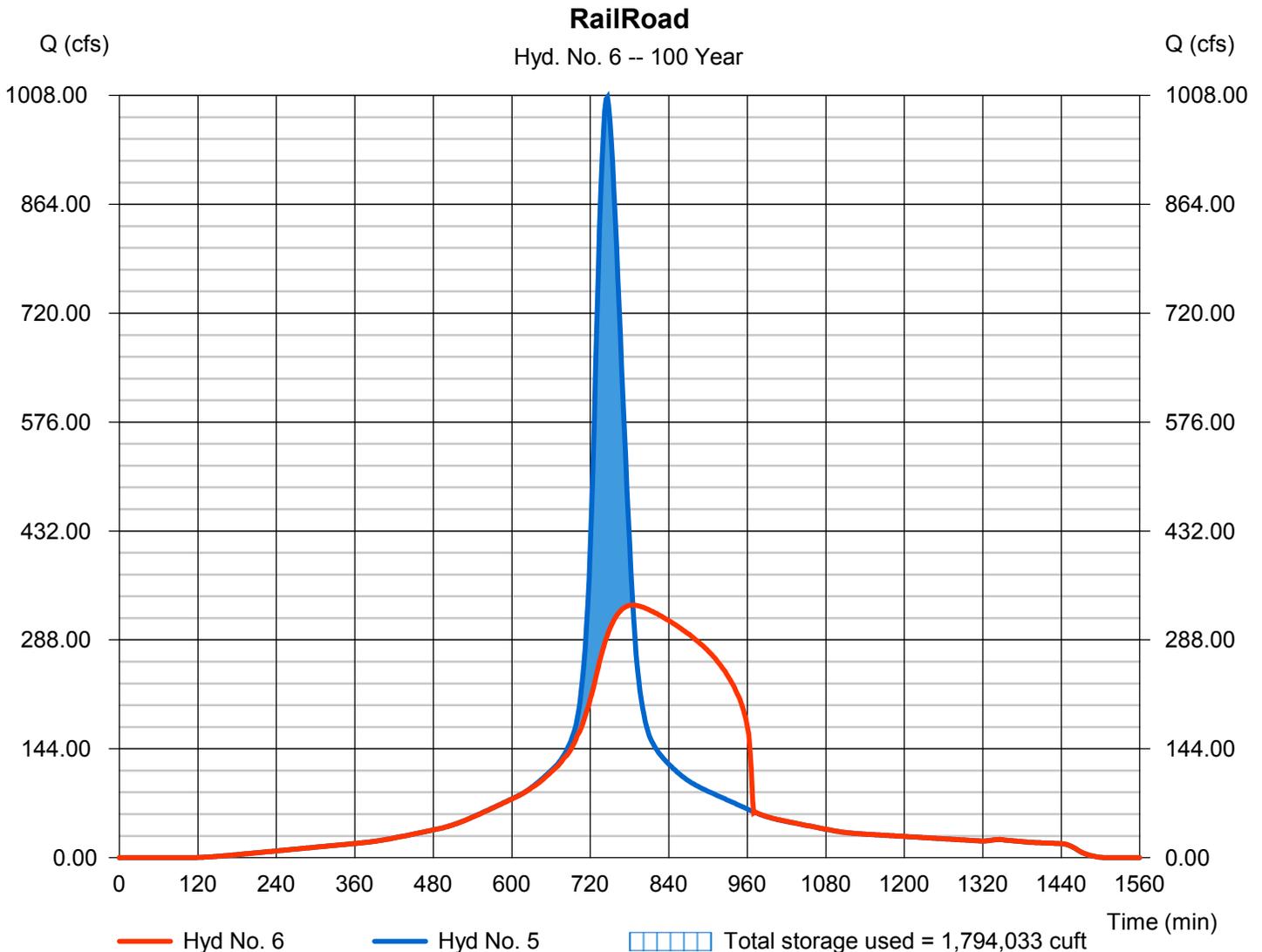
Thursday, Jan 6, 2011

## Hyd. No. 6

RailRoad

Hydrograph type	= Reservoir	Peak discharge	= 334.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 784 min
Time interval	= 2 min	Hyd. volume	= 6,703,100 cuft
Inflow hyd. No.	= 5 - Channel Fork	Max. Elevation	= 940.96 ft
Reservoir name	= Railroad Pond	Max. Storage	= 1,794,033 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

