

# 2024 HVE FORUM



**DOUBLETREE BERKELEY MARINA**  
**MARCH 4-8, 2024**



**ENGINEERING  
DYNAMICS  
COMPANY, LLC**

## TOPICS

Advanced, Intermediate, and Fundamentals of HVE  
Theoretical & Applied Vehicle Dynamics  
Reconstruction and Simulation Theory  
Building Vehicles and Environments  
Tips, Tricks & Tech Support  
White Paper Session  
Video Techniques

# Peace, Love and HVE



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HVE, HVE-2D, HVE-CSI, EDCRASH, EDSMAC, EDSMAC4, EDSVS, EDVTS, and the HVE and EDC logos are trademarks of Engineering Dynamics Company, LLC.

# Fundamentals for HVE & HVE-2D

## Fundamentals for HVE and HVE-2D - Parts I, II, III, IV and V

Instructor: Eric Hunter, P.E.

Time: Part I - Monday, 8:45 AM  
Part II - Monday, 1:30 PM  
Part III - Tuesday, 8:30 AM  
Part IV - Tuesday, 1:30 PM  
Part V - Wednesday, 8:30 AM

We recommend that students that are new users (1 year or less) of HVE/HVE-2D take this series of classes.

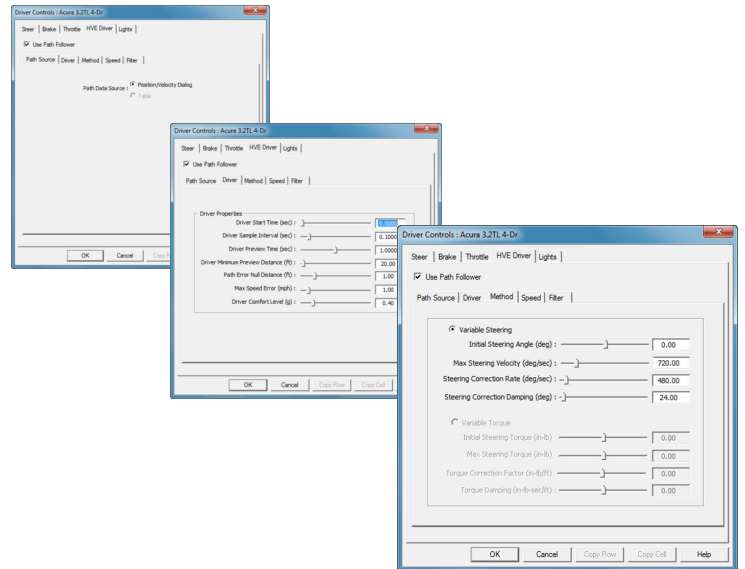
### Description:

This workshop series is designed for the new user who wants a basic understanding of how simulation programs help them investigate vehicle crashes and loss-of-control scenarios. Through a combination of lecture and hands-on computer labs, the student will learn how *HVE*-compatible simulation programs model vehicle behavior using physics-based calculation routines to predict vehicle trajectories based upon user entered vehicle and environmental factors, initial conditions and driver inputs.

*EDSMAC4* will be used extensively in these workshops.

Topics to be covered include:

- Anatomy of a Simulation
- Inputs
- Outputs
- Tire Model
- Tire Force Calculations
- Friction Circle
- Calculation Method
- Vehicle Connections
- Collision Modeling
- Driver Controls



Each student should bring their own laptop computer to use for hands-on simulation exercises, such as single vehicle path modeling, two vehicle collision analysis, multi-vehicle collision analysis and articulated vehicle modeling. Students should be generally familiar with the use of the Vehicle, Environment, Event and Playback Editors in their *HVE/HVE-2D* software, as they will be used extensively in creating and executing *EDSMAC* and *EDSMAC4* simulations.

Each part of the workshop series builds upon experiences from the previous part, so students should plan to attend from start to finish. Upon completion of the workshop, the student will have gained a general understanding of how simulation programs work, and also a greater insight into their use for real-world applications.

