

SOLAR TRANSIT STOPS ON CENTRAL AVENUE
Final Report

Prepared for

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16. Abstract This initiative sought to demonstrate existing commercially available transportation technologies for transit customer amenities that could significantly enhance transit experience and attract more riders – therefore making the Capital District Transportation Authority service more attractive, safe, and sustainable. CDTA installed solar-powered street transit amenities on a 2.5-mile section of Central Avenue in Albany, NY, located between Lark Street and the Albany city line to the West. Amenities installed were four (4) i-Shelter Solar Shelter Lighting systems, twenty-five (25) i-Stop solar-powered bus stop signs, and ten (10) BigBelly Cordless Compaction Systems. BigBelly Cordless Compaction Systems were installed at the future Bus Rapid Transit (BRT) stations located within the area of the proposal, i-Shelter Solar Shelter Lighting were installed at existing bus shelters located within the proposal area, and i-Stops were installed at all the existing bus stops within the proposal area that were not planned to become BRT stations and did not have a shelter. Project partners have been happy with the performance and feedback of the BigBelly systems and the solar shelters. The solar-powered bus stops signs have proven too expensive to maintain and too vulnerable to vandalism for the benefits they provide. Therefore, project partners are open to expanding their BigBelly and solar shelter infrastructure, but will not be expanding the i-Stop network along the Central Avenue corridor.			
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Abstract

This initiative sought to demonstrate existing commercially available transportation technologies for transit customer amenities that could significantly enhance transit experience and attract more riders – therefore making the Capital District Transportation Authority service more attractive, safe, and sustainable. CDTA installed solar-powered street transit amenities on a 2.5-mile section of Central Avenue in Albany, NY, located between Lark Street and the Albany city line to the West. Amenities installed were four (4) i-Shelter Solar Shelter Lighting systems, twenty-five (25) i-Stop solar-powered bus stop signs, and ten (10) BigBelly Cordless Compaction Systems. BigBelly Cordless Compaction Systems were installed at the future Bus Rapid Transit (BRT) stations located within the area of the proposal, i-Shelter Solar Shelter Lighting were installed at existing bus shelters located within the proposal area, and i-Stops were installed at all the existing bus stops within the proposal area that were not planned to become BRT stations and did not have a shelter. Project partners have been happy with the performance and feedback of the BigBelly systems and the solar shelters. The solar-powered bus stops signs have proven too expensive to maintain and too vulnerable to vandalism for the benefits they provide. Therefore, project partners are open to expanding their BigBelly and solar shelter infrastructure, but will not be expanding the i-Stop network along the Central Avenue corridor.

Key Words

Transit enhancement, Solar transit infrastructure, Transit customer amenities

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SUMMARY

This initiative sought to demonstrate existing commercially available transportation technologies for transit customer amenities that could significantly enhance transit experience and attract more riders – therefore making CDTA service more attractive, safe, and sustainable.

Increasing transit ridership is a very important tool in achieving energy conservation, relieving congestion on roads, and reducing the amount of pollutants released into the environment. Increases in ridership help to make operation of a transit system more efficient, conserve energy, reduce emissions, and provide economic benefits. Improving customer waiting amenities is a proven strategy to increase ridership. Street amenities make transit more efficient and easier to use, and improve safety and security of riders.

This project offers a number of valuable benefits to the New York State (NYS). Alternative modes of transportation, such as public transit, are increasingly important with the growing concern about energy security and environmental quality. Each time a person chooses to ride a bus and leaves a car at home, New York State comes a step closer to a more sustainable future. Increased transit ridership helps relieve traffic congestion on roads, improve area quality, and increase overall economic stability.

Another important benefit offered by this project is the promotion of alternative sources of energy. The installation of the i-Shelters, i-Stops and BigBelly systems serve as a showcase and example of how new technologies that utilize solar energy can be used in everyday life. The use of renewable energy resources like solar power reinforces the profile of public transit as a sustainable transportation alternative, and heightens the transit agency's reputation as an innovative leader.



