



Real-Time Bridge Monitoring Test Report

Version 1.0

Project Name: Real-Time Bridge Monitoring	Version: 1.0
Test Report	Date: 2014-01-08

Revision History

Date	Version	Description	Author
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1. SCOPE

1.1 System Overview

The bridge, we are monitoring, named “Borgoforte” is situated on the Po river. On the bridge some of the piles are enforced but there is one pile which is week and needs to be monitored. On this pile there is a number of sensors measuring physical forces that different sources make on bridge. Moreover, two cameras are providing pictures from both sides of the bridge. All data from sensors and pictures from cameras are stored in files and send to the server in packages each hour.

Our goal is to make a system for storing, calculating and presenting all relevant data of the bridge. We have to extract data from .txt files and store them to database. After that, calculations have to be done according to parameters. The calculated level of danger of the bridge is also stored in a database. Finally, both current and history data along with pictures can be presented to the user.

1.2 Overview

The test report document contains : scope, referenced documents, test specifications and procedures. This document provides a detailed description of each test specification and the requirement it tests. The test procedures explains the actions step-by-step, shows the expected result, and any special condition that is necessary for testing. Each requirement from the Requirements Definition version 1.4 includes a unique identification (ID) and specified functionality. The test cases will be used by the team to check if the system meets the requirements.

2. REFERENCED DOCUMENTS

The following documents are either referenced or used in preparation of this document:

2.1 Project Specific Document References

Requirements Definition version 1.4 for the project **Real-Time Bridge Monitoring**
January 6, 2014

Design Description version 1.6 for the project **Real-Time Bridge Monitoring**
January 07, 2014

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3. TEST SPECIFICATIONS AND PROCEDURES

3.1 Features to be Tested

- a) Admin Functions
- b) Engineer Functions
- c) Human Controller Functions
- d) External User Functions
- e) Parser
- f) Calculations
- g) External Interfaces
- h) Non-Functional Requirements

3.2 Features to not be Tested

N/A

3.3 Features Pass/Fail Criteria

Any discrepancies identified are classified as one of three types defined in Table 3-1:

Table 3-1 Severity Rankings for Discrepancies

Severity	Description
Critical	
Major	
Minor	

3.4 Input Specifications

See the Operator Action column for the detailed input specifications in Section 3.6

3.5 Output Specifications

See the Expected Results column for the expected outputs of each operator action in Section 3.6

3.6 Test Specifications

User Functionalities

External User

Test Name: Test Case 1: View of Stack image

Description: The external user should be able to see the stack image with each pylons, with also the flow direction.

Prerequisites: N/A

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Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the stack image.	The session shows the stack image.	Pass

Test Name: Test Case 2: View of bridge pictures

Description: The external user should be able to see the latest pictures of the both sides of the bridge.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the latest bridge pictures.	The session shows the latest bridge pictures.	Pass

Test Name: Test Case 3: View of diagram of wind speed

Description: The external user should be able to see the diagram showing the change of value of wind speed for the current day.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the diagram that shows the change of value of wind speed.	The session shows the diagram that shows the change of value of wind speed.	Pass

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Test Name: Test Case 4: View of diagram of wind direction

Description: The external user should be able to see the diagram showing the change of value of wind direction for the current day.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the diagram that show the change of value of wind direction.	The session shows the diagram that show the change of value of wind direction.	Pass

Test Name: Test Case 5: View of diagram of water level

Description: The external user should be able to see the diagram showing the change of water level for the current day.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the diagram that show the change of value of water level.	The session shows the diagram that show the change of value of water level.	Pass

Test Name: Test Case 6: View of diagram of depth of river bed

Description: The external user should be able to see the diagram showing the change of depth of river bed for the current day.

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Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the diagram that show the change of value of depth of river bed	The session shows the diagram that show the change of value of depth of river bed	Pass

Test Name: Test Case 7: View of diagram of maximum wind speed

Description: The external user should be able to see the diagram showing the change of maximum wind speed for the current day.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the diagram that show the change of value of maximum wind speed	The session shows the diagram that show the change of value of maximum wind speed	Pass

Test Name: Test Case 8: View of diagram of maximum wind direction

Description: The external user should be able to see the diagram showing the change of maximum wind direction value for the current day.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the diagram that show the change of value of maximum wind direction	The session shows the diagram that show the change of	Pass

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			value of maximum wind direction	
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Test Name: Test Case 9: View the flow rate