**Students are strongly encouraged to bring their computers to work through examples in these series of workshops.**

# Intermediate HVE & HVE-2D

## Intermediate *HVE* & *HVE-2D* - Parts I, II, III, IV and V

Instructor: James P. Sneddon

Times: Part I - Monday, 8:45 AM

Part II - Monday, 1:30 PM

Part III - Tuesday, 8:30 AM

Part IV - Tuesday, 1:30 PM

Part V - Wednesday, 8:30 PM

We recommend that students have taken the Fundamentals for HVE and HVE-2D class before taking this series of classes.

### Description:

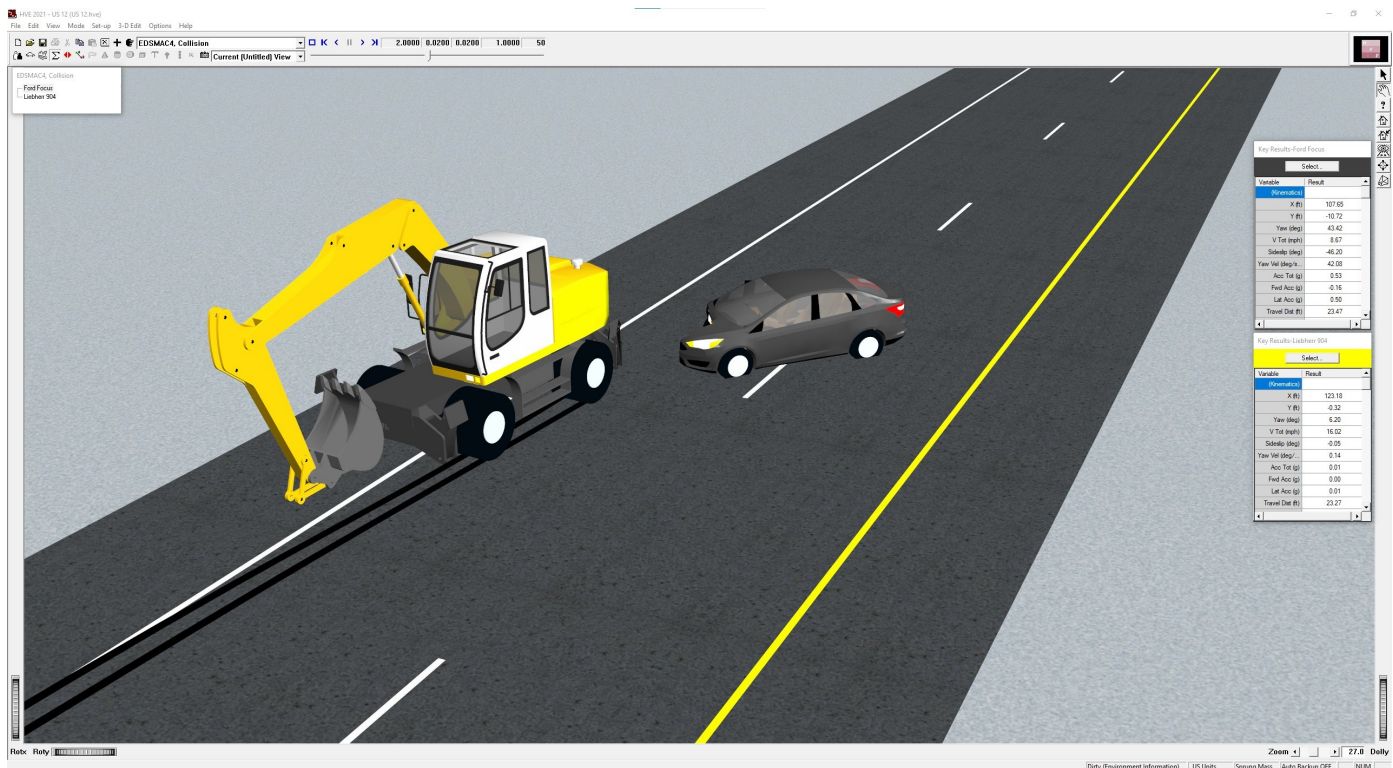
This workshop series is designed for the user who really wants hands-on exposure to using *HVE* or *HVE-2D* to simulate and reconstruct vehicle crashes and potential loss-of-control scenarios. The student will edit environments, build and edit vehicles and then use these objects in simulation studies based upon examples applicable to the real-world. If you are looking to learn solid, proven techniques for applying *HVE* or *HVE-2D* to your work, then this is the workshop series for you.