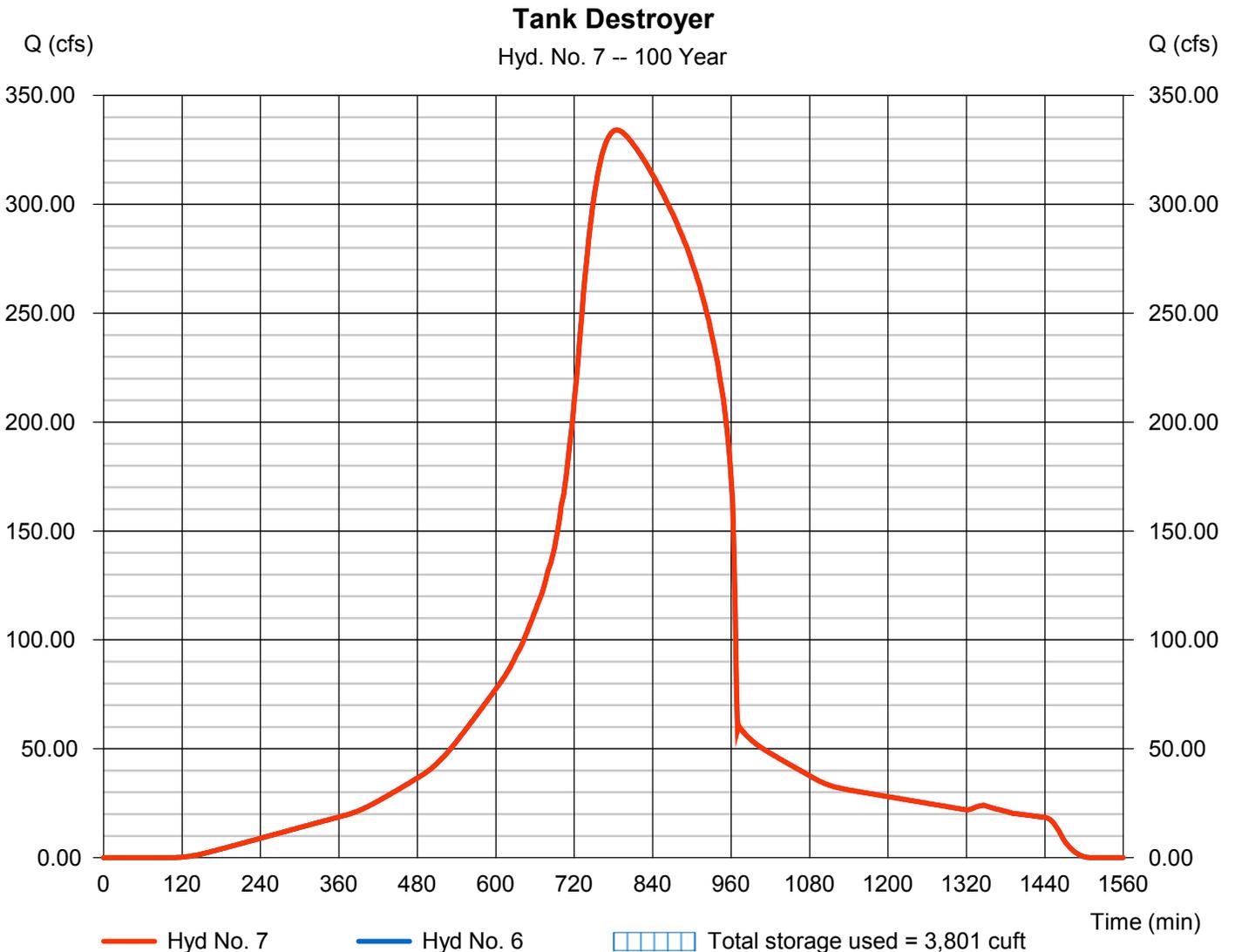
Thursday, Jan 6, 2011

## Hyd. No. 7

Tank Destroyer

Hydrograph type	= Reservoir	Peak discharge	= 334.15 cfs
Storm frequency	= 100 yrs	Time to peak	= 786 min
Time interval	= 2 min	Hyd. volume	= 6,703,098 cuft
Inflow hyd. No.	= 6 - RailRoad	Max. Elevation	= 928.01 ft
Reservoir name	= Tank Destroyer	Max. Storage	= 3,801 cuft

Storage Indication method used.



# Hydrograph Report

Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

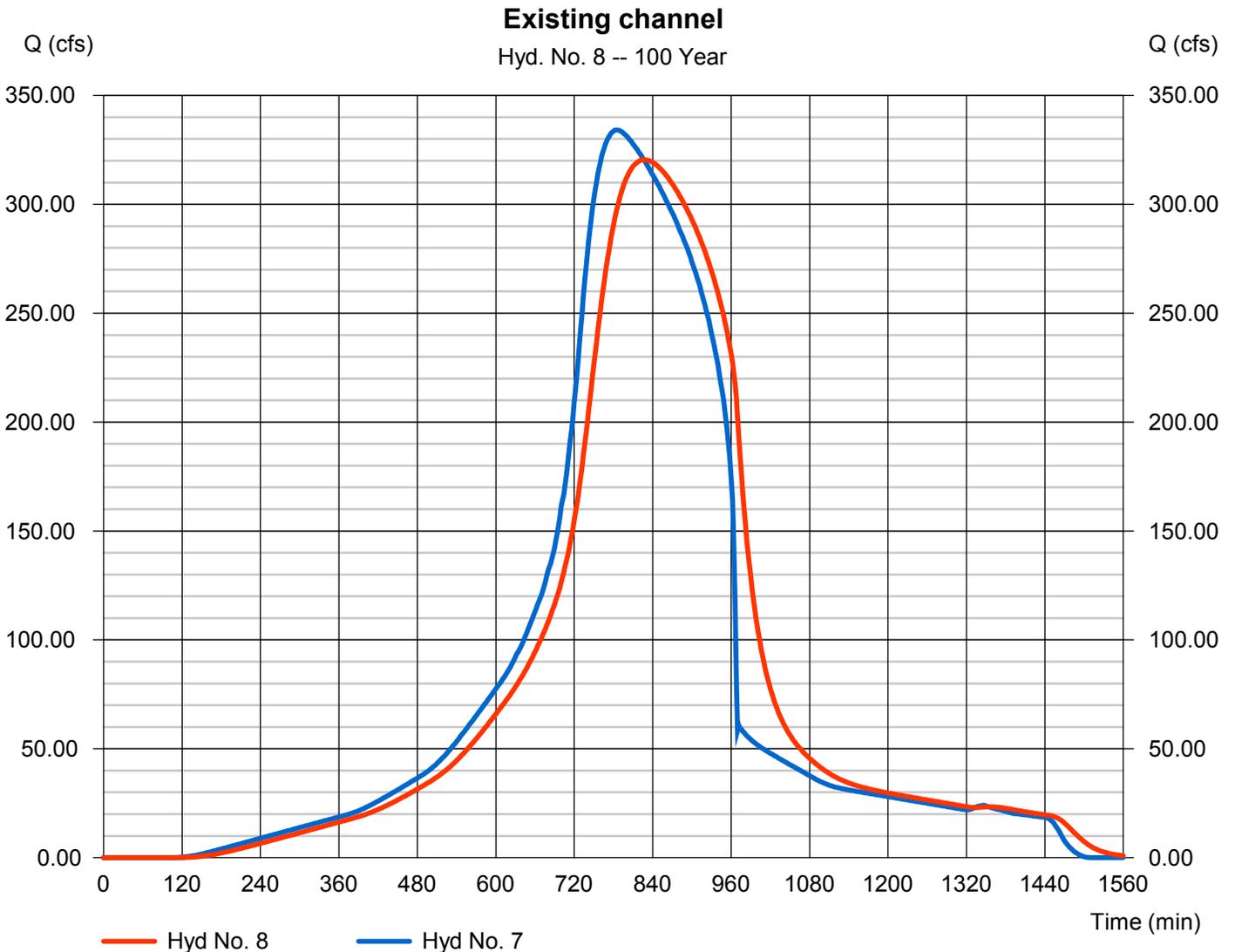
Thursday, Jan 6, 2011

## Hyd. No. 8

Existing channel

Hydrograph type	= Reach	Peak discharge	= 320.47 cfs
Storm frequency	= 100 yrs	Time to peak	= 828 min
Time interval	= 2 min	Hyd. volume	= 6,703,079 cuft
Inflow hyd. No.	= 7 - Tank Destroyer	Section type	= Trapezoidal
Reach length	= 4932.0 ft	Channel slope	= 0.4 %
Manning's n	= 0.030	Bottom width	= 12.0 ft
Side slope	= 15.0:1	Max. depth	= 3.0 ft
Rating curve x	= 0.621	Rating curve m	= 1.263
Ave. velocity	= 2.30 ft/s	Routing coeff.	= 0.0682

Modified Att-Kin routing method used.