Description: The external user should be able to see the current value of the flow rate.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the current value of flow rate	The session shows the current value of flow rate	Pass

Test Name: Test Case 10: View the wind speed

Description: The external user should be able to see the current value of the wind speed

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the current value of wind speed	The session shows the current value of wind speed	Pass

Test Name: Test Case 11: View the water speed

Description: The external user should be able to see the current value of the water speed.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the current value of water speed	The session shows the current value of water speed	Pass

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Test Name: Test Case 12: View the wind direction

Description: The external user should be able to see the current value of the wind direction.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the current value of wind direction.	The session shows the current value of wind direction.	Pass

Test Name: Test Case 13: View the water level

Description: The external user should be able to see the current value of the water level.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the current value of water level	The session shows the current value of water level	Pass

Test Name: Test Case 14: View the river bed level

Description: The external user should be able to see the current value of the river bed level.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows the current value of river bed level	The session shows the current value of river bed level	Pass

Test Name: Test Case 15: View Google Maps picture of bridge

Description: The external user should be able to see a Google maps picture of the bridge with a wind rose picture.

Prerequisites: N/A

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Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	External user enters in the "current state" session of the site.	The session shows a Google maps picture of the bridge with a wind rose picture.	The session shows a Google maps picture of the bridge with a wind rose picture.	Pass

Operator

The operator can see everything that the external user sees. Here are the specific test cases for the functionalities that only the operator has.

Test Name: Test Case 16: Log in

Description: The human controller should be able to log into the system with username and password

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	The Operator enters the credentials.	The operator is logged in in the system	The operator is logged in in the system	Pass

Test Name: Test Case 17: Change debris value

Description: The operator should be able to change the debris value. The debris value is a boolean

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the check box "D" that the operator can change.	The session shows the check box "D" that the operator can change.	Pass

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Test Name: Test Case 18: Change traffic value

Description: The operator should be able to change the traffic value. The traffic value is a boolean

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the check box "T" that the operator can change.	The session shows the check box "T" that the operator can change.	Pass

Test Name: Test Case 19: View alarm button

Description: The operator should be able to see the alarm button.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "current state" session of the site.	The session shows the alarm state	The session shows the alarm state	Pass

Test Name: Test Case 20: View worst-case table.

Description: The operator should see the table for CS values for each pylon, their combination label, and values N, M, Tx, Ty, Mx and My.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "current state" session of the site.	The session shows the worst-case table	The session shows the worst-case table	Pass

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Test Name: Test Case 21: View History Diagram of wind speed

Description: The operator should be able to see the history diagram showing wind speed during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of wind speed	The session shows the history diagram of wind speed	Pass

Test Name: Test Case 22: View History Diagram of wind direction

Description: The operator should be able to see the history diagram showing wind direction during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of wind direction	The session shows the history diagram of wind direction	Pass

Test Name: Test Case 23: View History Diagram of maximum wind speed

Description: The operator should be able to see the history diagram showing maximum wind speed during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of maximum wind speed	The session shows the history diagram of maximum wind speed	Pass

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Test Name: Test Case 24: View History Diagram of maximum wind direction

Description: The operator should be able to see the history diagram showing maximum wind direction during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of maximum wind direction	The session shows the history diagram of maximum wind direction	Pass

Test Name: Test Case 25: View History Diagram of water level

Description: The operator should be able to see the history diagram showing water level during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of water level	The session shows the history diagram of water level	Pass

Test Name: Test Case 26: View History Diagram of river bed height

Description: The operator should be able to see the history diagram showing river bed height during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of river bed height.	The session shows the history diagram of river bed	Pass

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			height.	
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Test Name: Test Case 27: View History Diagram of safety factor

Description: The operator should be able to see the history diagram showing safety factor during chosen period of time.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows the history diagram of safety factor	The session shows the history diagram of safety factor	Pass

Test Name: Test Case 28: Select dates for historical diagrams

Description: The human controller can choose a start date and end date for the historical graphs.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams" session of the site.	The session shows "start date" and "end date" that the operator can change	The session shows "start date" and "end date" that the operator can change	Pass

Test Name: Test Case 29: Select a specific day for historical diagrams

Description: The human controller can choose a specific day for the historical graphs.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the "history diagrams"	The session shows "specific date" that the operator can	The session shows "specific	Pass

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	session of the site.	change	date” that the operator can	
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Test Name: Test Case 30: Select a specific month for historical diagrams

Description: The human controller can choose a specific month for the historical graphs.