Attendees of this workshop series should be familiar with the use of all the editors (Vehicle, Environment, Event and Playback) of the *HVE* and *HVE-2D* simulation environment, as they will be used extensively in the workshops. Both *HVE* and *HVE-2D* users will be using the *EDCRASH* and *EDSMAC4* physics models. Case studies will be conducted on planar environments to accommodate *HVE-2D* users.

Each workshop builds upon experiences from the previous workshop, so students should plan to attend all parts. It is highly recommended that each student brings their own laptop computer to use during the workshops.

Upon completion of the workshops, the student will have a solid understanding of how to use the actual vehicles and the actual roadways in their simulations and reconstructions. They will also have greater insight into the capabilities of the physics models for real-world applications, which will help improve their accuracy, efficiency and workflow as a user.

**Students are strongly encouraged to bring their computers to work through examples in these series of workshops.**



# Advanced *HVE*

## Advanced *HVE* - Parts I, II, III, IV and V

Instructors: Anthony D. Cornetto, III, P.E. Terry D. Day, P.E. Wesley Grimes, P.E.

Other Guest Instructors

Times: Part I - Monday, 8:45 AM  
Part II - Monday, 1:30 PM  
Part III - Tuesday, 8:30 AM  
Part IV - Tuesday, 1:30 PM  
Part V - Wednesday, 8:30 PM

We recommend that students have taken the Intermediate *HVE* and *HVE-2D* class before taking this series of classes.

### Description:

This workshop series is designed for the advanced user who wants an interactive learning environment that addresses *HVE*'s most sophisticated features. A combination of open discussions and hands-on examples provides the ultimate exposure to *HVE*'s powerful capabilities. In-depth examples include the *DyMESH* Wheel Impact Model, Hydroplaning, Brake System Analysis, ABS and Electronic Stability Control. The Advanced *HVE* workshop teaches problem-solving techniques for complex simulations. The workshop includes a special focus on using new features added in the latest version of *HVE*.

NOTE: The specifics of the Advanced *HVE* workshop are not available at the time this booklet is published.

Attendees to this workshop series should be very familiar with the use of all editors (Vehicle, Environment, Event and Playback) of the *HVE* 3-D simulation environment, as they will be used extensively in the workshops. Attendees should also have significant experience using *EDSMAC4* and *SIMON*, and the *DyMESH* 3-D collision model.

Upon completion of the workshops, the student will have a solid understanding and greater insight into the full capabilities of *HVE*.

**Students are strongly encouraged to bring their computers to work through examples in these series of workshops.**



# HVE White Paper Session

## HVE White Paper Session

Moderator: Terry D. Day, PE  
Time: Wednesday, 1:30 PM

### Description:

This session is an opportunity for *HVE* users to showcase their skills to other *HVE* users, as well as to non-*HVE* users who may require the services of a consultant. The following subjects may be addressed in the presentations:

- *HVE* Case Studies
- Innovative Tips and Techniques Using *HVE*
- Any Application of *HVE* Showcasing its Capabilities (especially events involving important 3-dimensional vehicle behavior)

Papers from each year's *HVE* White Paper Session are made available to download directly from the Library section of the EDC website, thereby expanding the awareness of the work beyond just the attendees of the *HVE* Forum.

# Tips, Tricks and Tech Support Session

## Tips, Tricks and Tech Support

Instructors: Anthony D. Cornetto, III, P.E. and Danny Peralta  
Times: Wednesday, 8:30 AM

### Description:

This workshop series is designed for all users seeking general advice on improving their HVE capabilities and answers to common technical support questions. The goal is for the users and instructors to have an open discussion where everyone can share their experiences with HVE. Mr. Peralta, having provided users with tech support for over 12 years, will be sharing solutions to some of the typical tech support questions. Mr. Cornetto will be sharing some of his "tips and tricks" as an HVE user with 20+ years of experience.

Example topics: Importing custom vehicle geometries, Environment maps, Texture maps, Using 360 imagery, Resolving Excessive Wheel Deflection and Max Suspension Force errors, Extending numeric limits within HVE, Data driven video overlays, Google Maps elevation data, USGS TNM Download and EarthExplorer.

# The Theory Series

## Advanced EDCRASH

Instructor: Terry D. Day, P.E.

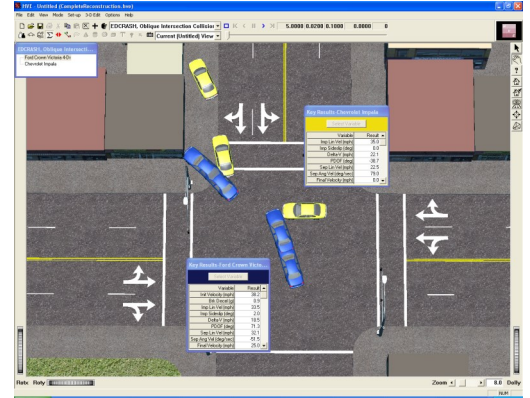
Time: Thursday, 8:30 AM

### Description:

This workshop builds on the topics covered in the EDC Reconstruction seminar. Specifically, the course will cover:

- EDCRASH Main Procedures flowchart.
- Examples that illustrate the program decisions based on user inputs
- Numerous examples of unique program applications
- Lots of Q and A and classroom discussion

Upon completing this workshop, the student will increase his/her understanding of how EDCRASH can be used to assist in the reconstruction of crashes.



## EDSMAC4: Model Overview

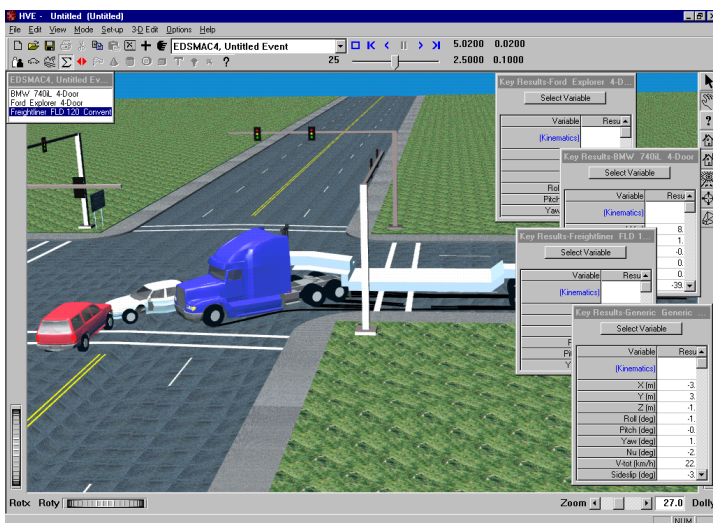
Instructor: Terry D. Day, P.E.

Time: Thursday, 1:30 PM

### Description:

The purpose of this workshop is to acquaint the student with the modeling procedures and capabilities of the EDSMAC4 simulation model. The following material is covered:

- General overview of the EDSMAC4 simulation model
- Detailed discussion of the improvements to the collision model and comparison with EDSMAC
- Detailed discussion of the articulated vehicle model
- Examples - This workshop provides several examples using EDSMAC4 to simulate collisions involving passenger vehicles and heavy trucks.



Upon completing this workshop, the student will understand the basic concepts and capabilities of the EDSMAC4 simulation model.

# Theoretical and Applied Vehicle Dynamics, Parts I, II and III

Instructor: Dr. L. Daniel Metz, Anthony D. Cornetto, III, P.E.

