Team X_a | Universal Mass
Transit Assessment

INSTRUCTIONS

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Welcome

Welcome to the Universal Mass Transit Assessment System (UMTAS) from Team X$_a$! UMTAS is designed to provide a stable, consistent approach for evaluating the accessibility of public transit infrastructure using a pre-established set of standards.

This document outlines how to procure and utilize the checklist evaluation toolkit that determines whether or not a TTC subway station meets the Universal Design principles that are manifested in the CSA's standards document.[*] The checklist will provide an analysis on the compliance or non-compliance of a space to the CSA's standards.

To begin using the checklist, it must first be created, which must be done by the group that is evaluating the subway stations. Therefore, it is important to do a preliminary visit to the stations that are being evaluated to identify notable gaps of non-compliance to the CSA's standards. This will form as the basis for the checklist creation. Additionally, the user creating the checklist must note any biases that they think may have an impact on the checklist creation. Some examples include height, weight, vision. These biases are physical in nature; however, users may also include mental biases too. The effects of cognition play a major role in biases and therefore it is best to disclose any mental biases too.

> We recommend that the user performs a preliminary walk-through of the station, performing an informal assessment of the station with the Universal Design principles and the CSA's standards in mind, before beginning the checklist creation process.

[*] This is the narrow interpretation of UMTAS that has been produced here. In actuality, these methods could be applied to any public transit infrastructure in Canada.
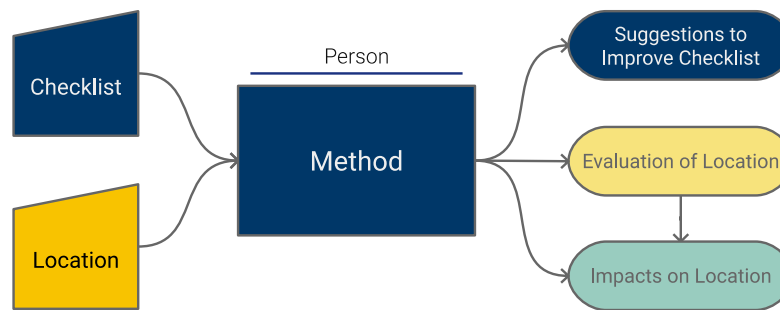
Figure 1: UMTAS. Taking in a checklist and applying it to a location produces results and ways to improve the checklist.

Preliminary Checklist Creation

The evaluation process begins with the creation of a preliminary version of the checklist, which will then be refined and improved through the tests found in the checklist utilization section. The content of the checklist is dependent on the CSA standards the user wishes to evaluate, with each entry in the checklist seeking to evaluate the compliance of the station to a specific CSA standard. The CSA standards are selected based on the goals and priorities of the user in their assessment. The user is free to select any standard they wish to be evaluated in this procedure, and develop one or more checklist items to evaluate compliance to each standard. That being said, not all standards are as compatible with checklist-style evaluation methods, so later steps may encourage the user to abandon the implementation of certain standards, if the user encounters sufficient difficulty in creating effective checklist items for that standard.

A preliminary checklist can be created using the following steps:

1. Consult the CSA's standards document.
2. Identify and select CSA's standards relevant to the checklist.
3. Organize the standards within the checklist document.
4. Disclose any biases that may affect the completion or the usage of the checklist.
5. Create questions based on the CSA's standards and implement into the checklist *e.g. Is there a landing zone on this flight of stairs?*
6. Ensure that the questions asked are relevant and are unbiased as much as possible.

This is outlined in more detail in the Technical documentation.

It is important to note that this step of the UMTAS methodology is used to create a checklist, and will leave it to the user to bridge the gap from checklist to data entry. Survey123 will be used as an example, but any other application could be used, using the necessary documentation, which is discussed in the next section.

Checklist Utilization

Using Survey123 for ArcGIS

Before beginning the process of the UMTAS method, it is important to have the Survey123 Field application downloaded on to the device, which runs iOS, Android, Amazon's Fire OS, or Windows 10. Please refer to the following documentation for getting started with Esri's Survey123:

- Survey123 Field App can be downloaded from: https://www.esri.com/en-us/arcgis/products/survey123/resources
- For getting started with the Survey123 Field App, see: https://learn.arcgis.com/en/projects/get-started-with-survey123/#GUID-C180ECAC-B98F-49D0-8938-779C0B5E3877
- For opening a survey in a web browser or to create a questionnaire (survey), see: https://doc.arcgis.com/en/survey123/desktop/get-answers/getanswers.htm

> Any survey can be opened in a web browser. However, for offline survey access, the survey needs to be downloaded in the field app ahead of time.

For More Information

See our YouTube series on UMTAS:

- Introducing UMTAS: https://youtu.be/TDEeQbvQHVc
- Getting Started with Survey123: https://youtu.be/OWZaCpVHAY0
- Doing a Survey: https://youtu.be/XzLeRm3lCTg
- Collecting Surveys for Offline Use: https://youtu.be/Mgmsok48qv8

Checking Up and Checking Out

Once the checklist has been created, the user should attempt to normalize their checklist document by getting feedback from other users of the checklist. By getting feedback and attempting to normalize the checklist, this will mitigate some biases inherent within the checklist. This process is iterative and must be done throughout the lifecycle of the checklist, especially during the checklist creation and utilization phase.

After normalization, the user may begin using their checklist at subway stations that they wish to test. The checklist will be used in an online format due to the ease of

access issues present in paper form. Thus, the user should use the Survey123 tool and implement their checklist within that platform, or something similar.† This will ideally minimize any issues that may come up such as editing and removing checklist items. Once the user has finished going through a station with the checklist, the user should then give their results to other teammates to minimize unintended biases. Since the checklist creation and utilization may have undesirable biases, it is important for the user to consult their teammates consistently throughout the life cycle of the checklist. This will minimize bias and introduce a standardized checklist toolkit.

Evaluation

After using the checklist and consulting team members the results from the checklist must then be evaluated. However, to evaluate these results, the checklist must be used in an iterative process to ensure a minimal margin of error. Thus, the user should visit the subway stations with the checklist over a period of time to ensure consistency with the results that they find. The following is a quick look at how the user should go about using the checklist:

1. Visit the subway station that is to be tested with the Survey123‡ tool that has the checklist integrated into the platform.
2. Go through the subway station with the checklist and identify if the subway station complies with the checklist items and by extension the CSA's standards.
3. Meet with team members and compare the results obtained from utilizing the checklist.
4. After comparing results, users should go through the subway stations with the checklist again over a period of time (such as different days) to introduce a normalized result.
5. The normalized results can then be compared again with the team members' results.
6. After comparing the results, the users can then begin identifying the impacts of the results obtained.

Checklist Impacts

After completing the checklist and its relevant testing, the user must identify potential impacts that may occur due to non-compliance with the CSA's standards.

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† This should not be construed to be an endorsement of Esri or Survey123. Rather, it was found to be a convenient platform upon which to put the checklist.
‡ Or similar

> It is important to note and reiterate that the checklist creation is based on the CSA's standards and by extension the Universal Design principles.

The impacts of non-compliance play an integral role in the checklist. The identification of non-compliance assists in providing the impacts of, and resolutions to, non-conformances to the standards outlined by the CSA. Once the user has identified the gaps in conformance, the user may begin to provide potential impacts of those non-conformances. This includes potential impacts to any user of the subway station, including (but not limited to) the general public that uses the subway stations, and the agency employees. Therefore, the user must identify as many potential impacts possibly affecting those that are using the subway stations as possible. The following example will provide a clearer understanding as to how the impacts can be identified from non-compliance.

Example: *Is there a landing zone on a flight of stairs?*

Answer: *No, there is not.*

Potential impacts include but are not limited to physical strain on those using the stairs, unintended marginalization on those who have cardiovascular diseases, marginalization of those who are not of normalized physical fitness.

The example above outlines how the checklist introduces potential impacts due to non-conformance. By doing so, the user may send these results to subway station agencies to provide context as to why by not meeting these standards, how people are negatively impacted by the laggard efforts of the transit agencies.

After completing the potential impacts, the user should make one last run-through with their team members to ensure that there is a consensus on the results from the checklist and a consensus on potential impacts. The process of reaching a consensus introduces a more standardized component to the checklist, which in turn allows for the reduction of unintended biases.

The Universal Design Principles are as follows:

Principle 1: *Equitable Use.*
The design is useful and marketable to people with diverse abilities.

Principle 2: *Flexibility in Use.*
The design accommodates a wide range of individual preferences and abilities.

Principle 3: *Simple and Intuitive Use.*
Use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or current concentration level.

Principle 4: *Perceptible Information.*
The design communicates necessary information effectively to the user, regardless of ambient conditions or the user's sensory abilities.

Principle 5: *Tolerance for Error.*
The design minimizes hazards and the adverse consequences of accidental or unintended actions.

Principle 6: *Low Physical Effort.*
The design can be used efficiently and comfortably and with a minimum of fatigue.

Principle 7: *Size and Space for Approach and Use.*
Appropriate size and space is provided for approach, reach, manipulation, and use regardless of user's body size, posture, or mobility.

> For more information, see: https://www.rickhansen.com/news-stories/blog/universal-design-101

Example Template

Here is an example template to use when evaluating the impacts:

Table 1: Example Impact Table

Universal Design Principle (UDP)	Does the Checklist Item Comply with the UDP?	What are the potential impacts of not complying with the UDP?
Equitable Use		
Flexibility in Use.		
Simple and Intuitive Use		
Perceptible Information		
Tolerance for Error		
Low Physical Effort		
Size and Space for Approach and Use		

Table 2: Example of how the impacts can be identified through the analysis of using the Universal Design Principles. E.g. Is there signage indicating an accessible elevator?

Universal Design Principle	Does the Checklist Item Comply with the UDP?	What are the potential impacts of not complying with the UDP?
Equitable Use	Yes	
Flexibility in Use.	Yes	
Simple and Intuitive Use	Yes	
Perceptible Information	No, braille not available	The information not being readily available for public unintentionally marginalizes those who have accessibility issues.
Tolerance for Error	Yes	
Low Physical Effort	Yes	
Size and Space for Approach and Use	No	- Families with strollers may not be able to get in. - Potential passengers may give up because "taking transit is too hard".