Prerequisites: The user must be logged in as an Operator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator enters in the “history diagrams” session of the site.	The session shows “specific month” that the operator can change	The session shows “specific month” that the operator can change	Pass

Test Name: Test Case 31: Logout

Description: The human controller should be able to log out of the system.

Prerequisites: The user must be logged in as an Operator, Engineer or Administrator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Operator clicks “logout” button	Operator is logged out	Operator is logged out	Pass

Engineer

The engineer can see everything that the external user and the operator sees. Here are the specific test cases for the functionalities that only the engineer has.

Test Name: Test Case 32: View parameters

Description: The engineer can view all the parameters that are stored in the database and used for calculations

Prerequisites: The user must be logged in as an Engineer

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Engineer enters in the database.	The database shows all the parameters used for calculations .	The database shows all the	Pass

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			parameters used for calculations	
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Administrator

Test Name: Test Case 33: Log in

Description: The administrator should be able to log into the system with username and password.

Prerequisites: The user must be logged in as an Administrator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Administrator enters the credentials	The administrator is logged in.	The administrator is logged in.	Pass

Test Name: Test Case 34: Register New User

Description: The administrator should be able to register a new user by entering information about the user: first name, last name, username, email and permission level (Engineer or Human Controller).

Prerequisites: The user must be logged in as an Administrator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Administrator enters all the information of the user and defines its permission level	A new user is registered.	A new user is registered.	Pass

Test Name: Test Case 35: Edit User

Description: The administrator should be able to edit any information about any user (except password).

Prerequisites: The user must be logged in as an Administrator

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Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Administrator edit the information of the user	The information of the user is updated	The information of the user is updated	Pass

Test Name: Test Case 36: Delete user

Description: The administrator should be able to delete a registered user from the system.

Prerequisites: The user must be logged in as an Administrator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Administrator clicks on "delete user" button	The user is deleted	The user is deleted	Pass

Test Name: Test Case 37: Log out

Description: The administrator should be able to log out of the system.

Prerequisites: The user must be logged in as an Operator, Engineer or Administrator

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Administrator clicks on "log out" button	The administrator is logged out.	The administrator is logged out.	Pass

Parser

Test Name: Test Case 38: Parse of the received package from the sensors.

Description: The parser shall convert all the received data in the database, in the table of Raw_Data (1sec). Each value has to fill one row of the table.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser converts the received data into the database.	The table Raw_Data (1sec) shall be filled with converted data.	The table Raw_Data (1sec) shall be filled with converted data.	Pass

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Test Name: Test Case 39: Parse name of the analog and sonar files.

Description: The parser shall convert the names of files for analog and sonar sensor like this:sonar***** and analog*****, where '*****' represents the number of seconds that have elapsed since 1st January 1904.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser converts the names of files of analog and sonar sensors.	The names of files shall be sonar***** or analog*****.	The names of files shall be sonar***** or analog*****.	Pass

Test Name: Test Case 40: Parse name of the picture files.

Description: The parser shall convert the names of pictures files like this: Modean[Mantova]***** where '*****' represents the exact time and date when the pictures were taken.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser converts the names of pictures files taken form the cameras.	The names of files shall be Modean[Mantova]******.	The names of files shall be Modean[Mantova]*****.	Pass

Test Name: Test Case 41: Parse unit measurement of wind speed.

Description: The parser shall convert the unit measurement of wind speed from 'mA' to 'm/s' according to the formula: $V [m / s] = ((V [mA] * 1000) - 4) * 3,75$, where V is the speed.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser converts the unit measurement of the wind speed.	The unit measurement of the wind speed shall be 'm/s'.	The unit measurement of the wind speed shall be 'm/s'.	Pass

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Test Name: Test Case 42: Parse unit measurement of hydrometer sensor

Description: The parser shall convert the unit measurement of hydrometer sensor which measures the distance between the hydrometer and the water and the height of the water. The unit measurement shall be converted from 'mA' to 'm'. The conversion shall be done according to the formulas: $h [m] = 20 + (((h [mA] * 1000) - 4) * (-1,25))$ for the distance and $h_{water} [m] = 29,86 - h [m]$ for the height of water.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser converts the unit measurement of the hydrometer data.	The unit measurement of the hydrometer data shall be 'm'.	The unit measurement of the hydrometer data shall be 'm'.	Pass

Test Name: Test Case 43: Parse unit measurement of wind direction

Description: The parser shall convert the unit measurement of wind direction from 'mA' to '°'(degree) according to the formula: $dir [°] = (((dir [mA] * 1000) - 4) * 22,5)$.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser converts the unit measurement of the wind direction.	The unit measurement of the wind speed shall be '°' (degree).	The unit measurement of the wind speed shall be '°' (degree).	Pass

Test Name: Test Case 44: Parse the timestamp of analog files.