Press Conference, June 2010

CDTA installed solar-powered street transit amenities on a 2.5-mile section of Central Avenue located between Lark Street and the Albany city line to the West. CDTA installed the following:

- Four (4) i-Shelter Solar Shelter Lighting systems, installed on top of existing bus shelters
- Twenty-five (25) i-Stop solar-powered bus stop signs at local bus stops along the NY5 corridor
- Ten (10) BigBelly Cordless Compaction Systems with a pair of side panel frames for advertising

The location of the proposed project is a perfect opportunity to introduce state-of-the-art street amenities like the i-Shelter, i-Stop and BigBelly systems for a number of reasons. First, CDTA is gearing up to implement BusPlus, a Bus Rapid Transit System (BRT) that will connect the city of Albany and the City of Schenectady on Route 5. A series of street amenity improvements have been planned to make the BRT project a success and complemented the installation of i-Shelters, i-Stops and BigBelly Systems at local bus stops. Secondly, CDTA has developed a partnership with Central Avenue Business Improvement District (CBID), which contributed \$10,000 towards the

purchase of the solar-powered BigBelly Systems, and is providing ongoing maintenance of the BigBelly systems, ensuring success to this part of the project. The project limits were selected to be co-incidental with the boundaries of the Central Avenue Business Improvement District (CBID).

Locations for the installation of BigBelly Cordless Compaction Systems, i-Shelter Solar Shelter Lighting, and i-Stops within the district were selected based on the following criteria:

1. BigBelly Cordless Compaction Systems were installed at the future BRT stations located within the area of the proposal (from Lark Street to the Albany city line);
2. i-Shelter Solar Shelter Lighting were installed at the existing bus shelters located within the proposal area;
3. i-Stops were installed at all the existing bus stops within the proposal area that were not planned to become BRT stations and did not have a shelter.

SCHEDULE

The first BigBelly's and iStops were installed between August 2009 and November 2009. Between November 2009 and March 2010 all four of the solar panels on shelters were in. By the end of 2010 everything was installed. Table 1 below shows the locations of all installations:

BigBellies: 10 units installed			
Stop Number	Stop Location	Number	Installation Status
3419	855 Central Ave	1	Complete
198	Hannaford Plaza	1	Complete
2663	Lark and Washington	1	Complete
3239	Lark and Washington (Armory)	1	Complete
207	Allen St	1	Complete
148	N. Allen St	1	Complete
211	N. Manning Blvd	1	Complete
145	N. Manning Blvd	1	Complete
141	Quail St	1	Complete
222	Quail St	1	Complete
i-Stops: 25 units installed			
236	RUSSELL RD & WESTERN AVE	1	Complete
249	S MANNING BLVD & WESTERN AVE	1	Complete
242	TAMPA AVE/ORMOND ST & WESTERN AVE	1	Complete
12022	EXECUTIVE PARK DRIVE @ STOP SIGN	1	Complete
159	1010 CENTRAL AVE	1	Complete
3987	979 CENTRAL AVE	1	Complete
10862	HENRY JOHNSON BLVD	1	Complete
223	HENRY JOHNSON BLVD	1	Complete
11617	HENRY JOHNSON BLVD	1	Complete
218	LEXINGTON AVE	1	Complete
136	LEXINGTON AVE & CENTRAL AVE	1	Complete
214	N LAKE AVE	1	Complete
139	N LAKE AVE	1	Complete
216	ROBIN ST	1	Complete
3500	ROBIN ST	1	Complete
156	YARDBORO AVE	1	Complete
195	YARDBORO AVE	1	Complete
10515	680 CENTRAL AVE (WESTVIEW HOMES)	1	Complete
202	EVERETT RD	1	Complete
221	ONTARIO ST	1	Complete
143	PARTRIDGE ST	1	Complete
220	PARTRIDGE ST	1	Complete
208	W LAWRENCE ST	1	Complete
3414	CENTRAL AVE & KING AVE	1	Complete
205	CENTRAL AVE & KING AVE	1	Complete
Transit Shelter Ad Light: 4 units installed			
3413	CENTRAL & COLVIN	1	Complete
125	COLVIN AVE	1	Complete
3455	HENRY JOHNSON BLVD	1	Complete
209	ONTARIO ST	1	Complete

Table 1

FIELD EVALUATION

The customer utilization of the BigBelly systems has been high. Customers have been utilizing the i-Stops, but we have noticed that some customers don't know that they can push the button on the pole to turn the light on. As time goes on, word of mouth is increasing awareness. It is difficult to know the utilization of the solar shelters since the lights turn on automatically.