# Hydrograph Report

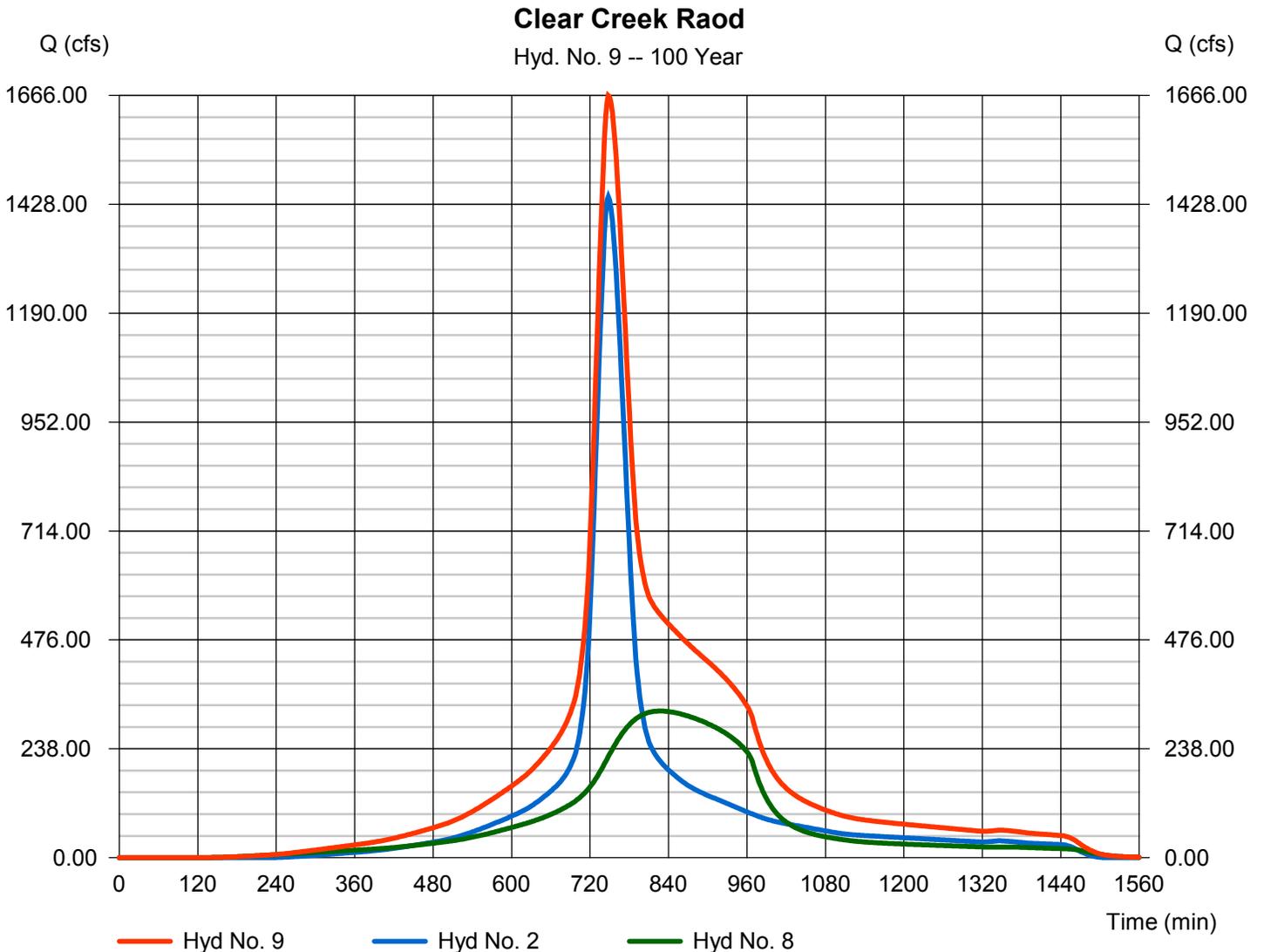
Hydraflow Hydrographs Extension for AutoCAD® Civil 3D® 2010 by Autodesk, Inc. v9.25

Thursday, Jan 6, 2011

## Hyd. No. 9

Clear Creek Raod

Hydrograph type	= Combine	Peak discharge	= 1665.68 cfs
Storm frequency	= 100 yrs	Time to peak	= 748 min
Time interval	= 2 min	Hyd. volume	= 16,127,320 cuft
Inflow hyds.	= 2, 8	Contrib. drain. area	= 312.690 ac



**Appendix D**

**Notice of Intent for  
Stormwater Discharges Associated  
with Construction Activity under a  
NPDES General Permit and  
Notice of Termination**

**Environmental Assessment**

---

**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

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**Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)**

**TCEQ Office Use Only**

Permit No.: TXR15

RN:

CN:

Ref No:



**Sign up now for ePermits NOI at [www6.tceq.state.tx.us/steers](http://www6.tceq.state.tx.us/steers)  
Get Instant Permit Coverage and only pay a \$225 application fee.**

If filing a paper NOI you can pay the application fee on line? Go to <https://www6.tceq.state.tx.us/epay/>

**IMPORTANT:**

- Use the **INSTRUCTIONS** to fill out each question in this form.
- Use the attached **CUSTOMER CHECKLIST** to make certain all you filled out all required information.
- Incomplete applications **WILL** delay approval or result in **automatic Denial**.

**Renewal of General Permit**

Is this NOI to renew an ACTIVE permit?

Yes - What is your permit number? **Permit No. TXR15**

No - a permit number will be issued.

**Application Fee if mailing a paper NOI:**

You must pay the **\$325** Application Fee to TCEQ for the application to be considered complete. Payment and NOI must be mailed to separate addresses. See instructions for correct mailing addresses.

**Provide your payment information below, for us to verify payment of the application fee:**

Mailed:	Check/Money Order No.:	Company Name on checking account:
EPAY:	Voucher No.:	Is the Payment Voucher copy attached? Yes

**A. OPERATOR (applicant)**

1. If the applicant is currently a customer with TCEQ, what is the Customer Number (CN) issued to this entity?  
**CN** [\(Search Central Registry\)](#)

2. What is the Legal Name of the entity (applicant) applying for this permit?

*(The legal name must be spelled exactly as filed with the Texas Secretary of State, County, or in the legal document forming the entity.)*

3. What is the name and title of the person signing the application?

*(The person must be an official meeting signatory requirements in TAC 305.43(a).)*

Name:	Title:
-------	--------

4. What is the Operator's (applicant) mailing address as recognized by the **US Postal Service?** [\(verify at USPS.com\)](#)

Address:	Suite No./Bldg. No./Mail Code:	
City:	State:	ZIP Code:
Country Mailing Information (if outside USA):	Country Code:	Postal Code:

5. Phone No.: ( ) Extension:

6. Fax No.: ( ) E-mail Address:

7. Indicate the type of Customer:

- |                  |                            |                     |
|------------------|----------------------------|---------------------|
| Individual       | Sole Proprietorship-D.B.A. | Limited Partnership |
| Corporation      | Federal Government         | General Partnership |
| State Government | County Government          | City Government     |
| Other Government | Other (describe):          |                     |

