

Award

Federal Award Identification Number (FAIN)	UT-2021-020-00
Temporary Application Number	1167-2021-13
Award Name	FY 2020 Research Innovation Program - Transit Infrastructure Condition Assessment
Award Status	Active (Executed)
Award Budget Number	0

Period of Performance Start Date	9/8/2021
Original Period of Performance End Date	3/31/2023
Current Period of Performance End Date	3/31/2023
	Revision #: 0

Part 1: Recipient Information

Name: Utah Transit Authority (UTA)

Recipient ID	Recipient OST Type	Recipient Alias	Recipient DUNS
1167	Transit Authority	Utah Transit Authority	069816163

Location Type	Address	City	State	Zip
Headquarters	669 W 200 S	SALT LAKE CITY	UT	841011014
Physical Address	669 W 200 S	SALT LAKE CITY	UT	84101
Mailing Address	669 W 200 S	SALT LAKE CITY	UT	84101

Union Information

Union Name	AMALGAMATED TRANSIT UNION
Address 1	2261 South Redwood Road
Address 2	Suite B
City	Salt Lake City
State	UT
Zipcode	84119
Contact Name	Rod Dunn
Telephone	8019728560
Fax	8019724938

E-mail rduinn@atu382.com

Website

Part 2: Award Information

Title: FY 2020 Research Innovation Program - Transit Infrastructure Condition Assessment

FAIN	Award Status	Award Type	Date Created	Last Updated Date	From TEAM?
UT-2021-020-00	Active (Executed)	Cooperative Agreement	8/18/2021	8/18/2021	No

Award Executive Summary

The project was awarded through the FY 2020 Real-Time Transit Infrastructure and rolling Stock Condition Assessment Program. This funding will use FY 2011 and FY 2016 5312 funds to develop and demonstrate a system that can identify, quantify, and monitor both the internal and external defects of rail track and tie structures with the potential for high-speed full track section inspection. The match ratio of this grant is 77.5/22.5. Specific match ratios per ALI are indicated in the extended budget description. The University of Utah will use indirect costs for this grant application. UTA will not be applying indirect costs. Attachments to this grant include: FARateAgreement2016_UU, Figures & Bibliography, FTA_SOW_PolarizedInfraredOpticalCameraSystem_UTA, Rail Defect Detection Deferred Local Match Letter_Signed, STIP Page 132.

Frequency of Milestone Progress Reports (MPR)

Quarterly

Frequency of Federal Financial Reports (FFR)

Quarterly

Does this application include funds for research and/or development activities?

This award includes research and development activities.

Pre-Award Authority

This award is not using Pre-Award Authority.

Does this application include suballocation funds?

Recipient organization is directly allocated these funds and is eligible to apply for and receive these funds directly.

Will this Grant be using Lapsing Funds?

No, this Grant does not use Lapsing Funds.

Will indirect costs be applied to this application?

This award is applying an approved Indirect cost rate(s).

Indirect Rate Details: The indirect document "FARate Agreement2016_UU" is attached to the grant. The approved rates are 52.50% for On-Campus Organized Research and 26% Off-Campus Research. The federal share requested for indirect costs is \$56,253.

Requires E.O. 12372 Review

Yes, this application requires E.O. 12372 Review

State Application ID: Application not selected for review.

Date Received by State:

Delinquent Federal Debt

No, my organization does not have delinquent federal debt.

Award Point of Contact Information

First Name	Last Name	Title	E-mail Address	Phone
Alma	Haskell	Grants Development Administrator	ahaskell@rideuta.com	801-741-8813
	samuel.yimer@dot.gov	General Engineer		

Award Budget Control Totals

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$15,691
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$322,464
Local			\$98,277
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$436,432

Award Budget

Project Number	Budget Item	FTA Amount	Non-FTA Amount	Total Eligible Amount	Quantity
UT-2021-020-01-00	550-00 (550-A1) Research Projects	\$15,691.00	\$4,560.00	\$20,251.00	7
UT-2021-020-01-00	50.20.00 TUITION/FEES	\$406.00	\$0.00	\$406.00	1
UT-2021-020-01-00	55.14.00 MANAGERIAL, TECHNICAL & PROFESSIONAL	\$4,805.00	\$1,599.00	\$6,404.00	1
UT-2021-020-01-00	55.19.00 OTHER	\$3,201.00	\$919.00	\$4,120.00	1
UT-2021-020-01-00	55.20.00 TRAVEL	\$443.00	\$122.00	\$565.00	1
UT-2021-020-01-00	55.30.00 FRINGE BENEFITS	\$2,421.00	\$592.00	\$3,013.00	1
UT-2021-020-01-00	55.49.00 SUPPLIES	\$1,805.00	\$640.00	\$2,445.00	1
UT-2021-020-01-00	55.82.00 GENERAL & ADMINISTRATIVE	\$2,610.00	\$688.00	\$3,298.00	1
UT-2021-020-02-00	550-00 (550-A2) Research Projects	\$322,464.00	\$93,717.00	\$416,181.00	7
UT-2021-020-02-00	50.20.00 TUITION/FEES	\$8,347.00	\$0.00	\$8,347.00	1
UT-2021-020-02-00	55.14.00 MANAGERIAL, TECHNICAL & PROFESSIONAL	\$98,746.00	\$32,859.00	\$131,605.00	1
UT-2021-020-02-00	55.19.00 OTHER	\$65,774.00	\$18,897.00	\$84,671.00	1

UT-2021-020-02-00	55.20.00 TRAVEL	\$9,101.00	\$2,512.00	\$11,613.00	1
UT-2021-020-02-00	55.30.00 FRINGE BENEFITS	\$49,753.00	\$12,160.00	\$61,913.00	1
UT-2021-020-02-00	55.49.00 SUPPLIES	\$37,100.00	\$13,160.00	\$50,260.00	1
UT-2021-020-02-00	55.82.00 GENERAL & ADMINISTRATIVE	\$53,643.00	\$14,129.00	\$67,772.00	1

Discretionary Allocations

Discretionary ID	Project Title	Amount Applied	FAIN	Congressional Release Date
D2021-RIRP-006	Polarized Infrared and Optical Imaging System for Transit Infrastructure Condition Assessment	\$322,464	UT-2021-020-00	8/25/2021
D2021-RIRP-007	Polarized Infrared and Optical Imaging System for Transit Infrastructure Condition Assessment	\$15,691	UT-2021-020-00	8/25/2021

Sources of Federal Financial Assistance

PO Number	Project Number	Scope Name	Scope Number	Scope Suffix	UZA Code	Area Name	Account Class Code	FPC	Description	Amendment Amount	Cumulative Amount
UT-26-7008	UT-2021-020-01-00	Research Project s	550-00 (550)	A1	490000	Utah	2011.23.26.06.1	01	RESEARCH AND TRAINING	\$15,691	\$15,691
UT-26-7008	UT-2021-020-02-00	Research Project s	550-00 (550)	A2	490000	Utah	2016.25.26.TD.2	01	Research, Development, Demonstration, and Deployment	\$322,464	\$322,464

Part 3: Project Information

Project Title: Polarized Infrared and Optical Imaging System for Transit Infrastructure Condition Assessment - FY 2011 Funds

Project Number	Temporary Project Number	Date Created	Start Date	End Date
UT-2021-020-01-00	1167-2021-13-P1	8/18/2021	1/1/2021	12/31/2022

Project Description

This project is for \$15,691 federal dollars in FY 2011 5012 funds. The rest of the project is funded through FY 2016 funds in another project in this award.

The project team will develop and demonstrate a system that can identify, quantify, and monitor both the internal and external defects of rail track and tie structures with the potential for high-speed full track section inspection. The system employs a polarized infrared camera and a polarized optical camera, whose data collection will be immune from adverse infrared or optical illumination conditions in a field environment. An envisioned fully developed system can be mounted on an inspection vehicle or revenue service train and provide early warning and long-term monitoring of track and tie conditions. The work plan is composed of three tasks: technology development, demonstration, and evaluation. The work plan allows a rapid technology demonstration, data collection and evaluation effort. It is the intent of the partners that the research will lead to a developed product that will eventually be applied as a commercial product with the goal of deployment at scale. The match ratio of this grant is 77.5/22.5. Specific match ratios per ALI are indicated in the extended budget description. Attachments to this grant include: FARateAgreement2016_UU, Figures & Bibliography, FTA_SOW_PolarizedInfraredOpticalCameraSystem_UTA, Rail Defect Detection Deferred Local Match Letter_Signed, STIP Page 134.