Description: The parser shall parse the column of the timestamps in the way that each row of the column shall have the timestamp of the detection of the sample. The decimals for the timestamp are allowed to be dropped.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser parses the timestamps	Each row of the 'timestamp' column	Each row of the	Pass

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	of analog files.	shall have a value that represents the time of detection of the sample.	'timestamp' column shall have a value that represents the time of detection of the sample.	
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Test Name: Test Case 45: Parse the distance: sonar sensor-bottom of the river

Description: The parser shall parse the distance between the sonar sensor and the bottom of the river according to the formula: $hBottom[m] = 12,3 - xx.xx [m]$.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser parses the distance between the sonar sensor and the bottom of the river.	The data shall be visible in the first column of the sonar*****.txt file.	The data shall be visible in the first column of the sonar*****.txt file.	Pass

Test Name: Test Case 46: Parse the timestamp of sonar files

Description: The parser shall parse the column of the timestamps in the way that each row of the column shall have the timestamp of the detection of the sample. The decimals for the timestamp are allowed to be dropped.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser parses the timestamps of analog files.	Each row of the 'timestamp' column shall have a value that represents the time of detection of the sample.	Each row of the 'timestamp' column shall have a value that represents the time of detection of the sample.	Pass

Calculations

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Test Name: Test Case 47: Calculations after parse

Description: All calculations should be preformed after each parse of the data.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Parser parses the data.	System stores the parsed data in the database.	System stores the parsed data in the database.	Pass
2	System performs calculations over the parsed data.	System shows the calculated data.	System shows the calculated data.	Pass

Test Name: Test Case 48: Push of wind.

Description: The push of the wind on the planking should be calculated by the formula:

$$Sv_{plank} = 1/2 * CD_{wi} * \rho_{air} * A_{traf} * V_{EFFwind}^2$$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System calculates the push of wind using the formula in the description.	System shows the calculated push of wind.	System shows the calculated push of wind.	Pass

Test Name: Test Case 49: Push of Wind for traffic A1.

Description: The push of the wind on the traffic for traffic combination A1 should be calculated by the formula: $SV (A1 traf) = 1/2 * CD_{wi} * \rho_{air} * (\beta_1 * A_{traf}) * V_{EFFwind}^2$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System calculates the push of wind for traffic A1 using	System shows the calculated push of wind for traffic combination A1	System shows the calculated push of wind	Pass

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	the formula in the description.		for traffic combination A1	
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Test Name: Test Case 50: Push of Wind for traffic A2

Description: The push of the wind on the traffic for traffic combination A1 should be calculated by the formula: $SV (A2 traf) = 1/2 * CDwi * \rho air * (\beta 1 * A traf) * V EFFwind$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System calculates the push of wind for traffic A2 using the formula in the description.	System shows the calculated push of wind for traffic combination A2	System shows the calculated push of wind for traffic combination A2	Pass

Test Name: Test Case 51: Push of Wind for traffic A3

Description: The push of the wind on the traffic for traffic combination A3 should be calculated by the formula: $SV (A3 traf) = 1/2 * CDwi * \rho air * (\beta 2 * A traf) * V EFFwind$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System calculates the push of wind for traffic A3 using the formula in the description.	System shows the calculated push of wind for traffic combination A3	System shows the calculated push of wind for traffic combination A3	Pass

Test Name: Test Case 52: Flow rate calculation

Description: The flow rate should be calculated using the formula:

$$Q = a_i * h_{water}^2 + b_i * h_{water} + c_i$$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System	System shows the	System	Pass

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	calculates the flow rate using the formula in the description	calculated value of flow rate.	shows the calculated value of flow rate.	
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Test Name: Test Case 53: Speed of water calculation

Description: The speed of water should be calculated using the formula: $V_{water} = a * h_{water}^3 + b * h_{water}^2 + c * h_{water}$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System calculates the flow rate using the formula in the description	System shows the calculated value of water level.	System shows the calculated value of water level.	Pass

Test Name: Test Case 54: Area Stack calculation

Description: The area of stack should be calculated using the formula: $A_s = B_s * h_s$

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System calculates the area stack using the formula in the description	System shows the calculated value of area stack.	System shows the calculated value of area stack.	Pass

External Interfaces

Test Name: Test Case 55: Alarm Button

Description: The alarm button should turn red if any pylon is outside the M-N domain.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	Pylon is outside the M-N domain.	Alarm button turns red.	Alarm button turns red.	Pass

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Non-Functional Requirements

Test Name: Test Case 56: Calculations and Parsing Time

Description: The system should parse the data from the sensors and perform calculations every one hour.

