US CIVILIAN YOUTH MALES
MODEL DESCRIPTION DOCUMENT (MDD)

Version 1.0

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CONTRACT NUMBER:

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

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1   MODEL OVERVIEW

1.1   DESCRIPTION

This document details the 3-Dimensional (3D) models of US Civilian Youth Male characters.   The US Civilian Youth 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 Youth 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 Youth 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 Youth Male character models components include:
- Long Sleeve T-Shirt or Henley Style T-Shirt
- Sneakers
- Jeans

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.

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Youth Male 1

Youth Male 2

Youth Male 3

Youth Male 4

Figure 1 US Civilian Youth Male Character Models

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_YouthMale1_skelmesh.fbx	04/07/16
1.0	Initial release of the US_Civilian_YouthMale2_skelmesh.fbx	04/07/16
1.0	Initial release of the US_Civilian_YouthMale3_skelmesh.fbx	04/07/16
1.0	Initial release of the US_Civilian_YouthMale4_skelmesh.fbx	04/07/16

1.4   MODEL SUMMARY

Table 2 Model Summary

Model Name	US_Civilian_YouthMale1_skelmesh.fbx US_Civilian_YouthMale2_skelmesh.fbx US_Civilian_YouthMale3_skelmesh.fbx US_Civilian_YouthMale4_skelmesh.fbx
SE Core MEL Version L ID US Civilian Youth Male	N/A
Model Units	Meters
Model Height	1.1 Meters (units) or 110 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

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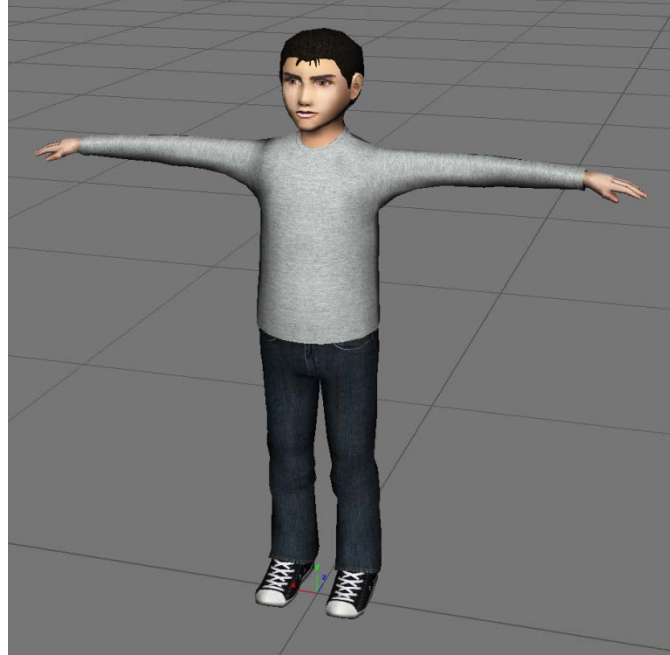
Youth Male 1
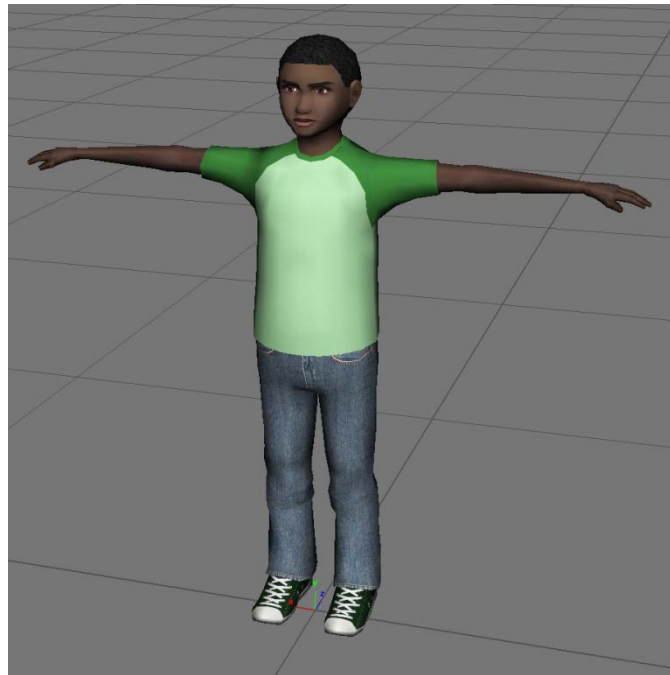**Figure 2 Youth Male 1 Origin on Cartesian X, Y, Z Coordinate System**
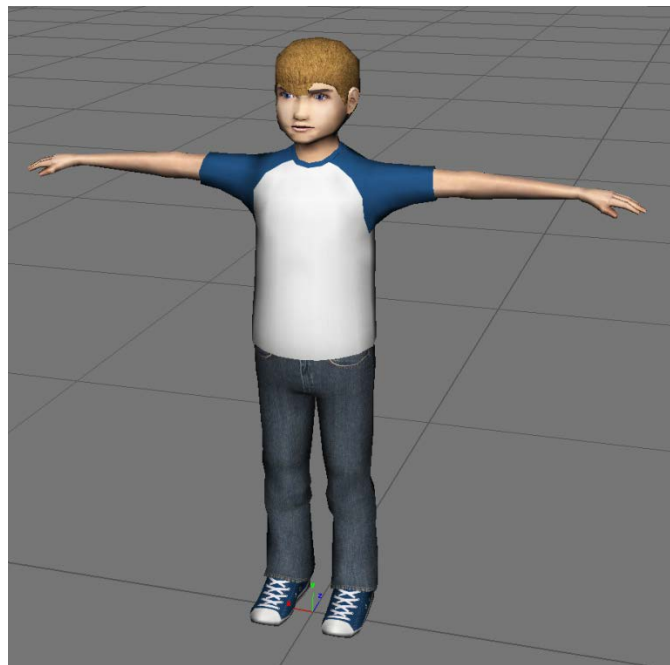
Youth Male 2
Figure 3 Youth Male 2 Origin on Cartesian X, Y, Z Coordinate System

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Youth Male 3

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

Youth Male 4

Figure 5 Youth 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 Youth Male character models have a single LOD which is labeled LOD0.

Table 3 Polygon Allocation

Model	# of Triangles	# of Vertices
Youth Male 1	3104	1622
Youth Male 2	3106	1609
Youth Male 3	3036	1568
Youth Male 4	3036	1568

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_YouthMale1_COL.dds (Diffuse) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 6 Youth Male 1 Texture Map

- US_Civilian_YouthMale1_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 7 Youth Male 1 Normal Map

- US_Civilian_YouthMale2_COL.dds (Diffuse) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 8 Youth Male 2 Texture Map

- US_Civilian_YouthMale2_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 9 Youth Male 2 Normal Map

- US_Civilian_YouthMale3_COL.dds (Diffuse) 2048 x 2048 pixels
- Texture Version: 1.0

- US_Civilian_YouthMale3_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 11 Youth Male 3 Normal Map

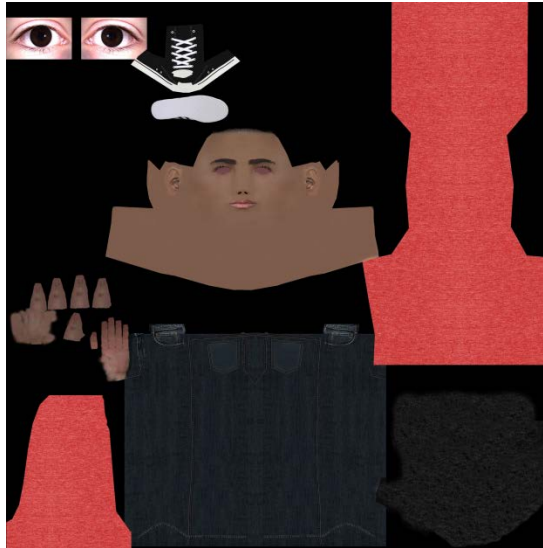- US_Civilian_YouthMale4_COL.dds (Diffuse) 2048 x 2048 pixels
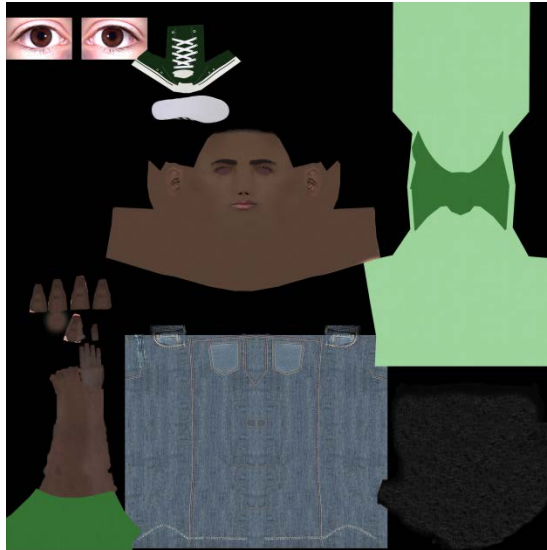- Texture Version: 1.0

Figure 12 Youth Male 4 Texture Map

- US_Civilian_YouthMale4_NRML.dds (Normal map) 2048 x 2048 pixels
- Texture Version: 1.0

Figure 13 Youth 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 Spine Spine1 Neck Head HeadEnd LeftShoulder LeftArm LeftForeArm LeftHand LeftThumbBase LeftThumbTip LeftHandTip RightShoulder RightArm	RightForeArm RightHand RightThumbBase RightThumbTip RightHandTip LeftUpLeg LeftLeg LeftFoot LeftToeBase LeftToe RightUpLeg RightLeg RightFoot RightToeBase 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

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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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