Project Benefits

The benefits of this project are to serve the transit industry by increasing safety, improving infrastructure reliability, and minimizing the risks of accidents induced by rail defects and tie degradation. The project team will investigate the polarized infrared and optical imaging technology as tools for transit asset assessment by (i) developing a robust passive infrared thermography for rail track and tie inspection, covering variations in defect types, sizes, temperature, and weather conditions; and (ii) developing a robust optical imaging solution, along with machine learning algorithms, that can detect and classify rail and tie external defects, such as rail surface condition and missing rail fasteners. Upon its success, the proposed research will open up a new avenue for high-speed real-time full track section inspection.

Additional Information

None provided.

Location Description

The project will be located along the Utah Transit Authority Rail corridors which cover all congressional districts.

Project Location (Urbanized Areas)

UZA Code	Area Name
490520	Salt Lake City--West Valley City, UT
491750	Provo--Orem, UT
499560	Ogden--Layton, UT

Congressional District Information

State	District	Representative
Utah	1	Blake Moore
Utah	2	Chris Stewart
Utah	3	John Curtis
Utah	4	Clarence "Burgess" Owens

Program Plan Information

STIP/TIP

Date: 10/1/2020

Description: STIP Page 134 - PIN T-010411

UPWP

Date: N/A

Description: N/A

Long Range Plan

Date: N/A

Description: N/A

Project Control Totals

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$15,691
Local			\$4,560
Local/In-Kind			\$0
State			\$0

State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$20,251

Project Budget

Project Number	Budget Item	FTA Amount	Non-FTA Amount	Total Eligible Amount	Quantity
UT-2021-020-01-00	550-00 (550-A1) Research Projects	\$15,691.00	\$4,560.00	\$20,251.00	7
UT-2021-020-01-00	50.20.00 TUITION/FEES	\$406.00	\$0.00	\$406.00	1
UT-2021-020-01-00	55.14.00 MANAGERIAL, TECHNICAL & PROFESSIONAL	\$4,805.00	\$1,599.00	\$6,404.00	1
UT-2021-020-01-00	55.19.00 OTHER	\$3,201.00	\$919.00	\$4,120.00	1
UT-2021-020-01-00	55.20.00 TRAVEL	\$443.00	\$122.00	\$565.00	1
UT-2021-020-01-00	55.30.00 FRINGE BENEFITS	\$2,421.00	\$592.00	\$3,013.00	1
UT-2021-020-01-00	55.49.00 SUPPLIES	\$1,805.00	\$640.00	\$2,445.00	1
UT-2021-020-01-00	55.82.00 GENERAL & ADMINISTRATIVE	\$2,610.00	\$688.00	\$3,298.00	1

Project Budget Activity Line Items

Budget Activity Line Item: 55.82.00 - GENERAL & ADMINISTRATIVE

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.82.00	GENERAL & ADMINISTRATIVE	INDIRECT COSTS	1

Extended Budget Description

This Activity Line Item covers indirect costs for the University of Utah. This is for all phases of the project including the data management plan, interim/final report and dissemination. The indirect cost FAR Rate Agreement is attached to this grant. The match ratio for this line item is 80/20. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$2,610
Local			\$688
Local/In-Kind			\$0

State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$3,298

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.49.00 - SUPPLIES

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.49.00	SUPPLIES	EQUIPMENT	1

Extended Budget Description

This ALI will include research project related supplies for both the University of Utah and Autofill for all phases of the project. The match ratio for this line item is 74/26. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$1,805
Local			\$640
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$2,445

Milestone Name	Est. Completion Date	Description
Start Date	8/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.30.00 - FRINGE BENEFITS

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.30.00	FRINGE BENEFITS	RESEARCH PROJECTS	1

Extended Budget Description

This ALI will cover fringe benefits for both University of Utah and Autofill staff for all phases of the project including the data management plan, interim/final report and dissemination of information. The match ratio for this line item is 80/20. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$2,421
Local			\$592
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$3,013

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.20.00 - TRAVEL

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.20.00	TRAVEL	RESEARCH PROJECTS	1

Extended Budget Description

Travel related to the project will be during phases 1, 2 and 3 for both University of Utah and Autofill staff. The match ratio for this line item is 78/22. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$443
Local			\$122
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$565

Milestone Name	Est. Completion Date	Description
Start Date	1/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.19.00 - OTHER