8. Independent Operator:	Yes	No (If governmental entity, subsidiary, or part of a larger corporation, check "No".)
9. Number of Employees:	0-20; 21-100; 101-250; 251-500; or 501 or higher	
10. Customer Business Tax and Filing Numbers <i>(This item is not applicable to Individuals, Government, GP or Sole Proprietor.)</i> <b>REQUIRED</b> for Corporations and Limited Partnerships ( <b>Verify the entity's status and filing no. with TX SOS at 512/463-5555</b> )		
State Franchise Tax ID Number:		Federal Tax ID:
TX SOS Charter (filing) Number:		DUNS Number (if known):
<b>B. APPLICATION CONTACT</b>		
If TCEQ needs additional information regarding this application, who should be contacted?		
1. Name:	Title:	Company:
2. Phone No.: (        )	Extension:	
3. Fax No.:	E-mail Address:	
<b>C. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE</b>		
1. TCEQ Issued RE Reference Number (RN): <b>RN</b> <b>(Search <a href="#">Central Registry</a>)</b>		
2. Name of Project or Site (the name as known by the community where this facility/project is located):  (example: phase and name of subdivision or name of project that's unique to the site)		
3. Does the site have a physical address? <b>If Yes</b> , complete <b>Section A</b> for a physical address. <b>If No</b> , complete <b>Section B</b> for site location information.		
<b>Section A:</b> Enter the physical address for the site. <b>(verify it with <a href="#">USPS.com</a> or other delivery source)</b>		
Street Number:		Street Name:
City:		ZIP Code:
<b>Section B:</b> Enter the site location information.		
If no physical address (Street Number & Street Name), provide a written location access description to the site: (Ex.: phase 1 of Woodland subdivision located 2 miles west from intersection of Hwy 290 & IH35 accessible on Hwy 290 South)		
City where the site is located or nearest city to site:		ZIP Code where site is located:
4. Identify the county where the site is located:		
5. Latitude:		Longitude:
6. What is the primary business of this entity? In your own words, briefly describe the primary business of the Regulated Entity: (Do not repeat the SIC and NAICS code)		
7. What is the mailing address for the regulated entity?		
Is the RE mailing address the same as the Operator?		Yes, address is the same as Operator      No, provide the address
Street Number:		Street Name:
City:	State:	ZIP Code:
<b>D. GENERAL CHARACTERISTICS</b>		
1. Is the site located on Indian Country Lands?      No      Yes – If Yes, do not submit this NOI. Contact EPA, Region VI If the site is on Indian country lands, you must obtain authorization through EPA, Region VI.		
2. What is the Standard Industrial Classification (SIC) code (see instructions for common codes): <b>(Search <a href="#">Osha.gov</a>)</b>		
Primary:		Secondary:

3(a) What is the total number of acres disturbed?

3(b) Is the project site part of a larger common plan of development or sale? Yes No

If **Yes**, the total number of acres disturbed can be less than 5 acres.

If **No**, the total number of acres disturbed must be 5 or more. If the total number of acres disturbed is less than 5 then the project site does not qualify for coverage through this Notice of Intent. Coverage will be denied. See the requirements in the general permit for small construction sites.

**4. Discharge Information (all information MUST be provided or the permit will be denied)**

4(a) What is the name of the water body(s) to receive the storm water runoff or potential runoff from the site?

4(b) What is the segment number(s) of the classified water body(s) that the discharge or potential discharge will eventually reach?

4(c) Are any of the surface water bodies receiving discharges from the construction site on the latest EPA-approved CWA 303(d) list of impaired waters?

Yes No

If **Yes**, provide the name of the impaired water body(s).

4(d) Is the discharge into an MS4? Yes No

If **Yes**, what is the name of the MS4 Operator?

Note: The general permit requires you to send a copy of the NOI to the MS4 Operator.

4(e) Is the discharge or potential discharge within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer?

Yes No

If the answer is **Yes**, please note that a copy of the agency approved Plan required by the Edwards Aquifer Rule (30 TAC Chapter 213) must be included or referenced in the Storm Water Pollution Prevention Plan.

**E. CERTIFICATION**

Check "Yes" to the certifications below. **Failure to certify to all items will result in denial.**

Yes	I certify that I have obtained a copy and understand the terms and conditions of the <a href="#">general permit (TXR150000)</a> .
-----	---

Yes	I certify that the full legal name of the entity (Operator) applying for this permit has been provided and is legally authorized to do business in Texas.
-----	---

Yes	I understand that a Notice of Termination (NOT) must be submitted when this authorization is no longer needed.
-----	--

Yes	I certify that a storm water pollution prevention plan has been developed and will be implemented prior to construction, and that is compliant with any applicable local sediment and erosion control plans, as required in the general permit TXR150000.
-----	---

**Operator Certification:**

I, \_\_\_\_\_  
Typed or printed name **(Required & must be legible)** Title **(Required & legible)**

certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the system, or those persons directly responsible for gathering the information, the information submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

I further certify that I am authorized under [30 Texas Administrative Code §305.44](#) to sign and submit this document, and can provide documentation in proof of such authorization upon request.

Signature: \_\_\_\_\_ Date: \_\_\_\_\_  
(Use blue ink)

## Did you complete everything? Use this checklist to be sure!

Are you ready to mail your form to TCEQ? Go to the General Information Section of the Instructions for mailing addresses.

Customer GP Notice of Intent Checklist <b>TXR150000</b>	
√	This checklist is for use by the operator to ensure a complete application. Missing information may result in denial of coverage under the permit. (See NOI Process description in the Instructions)
	<b>Application Fee of \$325.00</b> was mailed separately to TCEQ's Cashiers's Office (separate from the NOI) or the EPAY payment voucher is attached.
	<b>OPERATOR INFORMATION</b> - Confirm each item is complete: √ Customer Number (CN) issued by TCEQ Central Registry Legal Name as filed to do business in Texas (Call TX SOS 512/463-5555) Name and Title of person signing the application. This person must meet signatory requirements in 30 TAC Section 305.43 Operator Mailing Address is complete & verifiable with USPS. <a href="http://www.usps.com">www.usps.com</a> Phone Numbers/E-mail Address Type of Operator (Entity Type) Independent Operator Number of Employees For Corporations or Limited Partnerships – Tax ID and SOS Filing numbers are REQUIRED
	<b>Application Contact person</b> we can call for questions about this application.
	<b>REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE</b> - Confirm each item is complete: √ Regulated Entity Reference Number (RN) (if site is already regulated by TCEQ) Site/Project Name/Regulated Entity Site/Project (RE) Physical Address Please do not use a rural route or post office box for a site location <b>Or</b> if no physical address, the location information that includes description, zip code and city is listed. Latitude and Longitude <a href="http://www.terraserver.com/">TCEQ USGS Topographic Map Viewer</a> or <a href="http://www.terraserver.com/">http://www.terraserver.com/</a> Business description Site Mailing Address (checked same as operator or complete & verifiable with USPS. <a href="http://www.usps.com">www.usps.com</a> )
	<b>GENERAL CHARACTERISTICS</b> - Confirm each item is complete: √ Indian Country Lands –the facility is not on Indian Country Lands Standard Industrial Classification (SIC) code <a href="http://www.osha.gov/oshstats/sicser.html">www.osha.gov/oshstats/sicser.html</a> Acres Disturbed is provided and qualifies for coverage through a NOI. Common plan of development or for sale? Discharge Information: receiving water body segment number(s) is REQUIRED water body on the latest EPA-Approved Clean Water Act 303(d) list of impaired waters MS4 Operator Edwards Aquifer Rule
	<b>CERTIFICATION</b> Certification statements have been checked indicating “Yes” Signature meets <a href="#">30 Texas Administrative Code (TAC) §305.44</a> and is original and has been provided for the Operator.

# Notice of Intent (NOI) for Storm Water Discharges Associated with Construction Activity under TPDES General Permit (TXR150000)

## General Information and Instructions

### GENERAL INFORMATION

Where to Send the Notice of Intent (NOI) and other related forms:

BY REGULAR U.S. MAIL

Texas Commission on Environmental Quality  
Storm Water Processing Center (MC228)  
P.O. Box 13087  
Austin, TX 78711-3087

BY OVERNIGHT/EXPRESS MAIL

Texas Commission on Environmental Quality  
Storm Water Processing Center (MC228)  
12100 Park 35 Circle  
Austin, TX 78753

TCEQ Contact list:

Application Processing Questions relating to the status and form requirements:	512/239-3700, 512/245-0130 or <a href="mailto:swpermit@tceq.state.tx.us">swpermit@tceq.state.tx.us</a>
Technical Questions relating to the general permit:	512/239-4671 or <a href="mailto:swgp@tceq.state.tx.us">swgp@tceq.state.tx.us</a>
Environmental Law Division:	512/239-0600
Records Management for obtaining copies of forms submitted to TCEQ:	512/239-0900
Information Services for obtaining reports from program data bases (as available):	512/239-DATA (3282)
Financial Administration's Cashier's office:	512/239-0357 or 512/239-0187

Notice of Intent Process:

When your NOI is received by the program, the form will be processed as follows:

1. **Administrative Review:** Each item on the form will be reviewed for a complete response. In addition, the operator's legal name must be verified with Texas Secretary of State as valid and active (if applicable). The address(s) on the form must be verified with the US Postal service as an address receiving regular mail delivery. Never give an overnight/express mailing address.

2. **Notice of Deficiency:** If an item is incomplete or not verifiable as indicated above, a notice of deficiency (NOD) will be mailed to the operator. The operator will have 30 days to respond to the NOD. The response will be reviewed for completeness.

3. **Acknowledgment of Coverage:** An Acknowledgment Certificate will be mailed to the operator. This certificate acknowledges coverage under the general permit.

-or-

**Denial of Coverage:** If the application is too incomplete to process, or the operator fails to respond to the NOD or the response is inadequate, coverage under the general permit may be denied. If coverage is denied, the operator will be notified.

#### General Permit (Your Permit)

**If filing the NOI through ePermits online application**, coverage under the general permit begins the day the NOI is submitted to TCEQ through epermits. **Sign up now for on line NOI at <https://www6.tceq.state.tx.us/steers/>**

If mailing a paper NOI, coverage under the general permit begins **seven (7) days after a completed NOI is postmarked for delivery to the TCEQ**. You should have a copy of your general permit when submitting your application.

You may view and print your permit for which you are seeking coverage, on the TCEQ web site

[http://www.tceq.state.tx.us/permitting/water\\_quality/stormwater/TXR15\\_AIR.html](http://www.tceq.state.tx.us/permitting/water_quality/stormwater/TXR15_AIR.html).

#### General Permit Forms

The Notice of Intent (NOI), [Notice of Termination](#) (NOT), and [Notice of Change](#) (NOC) #20391 with instructions are available in Adobe Acrobat PDF format on the TCEQ web site [http://www.tceq.state.tx.us/permitting/water\\_quality/stormwater/TXR15\\_AIR.html](http://www.tceq.state.tx.us/permitting/water_quality/stormwater/TXR15_AIR.html).

Sign up now for on line Notice of Termination application at <https://www6.tceq.state.tx.us/steers/>

#### Change in Operator

An authorization under the general permit is not transferable. If the operator or owner of the regulated entity changes, the present permittee must submit a Notice of Termination and the new operator must submit a Notice of Intent. The NOT and NOI must be submitted not later than 10 days prior to the change in Operator status.

**TCEQ Central Registry Core Data Form**

The Core Data Form has been incorporated into this form. **Do not send a core data form to TCEQ.**

After final acknowledgment of coverage under the general permit, the program will assign a Customer Number (CN) and Regulated Entity Number (RN). For Construction Permits, a new RN will be assigned for each Notice of Intent filed with TCEQ, since construction project sites can overlap with other Customers. The RN assigned to your construction project will not be assigned to any other TCEQ authorization.

You can find the information on the Central Registry web site at [www12.tceq.state.tx.us/crpub/](http://www12.tceq.state.tx.us/crpub/). You can search by the Regulated Entity (RN), Customer Number (CN) or Name (Permittee), or by your permit number under the search field labeled "Additional ID". Capitalize all letters in the permit number.

The Customer (Permittee) is responsible for providing consistent information to the TCEQ, and for updating all CN and RN data for all authorizations as changes occur. For General Permits, a Notice of Change form must be submitted to the program area.

**Application Fees:**

**\$225.00 application fee** if submitting the NOI through ePermits.

**\$325.00 application fee** if submitting a paper NOI for processing.

The application fee is required to be paid at the time the NOI is submitted. Failure to submit payment at the time the application is filed will cause delays in acknowledgment or denial of coverage under the general permit.

• **Mailed Payments:**

**DO NOT mail your check with the original Notice of Intent application.**

Use the attached Application Fee payment submittal form if mailing the payment. Do not include a copy of the NOI.

**BY REGULAR U.S. MAIL**

Texas Commission on Environmental Quality  
Financial Administration Division  
Cashier's Office, MC-214      Cashier  
P.O. Box 13088  
Austin, TX 78711-3088

**BY OVERNIGHT/EXPRESS MAIL**

Texas Commission on Environmental Quality  
Financial Administration Division  
's Office, MC-214  
12100 Park 35 Circle  
Austin, TX 78753

• **ePAY Electronic Payment:**

Go to <https://www6.tceq.state.tx.us/epay/>

Select Water Quality, then select the fee category "GENERAL PERMIT CONSTRUCTION STORM WATER DISCHARGE NOI APPLICATION".

You must include a copy of the payment voucher with your NOI. Your NOI will not be considered complete without the payment voucher.

**The Annual Water Quality Fee has been consolidated into the Application Fee effective March 5, 2008. An annual fee will not be assessed and billed to operators on 9/1/2008. This does not relieve the operator of fees due for prior fiscal year assessments.**

The operator will continue to receive an invoice for payment of any past due annual fee. A 5% penalty will be assessed if the payment is received by TCEQ after the due date. Annual fee assessments cannot be waived as long as the authorization under the general permit was active on September 1 of the FY billed.

## INSTRUCTIONS FOR FILLING OUT THE NOI FORM

### A. OPERATOR (As defined in the general permit.)

#### 1. TCEQ Issued [Customer Number](#) (CN)

TCEQ's Central Registry will assign each customer a number that begins with "CN," followed by nine digits. **This is not a permit number**, registration number, or license number.

- If this customer has not been assigned a Customer Reference Number, leave the space for the Customer Reference Number blank.
- If this customer has already been assigned this number, enter the operator's Customer Reference Number in the space provided.

#### 2. Legal Name

Provide the legal name of the facility operator, as authorized to do business in Texas. The name must be provided exactly as filed with the Texas Secretary of State (SOS), or on other legal documents forming the entity, that is filed in the county where doing business. You may contact the SOS at 512/463-5555, or go to <http://www.sos.state.tx.us/corp/contact.shtml> for more information related to filing in Texas. If filed in the county where doing business, provide a copy of the legal documents showing the legal name.

#### 3. Name and Title of person signing the Notice of Intent application form. Signature meets [30 Texas Administrative Code \(TAC\) §305.44](#)

#### 4. Operator Mailing Address

Provide a complete mailing address for receiving mail from the TCEQ. The address must be verifiable with the US Postal Service at [www.usps.com](http://www.usps.com), for regular mail delivery (not overnight express mail). If you find that the address is not verifiable using the USPS web search, please indicate the address is used by the USPS for regular mail delivery.

#### 5. Phone Number

This number should correspond to this customer's mailing address given earlier. Enter the area code and phone number here. Leave "Extension" blank if this customer's phone system lacks this feature.

