US CIVILIAN TEEN MALES
MODEL DESCRIPTION DOCUMENT (MDD)

Version 1.0

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DOCUMENT REVISION HISTORY		
Version	**Description**	**Date**
0.1	Draft	01/07/15
1.0	Initial Release	04/01/16

TABLE OF CONTENTS

TABLE OF FIGURES

TABLE OF TABLES

1   MODEL OVERVIEW

1.1   DESCRIPTION

This document details the 3-Dimensional (3D) models of US Civilian Teen Male characters.   The US Civilian Teen Male character models can be used with and without weapons and with a set of animations (see the specific weapons and animations Model Description Documents for more information). Weapons are attached and detached from the US Civilian Teen Male character models at specific attach points.   During runtime weapons are attached and detached to the model by the visualization system that controls the 3D model. These models can be used with any visualization system that can import FBX or COLLADA formats.

The US Civilian Teen Male character models were developed by Dignitas Technologies for the Underground and Urban Sim projects. The models designs were based on reference images found on the internet. To meet the project performance requirements, medium fidelity models were developed.

The US Civilian Teen Male character models components include:
- Button Down or T-Shirt
- Sneakers
- Jeans or Shorts

1.2   REFERENCES

- 3D_Model_Development_Process.docx
    - The 3D model development process details Dignitas Technologies' procedure for building 3D characters and animations.
- Character_Model_Specification.docx
    - The character model specification provides the requirements for developing 3D character models and attachments.

Teen Male 1   Teen Male 2

Teen Male 3   Teen Male 4

Figure 1 US Civilian Teen Male Character Models

2

1.3   MODEL VERSION AND HISTORY

Information about the model version can be found in the "Model_Version.txt" file located in the model's directory (same directory the model's .fbx file is located).

Table 1 Character Revision History

Version	Description	Date
1.0	Initial release of the US_Civilian_TeenMale1_skelmesh.fbx	05/04/16
1.0	Initial release of the US_Civilian_TeenMale2_skelmesh.fbx	05/04/16
1.0	Initial release of the US_Civilian_TeenMale3_skelmesh.fbx	05/04/16
1.0	Initial release of the US_Civilian_TeenMale4_skelmesh.fbx	05/04/16

1.4   MODEL SUMMARY

Table 2 Model Summary

|	
Model Name	US_Civilian_TeenMale1_skelmesh.fbx US_Civilian_TeenMale2_skelmesh.fbx US_Civilian_TeenMale3_skelmesh.fbx US_Civilian_TeenMale4_skelmesh.fbx
SE Core MEL Version L ID US Civilian Teen Male	N/A
Model Units	Meters
Model Height	1.6 Meters (units) or 160 Centimeters
Coordinate System	Cartesian X, Y, Z (see Figures 3-6 below)
Model Origin	Origin is located on the ground between the character's feet. (0, 0, 0) (*See figures 3-6 below*)
Model Orientation Runtime	Forward: Positive Y Up: Positive Z
Model Orientation Maya	Forward: Negative Z Up: Positive Y

Teen Male 1

Figure 2 Teen Male 1 Origin on Cartesian X, Y, Z Coordinate System

Teen Male 2

Figure 3 Teen Male 2 Origin on Cartesian X, Y, Z Coordinate System
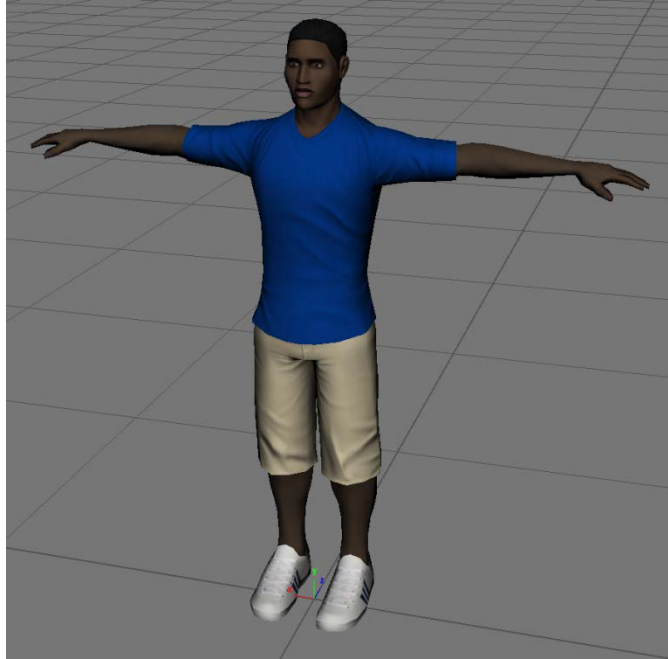
Teen Male 3

Figure 4 Teen Male 3 Origin on Cartesian X, Y, Z Coordinate System

Teen Male 4

Figure 5 Teen Male 4 Origin on Cartesian X, Y, Z Coordinate System

1.5   LICENSING/RIGHTS

Models built by Dignitas Technologies along with all files and documentation, have full Government Purpose Rights.

2   MODEL ATTRIBUTES

2.1   POLYGON ALLOCATION

Polygon allocation is the number of triangles and vertices for a given state and Level of Detail (LODs) in the model. The method for calculating the number of polygons is to gather each model state then count the polygons present in each representation. Animations are not included in the polygon allocation. The US Civilian Teen Male character models have a single LOD which is labeled LOD0.

Table 3 Polygon Allocation

Model	# of Triangles	# of Vertices
Teen Male 1	3290	1671
Teen Male 2	3244	1680
Teen Male 3	3128	1578
Teen Male 4	3331	1718

2.2   LEVEL OF DETAIL (LODS)

Dignitas supports only one LOD (LOD0) and no switch distances at this time.

2.3   TEXTURE MAPS

Textures:

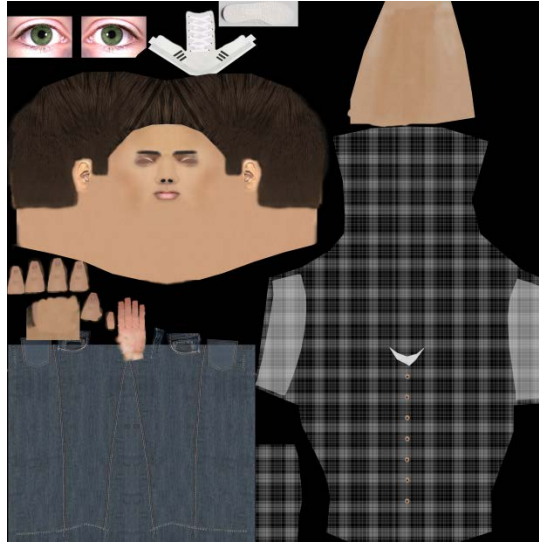- US_Civilian_TeenMale1_COL.dds (Diffuse) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 6 Teen Male 1 Texture Map

- US_Civilian_TeenMale1_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 7 Teen Male 1 Normal Map

- US_Civilian_TeenMale2_COL.dds (Diffuse) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 8 Teen Male 2 Texture Map

- US_Civilian_TeenMale2_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 9 Teen Male 2 Normal Map

- US_Civilian_TeenMale3_COL.dds (Diffuse) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 10 Teen Male 3 Texture Map

- US_Civilian_TeenMale3_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 11 Teen Male 3 Normal Map

- US_Civilian_TeenMale4_COL.dds (Diffuse) 2048 x 2048 pixels
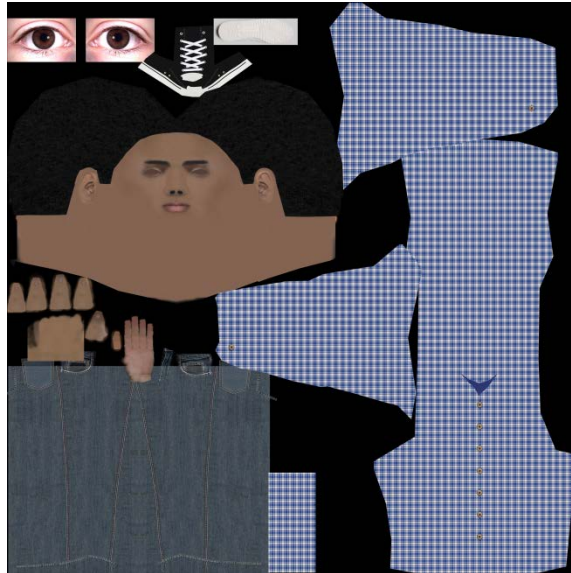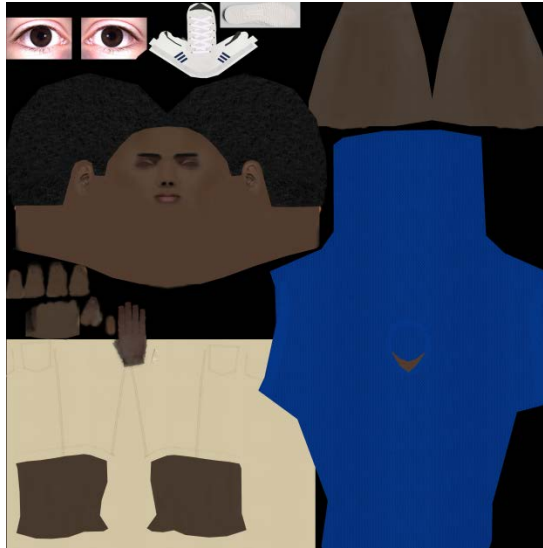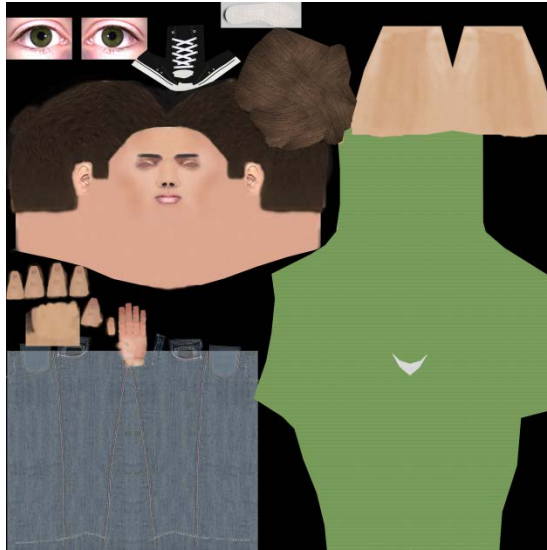- Texture Version: 1.0

Figure 12 Teen Male 4 Texture Map

- US_Civilian_TeenMale4_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 13 Teen Male 4 Normal Map

2.4 SENSOR VIEWS

Not applicable at this time.

2.5 HEALTH STATES

For more information on the Incapacitated and Killed States refer to their respective MDDs.

Healthy State

Incapacitated State

Killed State

2.6 SKELETAL STRUCTURE

2.6.1 JOINTS IN THE RIG

A **rig** is a skeleton that attaches to the 3D model to allow for animations to be added. The **joints** in the rig hold the translation and rotational data from the animations.

Naming convention for joints:

Table 4 Naming Convention for Joints

Hips	RightForeArm
Spine	RightHand
Spine1	RightThumbBase
Neck	RightThumbTip
Head	RightHandTip
HeadEnd	LeftUpLeg
LeftShoulder	LeftLeg
LeftArm	LeftFoot
LeftForeArm	LeftToeBase
LeftHand	LeftToe
LeftThumbBase	RightUpLeg
LeftThumbTip	RightLeg
LeftHandTip	RightFoot
RightShoulder	RightToeBase
RightArm	RightToe

2.6.2 ATTACH POINTS AND ATTACH MODELS

The model rig and the **Attach Model** (e.g. weapons, cell phones, etc) both have **Attach Points** where they can be connected ("attached") during runtime.   **Attach Points** are unweighted joints on the model rig that represent locations where **Attach Models** can be connected. Attachments occur during runtime

11

based on the animation applied to the model rig. Table 5 lists all Attach Points, associated Attach Models, and corresponding animations for this character model.

Table 5 Attached Models

Attach Point (on Rig)	Attach Model	Animations
RightHandWeaponAttach	None	All stowed animations
RightHandWeaponAttach	None	All WeaponFiring animations
RightHandWeaponAttach	None	Incapacitated and Killed animations

3   ANIMATIONS

The animations associated with this character are shown below. For additional animations compatible with this character, or more information on those listed above, please refer to the Animation MDDs.

- Walking
- Running
- Cowering
- Crawling
- Standing
- Kneeling
- Prone
- Incapacitated
- Crouching
- Killed

4   VERIFICATION APPROACH

4.1   RUNTIME SYSTEMS

This 3D model, associated accessories and weapons, and animations were tested using the following:

- Veritas 3D Viewer v1.16
- Veritas Model Viewer v1.4.1
- Unity3D

5   LIMITATIONS

No known issues.

6   CONTACT INFORMATION

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