The Resilience and Disaster Recovery Tool Suite

Run Checklist Version 2022.1

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13. ABSTRACT (Maximum 200 words)

Volpe developed the Resilience and Disaster Recovery (RDR) Tool Suite in support of the USDOT Office of Research, Development and Technology in collaboration with the Federal Highway Administration's Office of Natural Environment. The RDR Tool Suite enables transportation practitioners to assess the return-on-investment of resilient infrastructure across a range of potential hazard conditions to help prioritize resilience investments. This Run Checklist provides users with a comprehensive summary of input files and parameters to be reviewed before running an RDR analysis. It is complemented by the RDR Tool Suite Technical Document, User Guide, and Quick Start Tutorial.

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RDR Run Checklist

This document provides a high-level overview of the input files required to run a custom analysis with the RDR Tool Suite. For more details on the RDR input files, see the RDR Tool Suite User Guide.

Required Files

The following input files are required before the tool suite can be run for analysis:

- ☐ Batch file (`run_rdr_full.bat` OR `run_rdr_analysis.bat`)
  - ☐ Line 17 – Provide the full file path to the configuration file for the analysis.

- ☐ Configuration file (`{User-Defined}.config`, filename left up to user)
  The following parameters must be modified by the user before running a scenario. All other parameters in the configuration file have default values provided, which can be modified by the user as needed.
  - ☐ Line 17 – Provide the full file path to your input data folder.
  - ☐ Line 18 – Provide the full file path to where you want output data to be created. (RDR will automatically create this folder.)
  - ☐ Line 22 – Provide a text string identifier for your run; output files are labeled with this run ID.
  - ☐ Line 33 – Specify the beginning year of the ROI analysis period.
  - ☐ Line 35 – Specify the final year of the ROI analysis period.
  - ☐ Line 39 – Specify the base year for core model runs, corresponding to user-provided base year trip tables.
  - ☐ Line 42 – Specify the future year for core model runs, corresponding to user-provided future year trip tables.
  - ☐ Line 55 – Specify the year in which all monetary units are inputted and reported. All default values are in 2018 dollars.
  - ☐ Line 81 – Specify the number of scenarios to run in the AequilibraE core model to build the regression model.
  - ☐ Line 87 – Specify whether the run is a full run or an additional run.
  - ☐ Line 92 – If line 87 is set to True, specify the number of additional scenarios to run in the AequilibraE core model.
  - ☐ Line 126 – Provide the column name in the exposure analysis input files defining exposure level.
  - ☐ Line 163 – Specify the largest node ID in the user's network designating a centroid node.

- ☐ Model parameters file (`Model_Parameters.xlsx`)
  UncertaintyParameters tab
  - ☐ Column A ("Hazard Events") – List all hazard events as text strings for the RDR Metamodel (RDRM).

- ☐ Column B (“Recovery Stages”) – List all hazard recovery stages as nonnegative numbers (e.g., 0, 1, 2, …) for the RDRM.
- ☐ Column C (“Economic Scenarios”) – List all economic futures as text strings for the RDRM.
- ☐ Column D (“Trip Loss Elasticities”) – List all elasticity values as numbers (ranging from -1 to 0) for the RDRM.
- ☐ Column E (“Project Groups”) – List all resilience project groupings as text strings for the RDRM.

ProjectGroups tab

- ☐ Make sure every resilience project for the RDRM is listed in Column B (“Resiliency Projects”) and assigned to exactly one project group in Column A (“Project Groups”).

Hazards tab

- ☐ Make sure every hazard event in Column A of the UncertaintyParameters tab is listed as a row in this tab.
- ☐ Required columns – “Hazard Event”, “Filename”, “HazardDim1”, “HazardDim2”, “Event Probability in Start Year”

☐ User inputs file (`UserInputs.xlsx`)

UserInputs tab

- ☐ Column A (“Hazard Events”) – List all hazard events as text strings for the RDR ROI Analysis Module.
- ☐ Column B (“Economic Scenarios”) – List all economic futures as text strings for the RDR ROI Analysis Module.
- ☐ Column C (“Trip Loss Elasticities”) – List all elasticity values as numbers (ranging from -1 to 0) for the RDR ROI Analysis Module.
- ☐ Column D (“Resiliency Projects”) – List all resilience projects as text strings for the RDR ROI Analysis Module.
- ☐ Column E (“Event Frequency Factors”) – List all hazard event frequency multiplicative factors as numbers for the RDR ROI Analysis Module.
- ☐ Make sure every entry in columns A through D is included in the model parameters file.