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	System performs parsing and calculations every one hour	System stores the calculations in database	System stores the calculations in database	Pass

Test Name: Test Case 57: Response Time

Description: The loading time for each page should be less than 20 seconds

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	User makes an action in the system	System responds in less than 20 seconds	System responds in less than 20 seconds	Pass

Test Name: Test Case 58: Security

Description: A log in is required to sign into the system and view internal data

Prerequisites: N/A

Step	Operator Action	Expected Results	Observed Results	Pass/Fail
1	User tries to see something that is beyond his permission level	System redirects the user to the log-in view.	System redirects the user to the log-in view.	Pass

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3.7 Test allocation of Requirements

Requirement Number	Requirement Description	Test Case Where Verified
RE-V1.4-EU1	The external user should be able to see the stack image with each pylons, with also the flow direction	1
RE-V1.4-EU2	The external user should be able to see the latest pictures of the both sides of the bridge.	2
RE-V1.4-EU3	The external user should be able to see the diagram showing the change of value of wind speed for the current day.	3
RE-V1.4-EU4	The external user should be able to see the diagram showing the change of value of wind direction for the current day.	4
RE-V1.4-EU5	The external user should be able to see the diagram showing the change of water level for the current day.	5
RE-V1.4-EU6	The external user should be able to see the diagram showing the change of depth of river bed for the current day.	6
RE-V1.4-EU7	The external user should be able to see the diagram showing the change of maximum wind speed for the current day.	7
RE-V1.4-EU8	The external user should be able to see the diagram showing the change of maximum wind direction value for the current day.	8
RE-V1.4-EU9	The external user should be able to see the current value of the flow rate.	9
RE-V1.4-EU10	The external user should be able to see the current value of the wind speed	10
RE-V1.4-EU11	The external user should be able to see the current value of the water speed.	11
RE-V1.4-EU12	The external user should be able to see the current value of the wind direction.	12
RE-V1.4-EU13	The external user should be able to see the current value of the water level.	13
RE-V1.4-EU14	The external user should be able to see the current value of the river bed level.	14
RE-V1.4-EU15	The external user should be able to see a Google maps picture of the bridge with a wind rose picture.	15

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RE-V1.4-HC1	The human controller should be able to log into the system with username and password	16
RE-V1.4-HC17	The operator should be able to change the debris value. The debris value is a boolean	17
RE-V1.4-HC18	The operator should be able to change the traffic value. The traffic value is a boolean	18
RE-V1.4-HC19	The operator should be able to see the alarm button.	19
RE-V1.4-HC22	The operator should see the table for CS values for each pylon, their combination label, and values N, M, Tx, Ty, Mx and My.	20
RE-V1.4-HC23	The operator should be able to see the history diagram showing wind speed during chosen period of time.	21
RE-V1.4-HC24	The operator should be able to see the history diagram showing wind direction during chosen period of time.	22
RE-V1.4-HC25	The operator should be able to see the history diagram showing maximum wind speed during chosen period of time.	23
RE-V1.4-HC26	The operator should be able to see the history diagram showing maximum wind direction during chosen period of time.	24
RE-V1.4-HC27	The operator should be able to see the history diagram showing water level during chosen period of time.	25
RE-V1.4-HC28	The operator should be able to see the history diagram showing river bed height during chosen period of time.	26
RE-V1.4-HC29	The operator should be able to see the history diagram showing safety factor during chosen period of time.	27
RE-V1.4-HC30	The operator can choose a start date and end date for the historical graphs.	28
RE-V1.4-HC31	The operator can choose a specific day for the historical graphs.	29
RE-V1.4-HC32	The operator can choose a specific month for the historical graphs.	30
RE-V1.4-HC33	The operator should be able to log out of the system.	31
RE-V1.4-E33	The engineer can view all the parameters that are stored in the database and used for calculations	32
RE-V1.4-A1	The administrator should be able to log into	33

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	the system with username and password.	
RE-V1.4-A2	The administrator should be able to register a new user by entering information about the user: first name, last name, username, email and permission level (Engineer or Human Controller).	34
RE-V1.4-A3	The administrator should be able to edit any information about any user (except password).	35
RE-V1.4-A4	The administrator should be able to delete a registered user from the system.	36
RE-V1.4-A5	The administrator should be able to log out of the system.	37
RE-V1.4-P1	Each received package must be parsed into the database in the following way. Every hour the system receives a packet in which there are an analog file, a sonar file both with 3600 values and two images, one for camera. All these values are to be converted from the parser into the db, in the table of Raw_data(1sec). Each values has to fill one row of the table.	38
RE-V1.4-P2	For the analog and sonar sensors, the name of the files should be parsed in the following way. In the file names, analog*****.txt and sonar*****.txt, the ID (**...) represents the number of seconds that have elapsed since 1st January 1904 (using Labview encode), on the Greenwich meridian.	39
RE-V1.4-P3	For the picture files, the ID of the name Modean[Mantova]*****.jpg should represent the exact time and date when the picture was taken.	40
RE-V1.4-P4	The first column of the analog*****.txt file should be parsed in the following way. Each row in the column represents the wind speed (measured in mA). It should be converted to [m / s] by using the following formula: $V [m / s] = ((V [mA] * 1000) - 4) * 3,75$.	41
RE-V1.4-P5	The second column of the analog*****.txt file should be parsed in the following way. Each row in the column represents the distance between the hydrometer and the level of water (measured in mA). The actual distance [m] should be parsed by using the following formula: $h [m] = 20 + ((h [mA] * 1000) - 4) * (-1,25)$. The water height	42

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	should be parsed by using the following formula: $h_{water}[m] = 29,86 - h[m]$.	
RE-V1.4-P6	The third column of the analog*****.txt file should be parsed in the following way. Each row in the column represents the wind direction (measured in mA). It should be converted to [°] by using the following formula: $dir[°] = ((dir[mA] * 1000) - 4) * 22,5$.	43
RE-V1.4-P7	The fourth column of the analog*****.txt file should be parsed in the following way. Each row in the timestamp of the detection of the sample(Labview encode). The decimals for the timestamp are allowed to be dropped.	44
RE-V1.4-P8	The first column from the sonar*****.txt file should be parsed in the following way. The first column is the distance between sonar and the bottom of the river (measured in meters). The height of the bottom [m] should be parsed by using the following formula: $h_{Bottom}[m] = 12,3 - xx.xx[m]$.	45
RE-V1.4-P9	The second column from the sonar*****.txt file is the timestamp of the detection of the sample and should be parsed by using the Labview encode: the number represents the number of seconds that have elapsed since 1st January 1904, on the Greenwich meridian.	46
RE-V1.4-C1	All calculations should be preformed after each parse of the data.	47
RE-V1.4-C2	The push of the wind on the planking should be calculated by the formula: $Sv_{plank} = 1/2 * CD_{wi} * pair * A_{traf} * V_{EFFwind}$	48
RE-V1.4-C3	The push of the wind on the traffic for traffic combination A1 should be calculated by the formula: $SV(A1\ traf) = 1/2 * CD_{wi} * pair * (\beta_1 * A_{traf}) * V_{EFFwind}$	49
RE-V1.4-C4	The push of the wind on the traffic for traffic combination A1 should be calculated by the formula: $SV(A2\ traf) = 1/2 * CD_{wi} * pair * (\beta_1 * A_{traf}) * V_{EFFwind}$	50
RE-V1.4-C5	The push of the wind on the traffic for traffic combination A3 should be calculated by the formula: $SV(A3\ traf) = 1/2 * CD_{wi} * pair * (\beta_2 * A_{traf}) * V_{EFFwind}$	51
RE-V1.4-C7	The flow rate should be calculated using the	52

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	formula: $Q = ai * hwater^2 + bi* hwater + ci$	
RE-V1.4-C8	The speed of water should be calculated using the formula: $Vwater = a * hwater^3 + b * hwater^2 + c * hwater$	53
RE-V1.4-C9	The area of stack should be calculated using the formula: $As = Bs* hs$	54
RE-V1.4-EI1	The alarm button should turn red if any pylon is outside the M-N domain.	55
RE-V1.4-PE1	The system should parse the data from the sensors and perform calculations every one hour.	56
RE-V1.4-PE1	The loading time for each page should be less than 20 seconds	57
RE-V1.4-S1	A log in is required to sign into the system and view internal data	58