#### 6. Fax Number and E-mail Address

This number and E-mail address should correspond to operator's mailing address provided earlier. (Optional Information)

#### 7. Type of Entity

Check only one box that identifies the type of entity. Use the descriptions below to identify the appropriate entity type:

Individual is a customer who has not established a business, but conducts an activity that needs to be regulated by the TCEQ.

Sole Proprietorship— D.B.A. is a customer that is owned by only one person and has not been incorporated. This business may:

- be under the person's name
- have its own name ("doing business as," or d.b.a.)
- have any number of employees

Partnership is a customer that is established as a partnership as defined by the Texas Secretary of State's Office.

Corporation the customer meets all of these conditions:

- is a legally incorporated entity under the laws of any state or country
- is recognized as a corporation by the Texas Secretary of State
- has proper operating authority to operate in Texas.

Government- Federal, state, county, or city government (as appropriate)

the customer is either an agency of one of these levels of government or the governmental body itself.

Other is Estate, Trust, etc.

the customer does not fit one of the above descriptions. Enter a short description of the type of customer in the blank provided.

#### 8. Independent Operator

Check "No" if this customer is a subsidiary, part of a larger company, or is a governmental entity. Otherwise, check "Yes."

#### 9. Number of Employees

Check one box to show the number of employees for this customer's entire company, at all locations. This is not necessarily the number of employees at the site named in the NOI.

#### 10. State Franchise Tax ID Number

Corporations and limited liability companies that operate in Texas are issued a franchise tax identification number. If this customer is a corporation or limited liability company, enter this number here.

#### Federal Tax ID

All businesses, except for some small sole proprietors, individuals, or general partnerships should have a federal taxpayer identification number (TIN).

Enter this number here. Use no prefixes, dashes, or hyphens. Sole proprietors, individuals, or general partnerships do not need to provide a federal tax ID.

#### TX SOS Charter (filing) Number

Corporations and Limited Partnerships required to register with the Texas Secretary of State are issued a charter or filing number. You may obtain further information by calling SOS at 512/463-5555 <http://www.sos.state.tx.us/corp/contact.shtml>.

DUNS Number Most businesses have a DUNS (Data Universal Numbering System) number issued by Dun and Bradstreet Corp. If this customer has one, enter it here.
<b>B. Application Contact</b>
Provide the name, title and communication information of the person that TCEQ can contact for additional information regarding this application. <b>If the application is missing information and there is no contact person to call, the application may be denied.</b>
<b>C. REGULATED ENTITY (RE) INFORMATION ON PROJECT OR SITE</b>
1. <u>Regulated Entity Reference Number</u> (RN) This is a number issued by TCEQ's Central Registry to sites (a location where a regulated activity occurs) regulated by TCEQ. This is not a permit number, registration number, or license number. <ul style="list-style-type: none"> <li>• If this Regulated Entity has not been assigned a Regulated Entity Number, leave this space blank.</li> <li>• If this customer has been assigned this number, enter the operator's Regulated Entity Number.</li> </ul>
2. Site/Project Name/Regulated Entity If the site is already regulated by TCEQ, use the same name as on the existing <u>Regulated Entity Reference Number</u> (RN).  If new, provide the name of the site as known by the public in the area where the site is located. The name you provide on this application will be used in the TCEQ Central Registry as the Regulated Entity.
3. Site/Project (RE) Physical Address  <b>Section A:</b> Enter the complete physical address of where the site is located. This must be a street number and street name for a complete physical address. This address must be validated through US Postal Service or your local police (911 service) as a valid address. Please confirm this to be a complete and valid address. In some rural areas, new addresses are being assigned to replace rural route addresses. <b>Please do not use a rural route or post office box for a site location.</b>  <b>Section B:</b> If a site does not have an actual physical address that includes a street number and street name, then provide a complete written location access description, and the zip code and city where the site is located. For example: "The site is located 2 miles west from intersection of Hwy 290 & IH35, located on the southwest corner of the Hwy 290 South bound lane." This includes authorizations for construction projects such as highways and subdivision.
4. Identify the County where the site is located. If the site covers more than one county, provide the county that is most affected by the authorized activity and list the additional county(s) as secondary.
5. Latitude and Longitude Enter the latitude and longitude of the site in either degrees, minutes, and seconds or decimal form. For help obtaining the latitude and longitude, go to: <a href="#">TCEQ USGS Topographic Map Viewer</a> or <a href="http://www.terraserver.com/">http://www.terraserver.com/</a>
6. Description of Activity Regulated In your own words, briefly describe the primary business being conducted at the site. (A description specific to what you are doing that requires this authorization - Do not repeat the SIC Code(s).)
<b>SITE MAILING ADDRESS</b>
Provide a complete mailing address to be used by TCEQ for receiving mail at the site. In most cases, the address is the same as the operator. If so, simply place a check mark in the box. If you provide a different address, please verify the address with USPS as instructed above for the operator address.
<b>D. GENERAL CHARACTERISTICS</b>
1. <b>Indian Country Lands</b> If your site is located on Indian Country Lands, the TCEQ does not have authority to process your application. You must obtain authorization through EPA, Region VI, Dallas. Do not submit this form to TCEQ.  Indian Country means (1) all land within the limits of any American Indian reservation under the jurisdiction of the U.S. government, notwithstanding the issuance of any patent, and including rights-of-way running throughout the reservation; (2) all dependent Indian communities within the borders of the United States whether within the original or subsequently acquired territory thereof, and whether within or outside the limits of a State; and (3) all Indian allotments, the Indian titles which have not been extinguished, including rights-of-way running through the same.  Indian Tribe means any Indian Tribe, band, nation, or community recognized by the Secretary of the Interior and exercising substantial governmental duties and powers.
2. <b>Standard Industrial Classification (SIC) code</b> Provide the SIC code that best describes the construction activity being conducted at the site. Common SIC Codes related to construction activities include: 1521 Construction of Single Family Homes; 1522 Construction of Residential Bldgs. Other than Single Family Homes; 1541 Construction of Industrial Bldgs. and Warehouses; 1542 Construction of Non-residential Bldgs. other than Industrial Bldgs. and Warehouses; 1611 Highway & Street Construction, except Highway Construction; 1622 Bridge, Tunnel, & Elevated Highway Construction; 1623 Water, Sewer, Pipeline & Communications, and Power Line Construction. For help with SIC codes, go to: <a href="http://www.osha.gov/oshstats/sicses.html">www.osha.gov/oshstats/sicses.html</a>

### 3. Estimated Area of Land Disturbed

- 3(a). Provide the approximate number of acres that the construction site will disturb.  
3(b). Indicate if the site is part of a common plan of development or for sale.

Construction activities that disturb less than one acre, unless they are part of a larger common plan that disturbs more than one acre, do not require permit coverage.

Construction activities that disturb between one and five acres, unless they are part of a common plan that disturbs five acres or more acres, do not require submission of an NOI. Therefore, the estimated area of land disturbed should not be less than five, unless the project is part of a larger common plan that disturbs five or more acres.

"Disturb" means any clearing, grading, excavating, or other similar activities. If you have any questions about this item, please call the storm water technical staff at (512)239-4671.

### 4. Discharge Information

4 (a). The storm water may be discharged directly to a receiving stream or through a **MS4\*** from your site. It eventually reaches a receiving water body such as a local stream or lake, possibly via a drainage ditch. You must provide the name of the water body that receives the discharge from the site (a local stream or lake).

4 (b). The classified segment number(s) is REQUIRED to get coverage. Go to the link to find the segment number of the classified water body where storm water will flow <http://www.tceq.state.tx.us/compliance/monitoring/water/quality/data/wqm/viewer/viewer.html>. Call Water Quality Assessments at 512/239-4671 for further assistance. Another source for segments is: [http://www.tceq.state.tx.us/comm\\_exec/forms\\_pubs/pubs/gi-gi-316/index.html](http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/gi-gi-316/index.html)

4 (c). If any surface water body(s) receiving discharges from the construction site are on the latest EPA-approved CWA § 303(d) list of impaired waters, provide the name(s) of the water body(s).

EPA approved CWA 303d list of impaired waters can be found at: [Texas Water Quality Inventory and 303\(d\) List - Texas Commission on Environmental Quality - www.tceq.state.tx.us](http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/gi-gi-316/index.html)

4 (d). Identify the **MS4\*** Operator name if the storm water discharge is into an MS4.

**\*MS4 is an acronym for Municipal separate storm sewer system. MS4 is defined as a separate storm sewer system owned or operated by a state, city, town, county, district, association, or other public body (created by or pursuant to state law) having jurisdiction over disposal of sewage, industrial wastes, storm water, or other wastes, including special districts under state law such as a sewer district, flood control or drainage district, or similar entity, or an Indian tribe or an authorized Indian tribal organization, that discharges to water in the state.**

**For assistance, you may call the technical staff of the Water Quality Assessment & Standards Section at 512/239-4671.**

### 4 (e). Edwards Aquifer Rule

See maps on the TCEQ website to determine if the site is located within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer at [http://www.tceq.state.tx.us/compliance/field\\_ops/eapp/viewer.html](http://www.tceq.state.tx.us/compliance/field_ops/eapp/viewer.html).

If the discharge or potential discharge is within the Recharge Zone, Contributing Zone, or Contributing Zone within the Transition Zone of the Edwards Aquifer, a site specific authorization approved by the Executive Director under the Edwards Aquifer Protection Program (30 TAC Chapter 213) is required before construction can begin.

The general permit requires the approved Contributing Zone Plan or Water Pollution Abatement Plan to be included as a part of the Storm Water Pollution Prevention Plan. The certification must be answered "Yes" for coverage under the general permit.

### E. CERTIFICATIONS

Failure to indicate "Yes" to ALL of the certification items may result in denial of coverage under the general permit.

The certification must bear an original signature of a person meeting the signatory requirements specified under [30 Texas Administrative Code §305.44](http://www.tceq.state.tx.us/comm_exec/forms_pubs/pubs/gi-gi-316/index.html)

#### IF YOU ARE A CORPORATION:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(1) (see below). According to this code provision, any corporate representative may sign an NOI or similar form so long as the authority to sign such a document has been delegated to that person in accordance with corporate procedures. By signing the NOI or similar form, you are certifying that such authority has been delegated to you. The TCEQ may request documentation evidencing such authority.

#### IF YOU ARE A MUNICIPALITY OR OTHER GOVERNMENT ENTITY:

The regulation that controls who may sign an NOI or similar form is 30 Texas Administrative Code §305.44(a)(3) (see below). According to this code provision, only a ranking elected official or principal executive officer may sign an NOI or similar form. Persons such as the City Mayor or County Commissioner will be considered ranking elected officials. In order to identify the principal executive officer of your government entity, it may be beneficial to consult your city charter, county or city ordinances, or the Texas statute(s) under which your government entity was formed. An NOI or

similar document that is signed by a government official who is not a ranking elected official or principal executive officer does not conform to §305.44(a)(3). The signatory requirement may not be delegated to a government representative other than those identified in the regulation. By signing the NOI or similar form, you are certifying that you are either a ranking elected official or principal executive officer as required by the administrative code. Documentation demonstrating your position as a ranking elected official or principal executive officer may be requested by the TCEQ.

If you have any questions or need additional information concerning the signatory requirements discussed above, please contact the Texas Commission on Environmental Quality's Environmental Law Division at 512/239-0600.

### **30 Texas Administrative Code**

#### **§305.44. Signatories to Applications.**

(a) All applications shall be signed as follows.

(1) For a corporation, the application shall be signed by a responsible corporate officer. For purposes of this paragraph, a responsible corporate officer means a president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy or decision-making functions for the corporation; or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or having gross annual sales or expenditures exceeding \$25 million (in second-quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures. Corporate procedures governing authority to sign permit or post-closure order applications may provide for assignment or delegation to applicable corporate positions rather than to specific individuals.

(2) For a partnership or sole proprietorship, the application shall be signed by a general partner or the proprietor, respectively.

(3) For a municipality, state, federal, or other public agency, the application shall be signed by either a principal executive officer or a ranking elected official. For purposes of this paragraph, a principal executive officer of a federal agency includes the chief executive officer of the agency, or a senior executive officer having responsibility for the overall operations of a principal geographic unit of the agency (e.g., regional administrator of the EPA).

**Texas Commission on Environmental Quality**  
**General Permit Payment Submittal Form**  
**\$325 for a paper Construction NOI Application Fee**

Use this form to submit your Application Fee only if you are mailing your payment.

- Complete items 1 through 5 below:
- Staple your check in the space provided at the bottom of this document.
- Do not mail this form with your NOI form.
- Do not mail this form to the same address as your NOI.

**Mail this form and your check to:**

<p>BY REGULAR U.S. MAIL</p> <p>Texas Commission on Environmental Quality          Financial Administration Division          Cashier's Office, MC-214          P.O. Box 13088          Austin, TX 78711-3088</p>	<p>BY OVERNIGHT/EXPRESS MAIL</p> <p>Texas Commission on Environmental Quality          Financial Administration Division          Cashier's Office, MC-214          12100 Park 35 Circle          Austin, TX 78753</p>
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Fee Code: **GPA** General Permit: TXR150000

1. Check / Money Order No:
2. Amount of Check/Money Order:
3. Date of Check or Money Order:
4. Name on Check or Money Order:

**5. NOI INFORMATION**

If the check is for more than one NOI, list each Project/Site (RE) Name and Physical Address exactly as provided on the NOI. **DO NOT SUBMIT A COPY OF THE NOI WITH THIS FORM AS IT COULD CAUSE DUPLICATE PERMIT ENTRIES.**

See Attached List of Sites (If more space is needed, you may attach a list.)

Project/Site (RE) Name:

Project/Site (RE) Physical Address:

**Staple Check In This Space**

# **Appendix E**

# **Air Conformity Analysis**

**Environmental Assessment**

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**Construction and Operation of the New Clear Creek Shopping Center, Fort Hood, Texas**

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<b>Table 1: Proposed Facility</b>		
<b>Activity</b>	<b>Area</b>	
	<b>square feet</b>	<b>acres</b>
Main Building	270,000	6.20
Paved Area	466,732	10.71
Flatwork	18,110	0.42
<b>Total Graded Space</b>		<b>17.33</b>

**Table 2  
Preferred Alternative Vehicle Exhaust Emissions (2012)**

Activity	Equipment List	Equipment quantity	Days Used	Emission Factors <sup>1</sup> (lb/day)						Emissions (lbs/year)			
				NOx	VOC	CO	PM <sub>10</sub>			NOx	VOC	CO	PM <sub>10</sub>
Backhoe Excavation	Backhoe Loader	1	140	4.02	0.65	5.36	0.12			562.80	91.00	750.40	16.80
	Haul Truck	1	140	20.89	3.60	30.62	0.58			2924.60	504.00	4286.80	81.20
Cut and fill	Scraper	1	140	21.12	3.64	30.96	0.58			2956.80	509.60	4334.40	81.20
	Bulldozer	1	140	22.61	3.66	30.14	0.68			3165.40	512.40	4219.60	95.20
	Water Truck	1	140	20.89	3.60	30.62	0.58			2924.60	504.00	4286.80	81.20
Trenching	Trencher	1	100	5.82	1.00	8.53	0.16			582.00	100.00	853.00	16.00
	Track loader	1	100	4.02	0.65	5.36	0.12			402.00	65.00	536.00	12.00
Grading	Grader	1	120	10.22	1.76	14.98	0.28			1226.40	211.20	1797.60	33.60
	Bulldozer	1	120	22.61	3.66	30.14	0.68			2713.20	439.20	3616.80	81.60
	Water Truck	1	120	20.89	3.60	30.62	0.58			2506.80	432.00	3674.40	69.60
Concrete Slab pouring	Cement Truck	1	40	20.89	3.60	30.62	0.58			835.60	144.00	1224.80	23.20
Portable Equipment	Generator <sup>2</sup>	1	200	16.33	1.26	3.95	0.48			3266.00	252.00	790.00	96.00
	Air Compressor <sup>2</sup>	1	200	11.00	0.95	2.68	0.36			2200.00	190.00	536.00	72.00
Paving	Paving Machine	1	100	6.39	1.04	8.52	0.19			639.00	104.00	852.00	19.00
	Roller	1	100	5.01	0.86	7.34	0.14			501.00	86.00	734.00	14.00
Architectural Coatings	Air Compressor <sup>2</sup>	1	20	11.00	0.95	2.68	0.36			220.00	19.00	53.60	7.20
			Emissions lbs/day	223.7	34.5	273.1	6.5	Annual Emissions lbs/year		27,626.2	4,163.4	32,546.2	799.8
			Emissions tons/day	<b>0.11</b>	<b>0.017</b>	<b>0.14</b>	<b>0.0032</b>	<b>Annual Emissions TPY</b>		<b>13.81</b>	<b>2.08</b>	<b>16.27</b>	<b>0.40</b>

Notes:

1. Emission Factors from Table 4.4 of the El Dorado County APCD CEQA Guide.
2. Emission Factors for Generator and Air Compressor from Road Construction Emissions Model, 2010 Offroad EF worksheet.

<b>Table 3: Worker Trip Emissions (2012)</b>						
<b>Building Size</b>	<b>Trip Generation Factor (Trips/Day)<sup>1</sup></b>	<b>Pollutant</b>	<b>Emission Factor<sup>2</sup></b>	<b>Work Days in 2011<sup>3</sup></b>	<b>Annual Emissions</b>	
					<b>Lbs</b>	<b>Tons</b>
270,000	86	VOC	1.36	200	23,392	11.70
		NOX	0.97	200	16,684	8.34
		PM10	0.097	200	1,668	0.83
		CO	10.71	200	184,212	92.11

Notes:

1. Trip Factor from Table 4.8 of the El Dorado County APCD Guide (Trips/Day = 0.32/1,000 sf \* Building size).
2. Emission Factors interpolated from Table 4.9, Year 2010.
3. 20 Work Days per month for 10 months in 2011.

<b>Table 4: Fugitive Emissions (2012)</b>		
Emission Factor	0.22	tons/acre-month
Total area to be cleared	17.33	acres
No. of months	10	months <sup>1</sup>
PM10 Emissions	38.12	tons

Notes:

Emission Factor obtained from Table A-4 of the URBEMIS2007, Version 9.2, User's Guide.

1. One month is considered to include 20 working days with 8 hours of activity each day

<b>Table 5: VOC Emissions from Paving (2012)</b>				
Activity	Area (acres)	Emission Factor (lbs/acre-day)	Emissions	
			lb	tons
Off gas emissions (100 days activity)	10.71	2.62	2,807.25	1.40
<b>Total VOC Emissions</b>				<b>1.40</b>

Note:

Asphalt Paving VOC Emission Factor obtained from Table 4.6 of the El Dorado County APCD-CEQA Guide

<b>Table 6: VOC Emissions from Architectural Coatings (2012)</b>				
Activity	Area (sqft)	Emission Factor (lbs/day-sqft)	Emissions	
			lb	tons
Coatings (20 days activity)	270,000	1.63	16,939.46	8.47
<b>Total VOC Emissions</b>				<b>8.47</b>

Notes:

Emission Factor obtained from Table 4-7 of the El Dorado County APCD CEQA Guide.

For non-residential units,

$Em = (EF * \sqrt{Bsize}) * (Td + 3)$ , where EF = 1.63 lb/day-sqft for non residential units, Bsize = Building size sqft and Td = Total Painting days if known, otherwise assumed to be 17

<b>Table 7: Greenhouse Gas Emissions from Construction Vehicle Exhaust (2012)</b>						
<b>Pollutant</b>	<b>Emission Factor<sup>1</sup></b>	<b>Units</b>	<b>Amount<sup>2</sup></b>	<b>Units</b>	<b>Total Emissions</b>	<b>Units</b>
CO2	10.15	kg CO2/gallons	4020	Gallons	44.937225	tons
CH4	0.58	g/gallon	4020	Gallons	0.002568	tons
N2O	0.26	g/gallon	4020	Gallons	0.001151	tons
CO2 EQ					45.34	tons

Notes:

1. Emission factors from *California Climate Action Registry General Reporting Protocol* ([http://www.climateregistry.org/resources/docs/protocols/grp/GRP\\_3.1\\_January\\_2009.pdf](http://www.climateregistry.org/resources/docs/protocols/grp/GRP_3.1_January_2009.pdf)) for diesel fuel, Table C.3 for CO2 and Table C.6 for N2O and CH4.
2. Estimate 402 total gallons of fuel/month for 10 months used by construction equipment during 2012 (Table 4.1, El Dorado County APCD CEQA Guide).

<b>Table 8: Total Construction Emissions for the Facility (2012)</b>					
<b>Emission Source</b>	<b>Emissions (TPY)</b>				
	<b>VOC</b>	<b>NO<sub>x</sub></b>	<b>PM<sub>10</sub></b>	<b>CO</b>	<b>CO<sub>2</sub>EQ</b>
Vehicle Exhaust	2.08	13.81	0.40	16.27	45.34
Worker Trip Emissions	11.70	8.34	0.83	92.11	
Fugitive Emissions			38.12		
Asphalt Paving	1.40				
Architectural Coatings	8.47				
<b>TOTAL</b>	<b>23.65</b>	<b>22.16</b>	<b>39.36</b>	<b>108.38</b>	<b>45.34</b>