☐ Exposure analysis files (`{Filename}.csv` for each hazard event)

- ☐ Make sure there is a CSV file in the “`Hazards`” subdirectory with the designated filename (specified in the model parameters file) for each hazard event.
- ☐ Required columns – “link_id”, “A”, “B”, “Value” (or string corresponding to line 126 of the configuration file)

☐ Network attribute files (`node.csv` AND `{econ}{projgroup}.csv` for each economic scenario and project group)

Node file

- ☐ Make sure there is a CSV file named `node.csv` in the “`Networks`” subdirectory.
- ☐ Required columns – “node_id”, “x_coord”, “y_coord”, “node_type”

- ☐ Confirm that node IDs are unique.
- ☐ Label centroid nodes in the network as "centroid" (case-sensitive) in node_type column.

Link files

- ☐ Make sure there is a CSV file in the "`Networks`" subdirectory for each project group-economic scenario combination.
- ☐ Required columns – "link_id", "from_node_id", "to_node_id", "directed", "length", "facility_type", "capacity", "free_speed", "lanes", "allowed_uses", "toll"
- ☐ Confirm that link IDs are unique.
- ☐ Confirm the directed column is always equal to 1.
- ☐ Confirm the allowed_uses column is always equal to "c".
- ☐ Confirm the units of the capacity column is in vehicles / day / lane and the units of the toll column is in cents.

☐ Demand files (`{econ}_demand_summed.omx` for each economic scenario)

- ☐ Make sure there is an open matrix (OMX) file in the "`AEMaster/matrices`" subdirectory for each economic scenario.

☐ SQLite database (`project_database.sqlite`)

- ☐ Confirm this file exists in the "`AEMaster`" subdirectory. Otherwise, copy the template SQLite database from the "`config`" directory to the "`AEMaster`" subdirectory.

☐ Base year core model runs file (`Metamodel_scenario_SP_baseyear.csv` OR `Metamodel_scenario_RT_baseyear.csv`)

- ☐ Create a row with base year core model run outputs for each hazard event-recovery stage combination.
- ☐ Required columns – "hazard", "recovery", "trips", "miles", "hours"
- ☐ If using the base year run helper tool, make sure there is a CSV file named `baseyear.csv` in the "`Networks`" subdirectory.

☐ Resilience projects files (`project_info.csv` AND `project_table.csv`)

Project info file

- ☐ Make sure there is a CSV file named `project_info.csv` in the "`LookupTables`" subdirectory.
- ☐ Required columns – "Project ID", "Project Name", "Asset", "Project Cost"
- ☐ Make sure resilience project costs are already standardized for the period of analysis and provided in the dollar year units specified on line 55 of the configuration file.

Project table file

- ☐ Make sure there is a CSV file named `project_table.csv` in the "`LookupTables`" subdirectory.
- ☐ Required columns – "link_id", "Project ID", "Category"
- ☐ If using default repair cost and time tables, confirm Category column is either "Highway" or "Bridge".

- ☐ If using the optional "Exposure Reduction" column for resilience project partial mitigation modeling, make sure "Manual" is specified on line 169 of the configuration file and the units used in the column match units of the exposure analysis files.

Optional Files

The following input files provide optional functionality for a custom analysis:

- ☐ True shape file (`TrueShape.csv`)
  - ☐ If used, make sure there is a CSV file named `TrueShape.csv` in the "`LookupTables`" subdirectory.
  - ☐ Required columns – "link_id", "WKT"

- ☐ Link types look-up table (`link_types_table.csv`)
  - ☐ If used, make sure there is a CSV file named `link_types_table.csv` in the "`LookupTables`" subdirectory.
  - ☐ Required columns – "facility_type", "alpha", "beta"

- ☐ Exposure-disruption look-up table
  - ☐ If used, make sure "Manual" is specified on line 121 of the configuration file for link availability approach and the full path of the CSV file is specified on line 136 of the configuration file.
  - ☐ Required columns – "min_inclusive", "max_exclusive", "link_availability"

- ☐ Exposure-damage look-up table
  - ☐ If used, make sure "Manual" is specified on line 207 of the configuration file for exposure damage approach and the full path of the CSV file is specified on line 212 of the configuration file.
  - ☐ Required columns – "Asset Type", "min_exposure", "max_exposure", "Damage (%)"

- ☐ Repair cost look-up table
  - ☐ If used, make sure "User-Defined" is specified on line 219 of the configuration file for repair cost approach and the full path of the CSV file is specified on line 228 of the configuration file.
  - ☐ Required columns – "Asset Type", "Facility Type", "Damage Repair Cost", "Total Repair Cost"
  - ☐ Make sure costs are defined per lane-mile for all asset types except "Bridge", which has costs defined per square foot.

- ☐ Repair time look-up table
  - ☐ If used, make sure "User-Defined" is specified on line 235 of the configuration file for repair time approach and the full path of the CSV file is specified on line 239 of the configuration file.
  - ☐ Required columns – "Asset Type", "category_min", "category_max", "repair_time"