The operations of the BigBelly systems has been satisfactory. The only maintenance issue to date is that the garbage bags used in the BigBelly systems have proven significantly more expensive than conventional garbage bags. The CBID researched suppliers and found a manufacturer to custom-produce the bags. CDTA and the CBID split the cost on a large order to ensure a long-term supply. The operations of the i-Stops has been decent, with the exception of vandalism. CDTA has been pleased with the operations and maintenance of the solar shelters.



BigBelly at Hannaford Plaza

The durability of the equipment installed has not been tested over an extended time frame. To date, the BigBelly systems have withstood winter weather well and have not been susceptible to vandalism. The i-Stops are more susceptible to vandalism than other street amenities. As with other signage, they also experience significant impacts from moving vehicles. Within months after installation, CDTA staff were dealing with repairing broken components and knocked-over poles. A number of i-Stops have been vandalized, bent, or knocked down. In addition, i-stop systems have proven expensive to maintain, due to a lack of warranty, the cost of the parts, the cost of the shipping, and the time required to repair the systems. CDTA did not have a maintenance plan or budget appropriate for equipment as expensive or time-consuming to repair. CDTA has already purchased extra parts for at least 10 i-Stops. As with the BigBelly's, the solar shelters have stood up well to winter weather.

From our experience, we believe the BigBelly systems and the solar shelters are worth replicating elsewhere. The i-Stops do not seem well-suited for such a heavily trafficked corridor, though CDTA does use these solar bus stops elsewhere in the region with better success. One example is on NYS Route 50 in Saratoga County – this roadway sees high travel speeds, is dark, and has little development and few pedestrian amenities.

PLANNED PROGRESS IN THE FUTURE

- ✓ CBID will continue to maintain the BigBelly systems.
- ✓ CDTA will continue to maintain the solar shelters.
- ✓ CDTA will use five remaining i-stops as replacement parts for the solar bus stops.

IDENTIFICATION OF PROBLEMS AND SOLUTIONS FOUND

- ✓ Several i-Stops were not functioning properly upon assembly. CDTA worked with Carmanah's technical support to resolve the issue. CDTA hired a dedicated Streets Amenities Manager, allowing additional staff resources to move the project along.
- ✓ Installations took longer than anticipated, but were coordinated with sidewalk and BRT station construction.
- ✓ We could not install all i-stops at the planned locations due to conflicts with power lines. Due to this and an issue with vandalism, CDTA has reserved five i-Stops to use as replacement parts for the installed systems.



RIDERSHIP COMPARISON

Average daily ridership at the bus stops within the study area was about 76 in September/October 2009. These are the oldest figures accessible before project implementation. Total ridership after implementation, in September/October 2010, was about 92. See table 2 for more details. CDTA upgraded its MobileStatistics software system in September 2009, and data before the upgrade is difficult to compare to that gathered after the upgrade. It should also be noted that ridership did increase about 12-13% across the board. Taking this into account, ridership increased an average of about 7% at the stops that received an amenity from this grant.