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.19.00	OTHER	PERSONNEL	1

Extended Budget Description

Funding for this ALI is for personnel costs for the University of Utah staff. University of Utah staff are responsible for the polarized infrared camera system research, development and demonstration. The data management plan, interim, final report and dissemination of information are included in this ALI. The match ratio for this line item is 78/22. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$3,201
Local			\$919
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$4,120

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.14.00 - MANAGERIAL, TECHNICAL & PROFESSIONAL

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.14.00	MANAGERIAL, TECHNICAL & PROFESSIONAL	PERSONNEL	1

Extended Budget Description

Funding for this ALI is for personnel costs for Autofill staff. Autofill staff are responsible for the polarized optical camera system research, development and demonstration. The data management plan, interim, final report and dissemination of information are included in this ALI. The match ratio for this line item is 75/25. See the local deferred match letter attached to the grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
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5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$4,805
Local			\$1,599
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$6,404

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	1/31/2022	

Budget Activity Line Item: 50.20.00 - TUITION/FEES

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	50.20.00	TUITION/FEES	RESEARCH/OVERSIGHT TRAINING	1

Extended Budget Description

This project will be using 5312 funding for tuition reimbursement for students involved in phases 2 and 3 data collection. For this ALI there is no local match. See the local deferred match letter attached to the grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$406
Local			\$0
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$406

Milestone Name	Est. Completion Date	Description
Start Date	1/31/2022	
End Date	2/28/2022	

Project Environmental Findings

Finding: Class II(c) - Categorical Exclusions (C-List)

Class Level Description

Class II(c) consists of projects that do not have a significant environmental impact on the human or natural environment and are therefore categorically excluded from the requirement to prepare an environmental assessment or an environmental impact statement. FTA requires a sufficient project description to support a CE determination. The project may require additional documentation to comply with other environmental laws.

Categorical Exclusion Description

Type 05: Activities, including repairs, replacements, and rehabilitations, designed to promote transportation safety, security, accessibility and effective communication within or adjacent to existing right-of-way, such as: the deployment of Intelligent Transportation Systems and components; installation and improvement of safety and communications equipment, including hazard elimination and mitigation; installation of passenger amenities and traffic signals; and retrofitting existing transportation vehicles, facilities or structures, or upgrading to current standards.

Date Description	Date
Class IIc CE Approved	

Project Title: Polarized Infrared and Optical Imaging System for Transit Infrastructure Condition Assessment - FY 2016 Funds

Project Number	Temporary Project Number	Date Created	Start Date	End Date
UT-2021-020-02-00	1167-2021-13-P2	8/18/2021	7/1/2021	12/31/2022

Project Description

This project is for \$322,464 federal dollars in FY 2016 5012 funds. The rest of the project is funded through FY 2011 funds in another project in this award.

The project team will develop and demonstrate a system that can identify, quantify, and monitor both the internal and external defects of rail track and tie structures with the potential for high-speed full track section inspection. The system employs a polarized infrared camera and a polarized optical camera, whose data collection will be immune from adverse infrared or optical illumination conditions in a field environment. An envisioned fully developed system can be mounted on an inspection vehicle or revenue service train and provide early warning and long-term monitoring of track and tie conditions. The work plan is composed of three tasks: technology development, demonstration, and evaluation. The work plan allows a rapid technology demonstration, data collection and evaluation effort. It is the intent of the partners that the research will lead to a developed product that will eventually be applied as a commercial product with the goal of deployment at scale. The match ratio of this grant is 77.5/22.5. Specific match ratios per ALI are indicated in the extended budget description. Attachments to this grant include: FARateAgreement2016_UU, Figures & Bibliography, FTA_SOW_PolarizedInfraredOpticalCameraSystem_UTA, Rail Defect Detection Deferred Local Match Letter_Signed, STIP Page 134.

Project Benefits

The benefits of this project are to serve the transit industry by increasing safety, improving infrastructure reliability, and minimizing the risks of accidents induced by rail defects and tie degradation. The project team will investigate the polarized infrared and optical imaging technology as tools for transit asset assessment by (i) developing a robust passive infrared thermography for rail track and tie inspection, covering variations in defect types, sizes, temperature, and weather conditions; and (ii) developing a robust optical imaging solution, along with machine learning algorithms, that can detect and classify rail and tie external defects, such as rail surface condition and missing rail fasteners. Upon its success, the proposed research will open up a new avenue for high-speed real-time full track section inspection.

Additional Information

None provided.

Location Description

The project will be located along the Utah Transit Authority Rail corridors which cover all congressional districts.

Project Location (Urbanized Areas)

UZA Code	Area Name
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490520	Salt Lake City--West Valley City, UT
491750	Provo--Orem, UT
499560	Ogden--Layton, UT

Congressional District Information

State	District	Representative
Utah	1	Blake Moore
Utah	2	Chris Stewart
Utah	3	John Curtis
Utah	4	Clarence "Burgess" Owens

Program Plan Information

STIP/TIP

Date: 10/1/2020

Description: STIP Page 134. PIN T-010411

UPWP

Date: N/A

Description: N/A

Long Range Plan

Date: N/A

Description: N/A

Project Control Totals

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$322,464
Local			\$93,717
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$416,181

Project Budget

Project Number	Budget Item	FTA Amount	Non-FTA Amount	Total Eligible Amount	Quantity
UT-2021-020-02-00	550-00 (550-A2) Research Projects	\$322,464.00	\$93,717.00	\$416,181.00	7

UT-2021-020-02-00	50.20.00	TUITION/FEES	\$8,347.00	\$0.00	\$8,347.00	1
UT-2021-020-02-00	55.14.00	MANAGERIAL, TECHNICAL & PROFESSIONAL	\$98,746.00	\$32,859.00	\$131,605.00	1
UT-2021-020-02-00	55.19.00	OTHER	\$65,774.00	\$18,897.00	\$84,671.00	1
UT-2021-020-02-00	55.20.00	TRAVEL	\$9,101.00	\$2,512.00	\$11,613.00	1
UT-2021-020-02-00	55.30.00	FRINGE BENEFITS	\$49,753.00	\$12,160.00	\$61,913.00	1
UT-2021-020-02-00	55.49.00	SUPPLIES	\$37,100.00	\$13,160.00	\$50,260.00	1
UT-2021-020-02-00	55.82.00	GENERAL & ADMINISTRATIVE	\$53,643.00	\$14,129.00	\$67,772.00	1

Project Budget Activity Line Items

Budget Activity Line Item: 55.82.00 - GENERAL & ADMINISTRATIVE

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.82.00	GENERAL & ADMINISTRATIVE	INDIRECT COSTS	1

Extended Budget Description

This Activity Line Item covers indirect costs for the University of Utah. This is for all phases of the project including the data management plan, interim/final report and dissemination. The indirect cost FAR Rate Agreement is attached to this grant. The match ratio for this line item is 80/20. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$53,643
Local			\$14,129
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$67,772

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.49.00 - SUPPLIES

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.49.00	SUPPLIES	EQUIPMENT	1

Extended Budget Description

This ALI will include research project related supplies for both the University of Utah and Autofill for all phases of the project. The match ratio for this line item is 74/26. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$37,100
Local			\$13,160
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$50,260

Milestone Name	Est. Completion Date	Description
Start Date	8/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.30.00 - FRINGE BENEFITS

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.30.00	FRINGE BENEFITS	RESEARCH PROJECTS	1

Extended Budget Description

This ALI will cover fringe benefits for both University of Utah and Autofill staff for all phases of the project including the data management plan, interim/final report and dissemination of information. The match ratio for this line item is 80/20. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$49,753
Local			\$12,160
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$61,913

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.20.00 - TRAVEL

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.20.00	TRAVEL	RESEARCH PROJECTS	1

Extended Budget Description

Travel related to the project will be during phases 1, 2 and 3 for both University of Utah and Autofill staff. The match ratio for this line item is 78/22. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$9,101
Local			\$2,512
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$11,613

Milestone Name	Est. Completion Date	Description
Start Date	1/1/2022	
End Date	12/31/2022	

Budget Activity Line Item: 55.19.00 - OTHER

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.19.00	OTHER	PERSONNEL	1

Extended Budget Description

Funding for this ALI is for personnel costs for the University of Utah staff. University of Utah staff are responsible for the polarized infrared camera system research, development and demonstration. The data management plan, interim, final report and dissemination of information are included in this ALI. The match ratio for this line item is 78/22. See the local deferred match letter attached to this grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$65,774
Local			\$18,897
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0

Total Eligible Cost	\$84,671
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Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	12/31/2022	

Budget Activity Line Item: 55.14.00 - MANAGERIAL, TECHNICAL & PROFESSIONAL

Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	55.14.00	MANAGERIAL, TECHNICAL & PROFESSIONAL	PERSONNEL	1

Extended Budget Description

Funding for this ALI is for personnel costs for Autofill staff. Autofill staff are responsible for the polarized optical camera system research, development and demonstration. The data management plan, interim, final report and dissemination of information are included in this ALI. The match ratio for this line item is 75/25. See the local deferred match letter attached to the grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$98,746
Local			\$32,859
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$131,605

Milestone Name	Est. Completion Date	Description
Start Date	7/1/2021	
End Date	1/31/2022	

Budget Activity Line Item: 50.20.00 - TUITION/FEEES
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Scope Name / Code	Line Item #	Line Item Name	Activity	Quantity
Research Projects (550-00)	50.20.00	TUITION/FEEES	RESEARCH/OVERSIGHT TRAINING	1

Extended Budget Description

This project will be using 5312 funding for tuition reimbursement for students involved in phases 2 and 3 data collection. For this ALI there is no local match. See the local deferred match letter attached to the grant.

Will 3rd Party contractors be used to fulfill this activity line item?

No, 3rd Party Contractors will not be used for this line item.

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$8,347

Local			\$0
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$8,347

Milestone Name	Est. Completion Date	Description
Start Date	1/31/2022	
End Date	2/28/2022	

Project Environmental Findings

Finding: Class II(c) - Categorical Exclusions (C-List)

Class Level Description

Class II(c) consists of projects that do not have a significant environmental impact on the human or natural environment and are therefore categorically excluded from the requirement to prepare an environmental assessment or an environmental impact statement. FTA requires a sufficient project description to support a CE determination. The project may require additional documentation to comply with other environmental laws.

Categorical Exclusion Description

Type 05: Activities, including repairs, replacements, and rehabilitations, designed to promote transportation safety, security, accessibility and effective communication within or adjacent to existing right-of-way, such as: the deployment of Intelligent Transportation Systems and components; installation and improvement of safety and communications equipment, including hazard elimination and mitigation; installation of passenger amenities and traffic signals; and retrofitting existing transportation vehicles, facilities or structures, or upgrading to current standards.

Date	Description	Date
	Class IIc CE Approved	

Part 4: Fleet Details

No fleet data exists for this application.

Part 5: FTA Review Comments

There are no review comments to display at this time.

Part 6: Agreement

UNITED STATES OF AMERICA
DEPARTMENT OF TRANSPORTATION
FEDERAL TRANSIT ADMINISTRATION

**COOPERATIVE AGREEMENT
(FTA C-28, February 9, 2021)**

On the date the authorized U.S. Department of Transportation, Federal Transit Administration (FTA) official sign this Cooperative Agreement, FTA has obligated and awarded federal assistance as provided below. Upon execution of this Cooperative Agreement by the Recipient named below, the Recipient affirms this FTA Award, enters into this Cooperative Agreement with FTA, and binds its compliance with the terms of this Cooperative Agreement.

The following documents are incorporated by reference and made part of this Cooperative Agreement:

- (1) "Federal Transit Administration Master Agreement," FTA MA(28), February 9, 2021, <http://www.transit.dot.gov>,
- (2) The Certifications and Assurances applicable to the FTA Award that the Recipient has selected and provided to FTA, and
- (3) Any Award notification containing special conditions or requirements, if issued.

WHEN THE TERM "FTA AWARD" OR "AWARD" IS USED, EITHER IN THIS COOPERATIVE AGREEMENT OR THE APPLICABLE MASTER AGREEMENT, "AWARD" ALSO INCLUDES ALL TERMS AND CONDITIONS SET FORTH IN THIS COOPERATIVE AGREEMENT.

FTA OR THE FEDERAL GOVERNMENT MAY WITHDRAW ITS OBLIGATION TO PROVIDE FEDERAL ASSISTANCE IF THE RECIPIENT DOES NOT EXECUTE THIS COOPERATIVE AGREEMENT WITHIN 90 DAYS FOLLOWING FTA'S AWARD DATE SET FORTH HEREIN.