Times: Part I - Thursday, 8:30 AM

Part II - Thursday, 1:30 PM

Part III - Friday, 8:30 AM

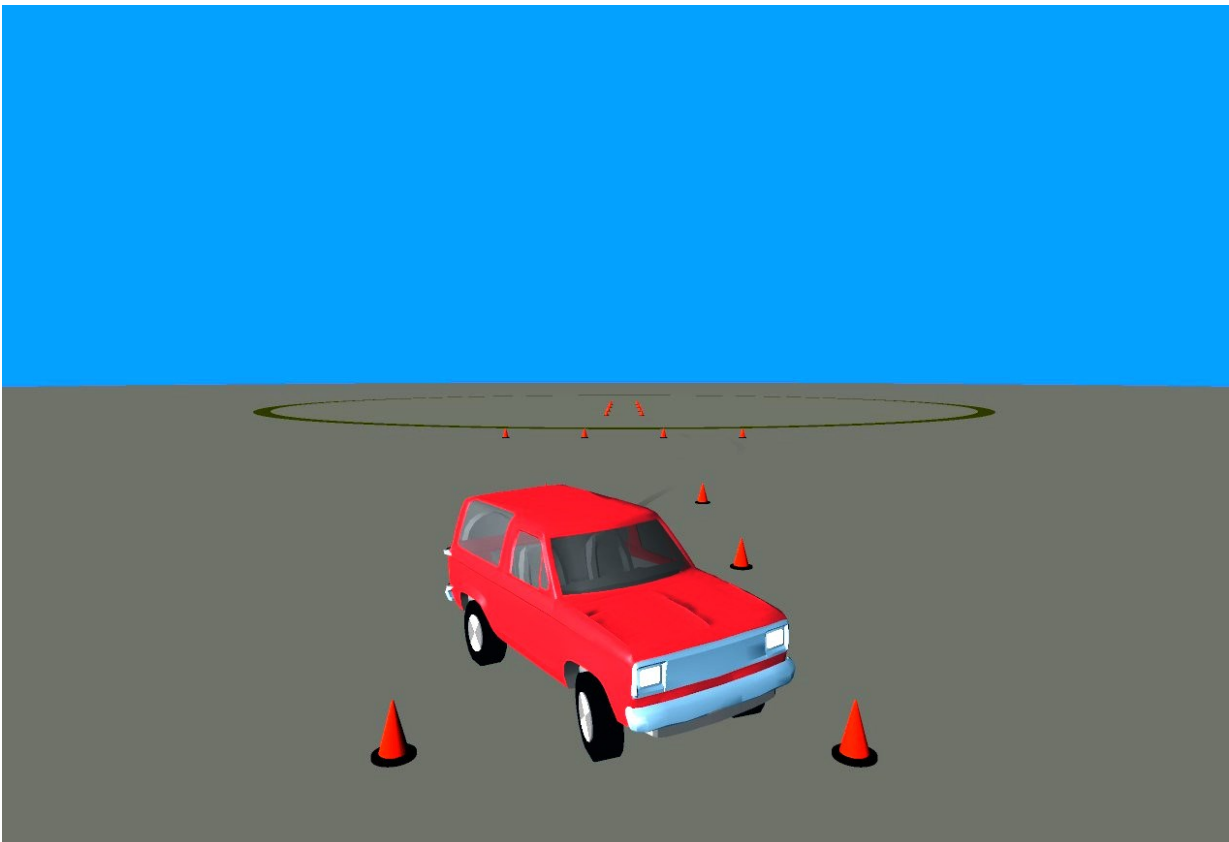
## Description:

This workshop will provide an overview of vehicle dynamics from a steady state and transient point of view. Theoretical calculations and HVE methods for analyzing vehicle performance are introduced and included, as is a thorough review of the influence of tire behavior on vehicle dynamics. Actual examples of the use of HVE will be presented in the workshop entitled THEORETICAL AND APPLIED VEHICLE DYNAMICS, PART III. Attendees to PART III will be well prepared to appreciate these examples

The following material will be discussed in this workshop:

- Introduction to Vehicle Dynamics
- Tire Mechanics and Characteristics
- Fundamentals Control Theory Concepts
- Linear Vehicle Dynamics Metrics and Properties
- Understeer/Oversteer/Neutral Steer Behavior
- Transient Handling Models
- Overview of Ride Dynamics

Upon completing this workshop, the student will have an increased understanding of vehicle dynamics analysis and behavior, as well as computational methods for use in such studies.



# The Theory Series, Continued

## Using *DamageStudio*

Instructor: Terry D. Day, P.E.

Time: Friday, 8:30 AM

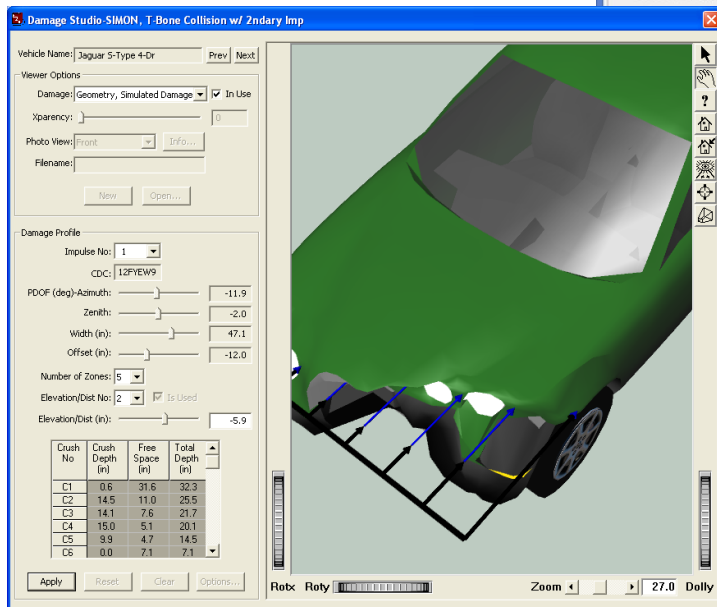
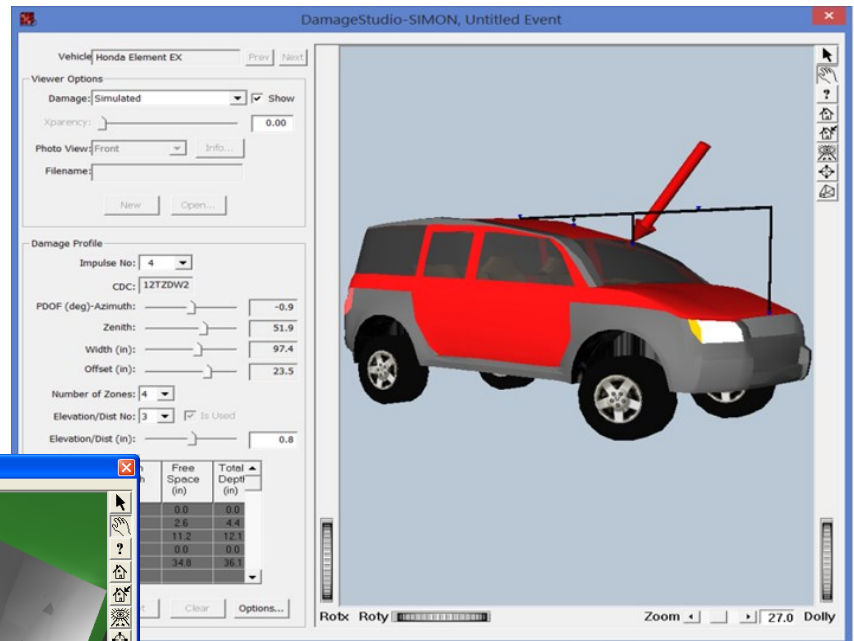
### Description:

The goal of this workshop is to provide both a theoretical and a practical basis for DamageStudio. The theoretical basis focuses on the subject of collision mechanics and how DamageStudio captures that information. The practical basis uses a hands-on approach, providing real-world examples.

The following topics are covered:

- High-level Overview
  - What is DamageStudio?
  - Which physics models use DamageStudio?
  - Differences between DamageStudio and current methods and options
- Description of CollisionData
  - Included parameters
  - Integration into SIMON
  - Integration into EDSMAC4
- Description of DamageStudio
  - Viewer options
  - Damage profile options
- DamageStudio Applications and Examples (Hands-on)
  - 2-Car collision
  - Rollover

Upon completing this workshop, the student will be able to understand how DamageStudio produces the damage information presented in the Collision Data report and the DamageStudio viewer, and to apply DamageStudio to individual cases involving vehicle collisions and rollovers.





# Building Environment Models

## Advanced 3-D Environments, Part I & II

Instructor: James P. Sneddon

Times: Part I - Thursday, 8:30 AM

Part II - Thursday, 1:30 PM

### Description:

The purpose of this workshop is to extend an *HVE* User's abilities to build detailed three-dimensional terrain models for their simulation studies. A terrain model will be built of a real-world roadway from point cloud data acquired with a three-dimensional scanner. Rhinoceros 3D modeling software will be used in conjunction with the 3-D Editor to create an environment model. The same methods can be applied to a total station survey. **It is highly recommended that each student installs an evaluation copy of Rhinoceros on their laptop computer.**

The following material is covered:

- Review of actual site and identification of key elements
- Planning terrain model requirements
- Discussion of surveying and data collection methods
- Creating a three-dimensional terrain model from a point cloud
- Add additional roadway markings such as center lines and fog lines
- Establishing mesh density and surface normal orientation
- Importing 3-D Environment from 3<sup>rd</sup> party CAD or COGO software
- Quality checking the finished terrain model using simulations of vehicles driving on the surface

Upon completing the Advanced 3-D Environments workshops, the student will understand the methodology used to build a environment model and be able to acquire point data themselves using a 3D scanner or total station, or work with a surveyor to develop a model for their use in *HVE*. Additionally, the student will be familiar with the processes required to build detailed models of any roadway or terrain required for their own detailed simulation studies.

# Building Vehicle Models

## Building Vehicles

Instructor: Daniel Peralta

Time: Thursday, 1:30 PM

### Description:

This workshop introduces the processes and standards EDC uses to build vehicles for *HVE*. The following material is covered:

- The process used by EDC to obtain the necessary vehicle data as well as the format required by the *HVE* Vehicle Data structure. A sample Vehicle Data File is reviewed in detail.
- How to prepare custom vehicle geometries for use in *HVE* and an overview of how custom vehicle geometries can be created from scratch
- Creating custom vehicles by editing the data of a class specific generic as well as the process of saving this customized vehicle into the User database for use in future cases
- Adding functional lights and an undercarriage texture to custom vehicle geometries

Upon completing this workshop, the student will have a good outline to follow for building *HVE* and *HVE-2D* compatible vehicles as well as the necessary tools for customizing the appearance and data of an existing vehicle.

# Using The 3-D Editor

## 3-D Editor: Functionality, Friction Zones, Overlays & Importing Models

Instructor: Daniel Peralta

Time: Thursday, 8:30 AM

### Description:

This workshop will expose the student to the features and capabilities of both the Environment Editor and its 3-D Editor. The Environment Editor is used to create 2D Aerial Photo Environments as well as import 2D and 3D terrain files. The 3-D Editor allows you to enhance an imported environment model by assigning friction factors, applying textures, or even adding functioning traffic signals. When necessary, the 3-D Editor can also be used to create simple environment models.

The following material is covered:

Navigating the 3-D Editor

Editing imported environments

Supported file types

How to prep environment models to successfully import them into *HVE*

How to import and scale 2D aerial images

Applying a sky image and the HVE sky dome

Adding friction zones and how they are used by HVE

How to use the Scissors tool to extract portions of a mesh and decrease its polygon count.

HVE Overlays (a.k.a. Layers)

What happens when overlapping surfaces exist (i.e., tunnels, bridges, road lanes) and how HVE determines which surface to pay attention to and which to ignore

# Simulation Movies

## Video Creator and Movies

Instructor: James P. Sneddon

Time: Friday, 8:30 AM

### Description:

The purpose of this workshop is to acquaint the student with the capabilities of the HVE Video Creator. The following material is covered:

- Creating Trajectory Simulations - The student will learn how to select Trajectory Simulations produced by each simulation event.
- Viewer Basics - The student will learn how to use the two basic methods available for setting the view: Viewer Thumb Wheels and Set Camera dialog.
- Using the Video Creator - The student will learn how to combine multiple simulations within the Video Creator Window and the "rules of precedence" will be addressed.
- Object-based Cameras - The student will learn how to attach the camera to a moving object (e.g., camera car).
- Creating Simulation Videos - The student will learn how to use the HVE Video Creator to create real-time and slow-motion HD videos.