Ridership Comparison

Stop	2009		2010		% Change	
	Daily On	Daily Off	Daily On	Daily Off	Daily On	Daily Off
CENTRAL AVE & COLVIN AVE (00125)	116	172	111	191	-4%	11%
CENTRAL AVE & LEXINGTON AVE (00136)	105	75	122	83	16%	12%
CENTRAL AVE & N LAKE AVE (00139)	99	80	119	95	20%	19%
CENTRAL AVE & QUAIL ST (00141)	125	106	153	119	22%	12%
CENTRAL AVE & PARTRIDGE ST (00143)	59	63	63	70	8%	12%
CENTRAL AVE & N MANNING BLVD (00145)	58	66	70	81	20%	23%
CENTRAL AVE & N ALLEN ST (00148)	83	81	102	90	22%	12%
CENTRAL AVE & YARDBORO AVE (00156)	6	10	9	11	43%	10%
1010 CENTRAL AVE (00159)	25	17	32	23	29%	37%
CENTRAL AVE & YARDBORO AVE (00195)	7	6	9	7	33%	7%
CENTRAL AVE & HANNAFORD PLAZA (00198)	172	98	236	116	37%	18%
CENTRAL AVE & EVERETT RD (00202)	6	4	7	6	22%	53%
CENTRAL AVE & KING AVE (00205)	25	24	28	28	12%	17%
CENTRAL AVE & N ALLEN ST (00207)	29	29	38	38	34%	35%
CENTRAL AVE & W LAWRENCE ST (00208)	39	34	42	38	9%	14%
CENTRAL AVE & ONTARIO ST (00209)	113	106	149	128	32%	21%
CENTRAL AVE & N MANNING BLVD (00211)	50	58	70	70	42%	22%
CENTRAL AVE & N LAKE AVE (00214)	67	92	85	116	26%	25%
CENTRAL AVE & ROBIN ST (00216)	44	69	59	86	35%	24%
CENTRAL AVE & LEXINGTON AVE (00218)	68	116	73	138	7%	19%
CENTRAL AVE & PARTRIDGE ST (00220)	64	70	76	78	19%	12%
CENTRAL AVE & ONTARIO ST (00221)	75	78	94	92	25%	18%
CENTRAL AVE & QUAIL ST (00222)	97	146	118	171	21%	17%
CENTRAL AVE & HENRY JOHNSON BLVD (00223)	46	119	47	134	4%	13%
WESTERN AVE & RUSSELL RD (00236)	24	7	28	8	13%	16%
WESTERN AVE & TAMPA AVE / ORMOND ST (00242)	11	7	19	12	64%	55%
WESTERN AVE & S MANNING BLVD (00249)	6	7	8	9	34%	18%
WASHINGTON AVE & LARK ST (02663)	190	552	196	665	3%	21%
WASHINGTON AVE & LARK ST (ARMORY) (03239)	625	240	747	261	20%	9%
CENTRAL AVE & COLVIN AVE (03413)	93	70	99	77	7%	10%
CENTRAL AVE & KING AVE (03414)	22	31	35	37	57%	20%
855 CENTRAL AVE (03419)	45	102	74	152	64%	50%
CENTRAL AVE & HENRY JOHNSON BLVD (03455)	224	110	263	122	18%	11%
CENTRAL AVE & ROBIN ST (03500)	80	67	104	83	30%	23%
979 CENTRAL AVE (03987)	16	31	19	38	15%	23%
680 CENTRAL AVE (WESTVIEW HOMES) (10515)	33	39	36	53	9%	39%
HENRY JOHNSON BLVD & CENTRAL AVE (10862)	1	2	2	3	51%	61%
CENTRAL AVE & HENRY JOHNSON BLVD (11617)	27	7	33	6	26%	-16%
EXECUTIVE PARK DRIVE @ STOP SIGN (12022)	8	9	10	24	36%	169%
Average	76	77	92	91	20%	19%

Table 2: Ridership comparison

SURVEY RESULTS

CDTA conducted customer surveys of people waiting at a bus stop. See Appendix A for the survey document. A total of 32 surveys were administered at the Hannaford Plaza.

Most respondents had noticed the BigBellies, and just under half thought there had been less trash at the shelters. One respondent thought the BusPlus stops seemed to have less trash, but not the local shelters.

About 2/3 of respondents regularly or occasionally ride the bus at night. See Figure 1, which shows the percentage of all respondents. About 1/3 had noticed solar panels; almost 2/3 had noticed that some shelters are lit at night –almost all of those said they like the lit shelters.

Just under half of respondents had noticed the i-Stops – of those, 2/3 like them – the other 1/3 said they don't care one way or the other.