FTA AWARD

Federal Transit Administration (FTA) hereby awards a Federal Cooperative Agreement as follows:

Recipient Information

Recipient Name: Utah Transit Authority (UTA)

Recipient ID: 1167

DUNS No: 069816163

Award Information

Federal Award Identification Number: UT-2021-020-00

Award Name: FY 2020 Research Innovation Program - Transit Infrastructure Condition Assessment

Award Start Date: 9/8/2021

Original Award End Date: 3/31/2023

Current Award End Date: 3/31/2023

Award Executive Summary: The project was awarded through the FY 2020 Real-Time Transit Infrastructure and rolling Stock Condition Assessment Program. This funding will use FY 2011 and FY 2016 5312 funds to develop and demonstrate a system that can identify, quantify, and monitor both the internal and external defects of rail track and tie structures with the potential for high-speed full track section inspection. The match ratio of this grant is 77.5/22.5. Specific match ratios per ALI are indicated in the extended budget description. The University of Utah will use indirect costs for this grant application. UTA will not be applying indirect costs. Attachments to this grant include: FARateAgreement2016_UU, Figures & Bibliography, FTA_SOW_PolarizedInfraredOpticalCameraSystem_UTA, Rail Defect Detection Deferred Local Match Letter_Signed, STIP Page 132.

Research and Development: This award includes research and development activities.

Indirect Costs: This award is applying an approved Indirect cost rate(s).

Suballocation Funds: Recipient organization is directly allocated these funds and is eligible to apply for and receive these funds directly.

Pre-Award Authority: This award is not using Pre-Award Authority.

Award Budget

Total Award Budget: \$436,432.00

Amount of Federal Assistance Obligated for This FTA Action (in U.S. Dollars): \$338,155.00

Amount of Non-Federal Funds Committed to This FTA Action (in U.S. Dollars): \$98,277.00

Total FTA Amount Awarded and Obligated (in U.S. Dollars): \$338,155.00

Total Non-Federal Funds Committed to the Overall Award (in U.S. Dollars): \$98,277.00

Award Budget Control Totals

(The Budget includes the individual Project Budgets (Scopes and Activity Line Items) or as attached)

Funding Source	Section of Statute	CFDA Number	Amount
5312 - Research, Development, Demonstration, Deployment (FY2012 and Prior)	5312	20514	\$15,691
5312 - Research, Dev., Demo/Deploy., and Evaluation Projects	5312-1	20514	\$322,464
Local			\$98,277
Local/In-Kind			\$0
State			\$0
State/In-Kind			\$0
Other Federal			\$0
Transportation Development Credit			\$0
Adjustment			\$0
Total Eligible Cost			\$436,432

(The Transportation Development Credits are not added to the amount of the Total Award Budget.)

U.S. Department of Labor Certification of Public Transportation Employee Protective Arrangements:

Original Certification Date:

Special Conditions

There are no special conditions.

FINDINGS AND DETERMINATIONS

By signing this Award on behalf of FTA, I am making all the determinations and findings required by federal law and regulations before this Award may be made.

FTA AWARD OF THE COOPERATIVE AGREEMENT

Awarded By:
Mary Leary
Deputy Associate Administrator
FEDERAL TRANSIT ADMINISTRATION
U.S. DEPARTMENT OF TRANSPORTATION
Contact Info: mary.leary@dot.gov
Award Date: 9/8/2021

EXECUTION OF THE COOPERATIVE AGREEMENT

Upon full execution of this Cooperative Agreement by the Recipient, the Effective Date will be the date FTA or the Federal Government awarded Federal assistance for this Cooperative Agreement.

There are several identical counterparts of this Cooperative Agreement in typewritten hard copy. Each counterpart is:

- (1) Fully signed in writing by the duly authorized officials of FTA or the Federal Government and the Recipient, and
- (2) Deemed to be an original having identical legal effect.

By executing this Cooperative Agreement, the Recipient intends to enter into a legally binding agreement in which the Recipient:

- (1) Affirms this FTA Award,
- (2) Adopts and ratifies all of the following information it has submitted to FTA:
 - (a) Statements,
 - (b) Representations,
 - (c) Warranties,
 - (d) Covenants, and
 - (e) Materials,
- (3) Consents to comply with the requirements of this FTA Award, and
- (4) Agrees to all terms and conditions set forth in this Cooperative Agreement.

Executed By:
William Greene
Chief Financial Officer
Utah Transit Authority (UTA)
9/13/2021