Upon completing this workshop, the student will be able to create and view trajectory simulations. The student will also be able to create a multiple-event accident sequence, as well as create and replay high-definition simulation videos.

# 2024 HVE Forum Travel Information

The 2024 HVE Forum will take place March 4 - 8, 2024, at the DoubleTree Berkeley Marina. To receive the special hotel room rate of \$155 + tax per night, visit [www.edccorp.com](http://www.edccorp.com) and use the 2024 HVE Forum Hotel Room Reservation Link on the 2024 HVE Forum page. Reserve your room while space is available in the room block. The room block will expire on February 12, 2024. It is strongly recommended to make your reservations as soon as possible.

## Hotel Details:

**Address:** DoubleTree Berkeley Marina  
200 Marina Blvd  
Berkeley, CA 94710

**Website:** <https://www.hilton.com/en/hotels/jbkcadt-doubletree-berkeley-marina>

**Online Reservations:** [EDC 2024 HVE FORUM - RESERVATION LINK](#)

## About The Hotel:

Find us overlooking Berkeley Marina, with views of the San Francisco Bay. We're a 10-minute drive from University of California, Berkeley, and we are just two miles from the closest BART station for quick trips into San Francisco. Enjoy our indoor pool, fitness center, and waterfront dining at the Berkeley Boathouse.

## On-site amenities include:

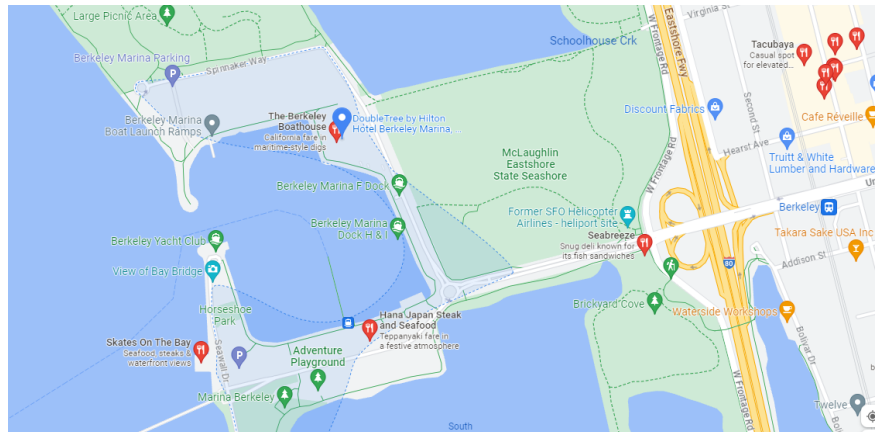
- Free Wi-Fi
- Business center
- The Berkeley Boat House, Made Market, and In Room Dining
- Fitness Center and Indoor Pool

## Hotel Parking:

- Self-park: \$30/day (on-site)
- Valet parking: \$32/day
- In/Out privileges available
- Hourly parking: 0-3 hr: \$18;  
3-6 hrs: \$24; 6+ hrs: \$30

## Airport & Ground Transportation Suggestions:

- Metropolitan Oakland International (OAK)  
Distance from Hotel: 15 miles
- San Francisco International Airport (SFO)  
Distance from Hotel: 22 miles
- Taxi Fare (estimated) - \$25 - \$75 one way
- Uber Fare (estimated) - \$25 - \$45
- Uber - \$19 - \$22
- Bus Service - \$2/person (line 50, 27 minute ride to hotel)



## Other Hotels Nearby:

If you find that your choice of room at the Crowne Plaza is not available, please call EDC Customer Service for other hotels nearby.

See you in Berkeley!