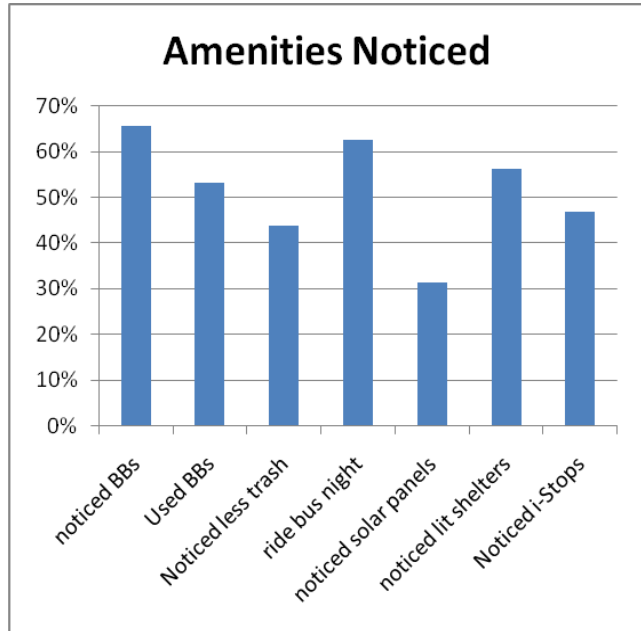


Figure 1

90% of respondents who at least occasionally take the bus at night said they feel safer waiting in one of the illuminated shelters; 45% said they feel safer waiting at an i-Stop. See Figure 2, based off of the number of respondents who regularly or occasionally ride the bus at night. A few respondents felt safe at night with or without lighting. In general, women more enthusiastically responded that they feel safer waiting in lit shelters at night.

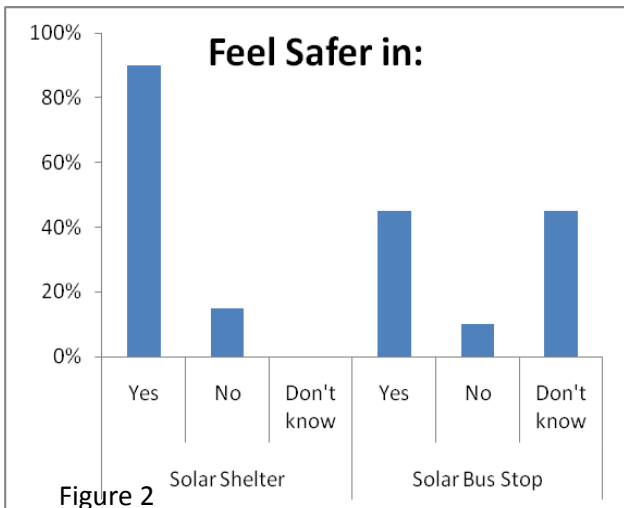


Figure 2

ANALYSIS OF ACTUAL COST INCURRED IN RELATION TO THE BUDGET

The project was completed within budget.

CDTA contributed the following additional resources to the project:

- ✓ BigBellies Installation: 10 units x \$125/unit = \$1,250.00
- ✓ i-Stops Assembly and Installation: 25 units x \$650/unit = \$16,250.00
- ✓ Solar Shelters Assembly and Installation: 4 units x \$750/unit = \$3,000.00

Total \$20,500.00

The Central Avenue Business Improvement District (CBID) contributed \$10,000 towards the purchase of BigBelly units.

CONCLUSIONS AND RECOMMENDATIONS FOR FURTHER WORK

CDTA has concluded that the solar shelters are a technology worth pursuing, but the i-Stops as provided by Carmanah are not. Not only have we experienced significant difficulty maintaining the i-Stops, but the survey also showed that riders are more appreciative of the shelters than the i-Stops in the Route 5 corridor. The project partners are pleased with the BigBelly systems, though we are still researching more reasonably priced garbage bags. The CBID is also looking into adding remote monitoring to the systems to more efficiently schedule pick-ups.

APPENDIX A: CUSTOMER SATISFACTION SURVEY

Solar signs, trash cans, and bus shelters

Do you regularly travel along Central Ave?	Yes	No	(If no, stop.)	
How do you travel? (circle all that apply.)				
Bus	Car	Bicycle	Walk	

Have you noticed the solar powered trash cans along the street?		Yes	No	
Have you used them?	Yes	No	Don't Know	
Have you noticed less trash at the bus stop?	Yes	No	Don't Know	

Do you ride the bus here at night?	Yes	Occasionally	No	
Have you noticed the solar panels on the bus shelters?		Yes	No	
(If yes) Do you like them?	Yes	No	Don't Care	
Have you noticed some shelters are lit at night?		Yes	No	
(If yes) Do you like that they are lit?		Yes	No	Don't Care
Have you noticed the solar powered bus stop signs?		Yes	No	
(If yes) Do you like them?	Yes	No	Don't Care	

(If you ride bus at night) Do you feel safer waiting at one of the illuminated shelters?				
Yes	No	Don't Know		
(If you ride bus at night) Do you feel safer waiting at one of the illuminated signs?				
Yes	No	Don't Know		
(If you DON'T ride bus at night) Would you be more likely to take the bus at night with a shelter or sign that is brightly lit?				
Yes	No	Don't Know		

Comments: