Overview of the TCQSM, 2nd Edition

Paul Ryus
Kittelson & Associates, Inc.

Presentation Overview

- Brief introduction to the project
- TCQSM history
- TCQSM applications
- Questions to think about
Project Overview

- Recommend additions, revisions, format
- Conduct gap-filling research
- Prepare TCQSM 3rd Edition
- Prepare information program

TCQSM Webinar Series Objectives

- Provide background on TCQSM material for focus group and online survey participants
- Expand industry’s awareness of the manual and its potential uses
- Lay groundwork for updated training material when the new manual is published (2013)
Webinar Series Topics

- Overview of the TCQSM 2nd Edition
- Fixed Route Quality of Service
- Bus Transit Capacity
- Rail Transit Capacity
- Ferry Transit Capacity
- Stop, Station, and Terminal Capacity
- Demand Response Capacity and Quality of Service

TCQSM History
What is the TCQSM?

- Intended to be a fundamental reference document for transit practitioners and policy makers
- Compiles a wide variety of work in the transit field that had not been available previously in one place
- Can be used for:
  - Planning and designing transit service and facilities
  - Evaluating service quality from the passenger point of view
  - Estimating changes in speed and capacity resulting from system changes (new vehicles, fare media, etc.)
  - Much more

What Isn’t the TCQSM?

- Not a policy or standards document
  - Use in conjunction with relevant standards (e.g., fire code)
  - Provides a “level of service” (LOS) framework for measuring service quality, but doesn’t specify what LOS to provide
- Doesn’t address ridership estimation
  - However, impacts of quality of service changes on existing ridership are discussed
- Doesn’t address cost impacts of service changes
Research Problem Statement:
TCQSM 1st Edition

- The transportation profession lacks a consolidated and generally accepted set of transit-capacity and quality-of-service definitions, principles, practices, and procedures for planning, designing, and operating vehicles and facilities.

- This is in contrast to the Highway Capacity Manual that defines quality of service and presents fundamental information and computational techniques related to quality of service and capacity of highway facilities.

- In the absence of a comparable, authoritative document, the case for transit service in a multimodal decision environment is weakened. Therefore, there is a need for a Transit Capacity and Quality of Service Manual.
Research Objectives: TCQSM 1st Edition

- Define the content of a comprehensive TCQSM
- Provide transit input to the HCM 2000
- Develop a research plan for completing the TCQSM
- Complete TCQSM portions for which information is available and produce an interim document
- Conduct research on one or more high-priority research topics growing out of the research agenda
  - QOS framework
  - Consistent procedure for collecting bus & light rail dwell time data

TCQSM 1st Edition

- Published as TCRP Web Document 6 in January 1999
- Due to TCRP budget cuts & decision to develop a 2nd Edition, it had a limited distribution, mainly CD-ROM and online
1st Edition Outline

- Introduction and Concepts
- Bus Transit Capacity
- Rail Transit Capacity
- Terminal Capacity
- Quality of Service
- Glossary

Research Problem Statement: TCQSM 2nd Edition

- The First Edition of the TCQSM is a start toward providing the transportation industry with a transit companion to the *Highway Capacity Manual*

- Despite the contribution of the First Edition of the TCQSM, there are still gaps in coverage

- Before the document can acquire stature, the gaps must be addressed and the professional community must be heard through a testing and public comment period
Research Objectives: TCQSM 2nd Edition

- Develop an updated TCQSM, filling gaps in the current edition and expanding and enhancing the scope
- Add material addressing:
  - Quality of service and capacity implications of service for people with disabilities
  - Passenger service times
  - System availability and coverage
  - Other characteristics
    - Ferry capacity
    - Minor rail mode capacity (e.g., aerial trams)

TCQSM 2nd Edition

- Published as TCRP Report 100
- Print, CD, and online versions available
- TCRP’s best-selling document
2nd Edition Outline

- Introduction and Concepts
- Transit in North America
- Quality of Service
- Bus Transit Capacity
- Rail Transit Capacity
- Ferry Capacity
- Stop, Station & Terminal Capacity
- Glossary
- Index

TCQSM 3rd Edition Research Objectives

- The TCQSM presents a framework for evaluating and planning public transportation systems. The objective of this research is to develop a 3rd Edition that:
  - Identifies and fills gaps in the current Manual
  - Reflects the latest transit capacity and quality-of-service applications and research
  - Improves the usefulness and relevance of the Manual for practitioners, policy makers, and other public transit stakeholders.
TCQSM’s Relationship to the HCM 2000

- FTA/industry desire for a companion transit document to the HCM that would eventually gain the same stature
  - HCM’s level-of-service (LOS) system often used to define minimum roadway operating standards
  - Not meeting roadway LOS standards is a justification for investments to restore operations to the desired level
  - TCQSM’s LOS framework uses the same A-to-F scale with which decision-makers are often already familiar

Relationship to the HCM 2010

- HCM has a multimodal focus
  - No separate all-inclusive transit, bicycle, pedestrian chapters
  - Non-auto material presented throughout the HCM, alongside auto-related material

- TCQSM treated as a "companion document"
  - HCM users referred to the TCQSM for information and methods on transit capacity and transit-specific quality of service
    - Technical transit material generally removed from the HCM
    - Frequent cross-references to the TCQSM
  - Transit quality of service still included in the Urban Streets chapters in a multimodal context
2010 HCM Organization

- Four-volume format
  - Volume 1 (print) presents basic concepts
  - On-street transit concepts included where appropriate
  - HCM Primer chapter designed for non-technical users
  - Volumes 2 and 3 (print) present detailed capacity, speed, and LOS calculation methods
  - Equations, example problems
  - Volume 4 (electronic only) presents supplemental material
  - Supplemental chapters on special-interest topics
  - Technical Reference Library
  - Applications Guide (process of applying HCM)
  - Post-2010 updates

TCQSM Applications
Transit Capacity & Quality of Service Committee

- Standing committee of the Transportation Research Board that is charged with:
  - Maintaining the TCQSM
  - Identifying research needs in the committee’s area of interest

- Prior to the development of the TCRP A-15C project, the Committee undertook a volunteer effort to identify TCQSM usage

Process Used to Identify TCQSM Applications

- Internet searches
- Applications by TCQS committee members & their organizations
- TRB papers reviewed by the committee
- 53 distinct applications identified
- Volunteer effort (not as thorough as a research project literature review) that provides insights into how the manual has been used
TCQSM Usage by Topic Area

- Quality of service (37)
- Capacity (11)
- Both (5)
TCQSM Usage by Application

- Transit/transportation planning (19)
  - Long-range planning, existing conditions analysis (12)
  - Alternatives analysis, EIS (5)
  - Short-range planning (2)
- Theoretical paper (e.g., new measures) (9)
- Research/field study using current measures (7)
- Policy paper (5)
- Source of data or definitions (5)
- Other (8)

Observations (1)

- Most long-range planning applications have looked only at existing conditions (i.e., a report card)
  - Evaluating future conditions for different alternatives would help inform comparisons and alternative selection
  - TCQSM does not provide tools for estimating future reliability
  - Long-range plans typically do not estimate future transit demand (required to evaluate crowding and need for additional frequency)
  - A masters thesis (Zuehlke, 2007) using Atlanta regional model data, found that auto travel times were generally overestimated and transit travel times were generally underestimated, leading to unreliable assessments of transit-auto travel time differences
Observations (2)

- Much difference of opinion on how to measure QOS
  - Individual, separate measures vs. combined, single measure
  - Different measures for the same aspect of QOS
    - Speed (e.g., % of posted speed) instead of travel time difference
    - Excess wait time instead of on-time performance
    - Combination of coverage & frequency
  - Report performance measure values instead of LOS letters
  - Report LOS numbers instead of letters (avoid “grade” connotation)
  - Passenger point-of-view vs. agency point-of-view

Observations (3)

- Few examples of agencies setting standards based on LOS
- Virtually no usage of demand-response LOS found
- QOS material appears to be more widely used than capacity material
Observations (4)

- Considerable international interest
  - Material from Australia, Brazil, Canada, Columbia, Ireland, Mexico, South Korea, and Thailand included in the review
  - World Bank usage
  - TCQSM reportedly translated into Chinese and French

Observations (5)

- Some signs of TCQSM becoming the authoritative document that was originally intended
  - Use by New York MTA Inspector General, New York City Comptroller
  - Strong support by Florida DOT
  - Use by FTA in New Starts process
  - Referenced in other guidance documents as the source of information on transit capacity & QOS
  - Used in university-level public transportation classes
Highlights (1)

- Seattle Transit Plan
  - Used TCQSM as basis for determining performance measures for higher-frequency bus routes
  - Used LOS numbers (+3, +2, +1, -3, -6, -9) instead of letters
    - Positive numbers = "Pass"
    - Negative numbers = "Fail", take action
  - Some measures changed (e.g., speed instead of transit-auto travel time)
  - Monitoring process established and carried out

Highlights (2)

- Florida DOT
  - Until 2008, required Florida MPOs to evaluate transit QOS as part of long-range plan updates
  - Florida Quality/Level of Service Handbook uses TCQSM as the basis for its transit LOS measure, but combines several factors into one measure
  - Sponsored two research projects on estimating transit travel time using regional model data
  - Developed a “Transit QOS Applications Guide”
Highlights (3)

- Northern Virginia 2030 Transp. Plan
  - Evaluated both existing and future alternative transit LOS for the five-county study area
  - Transit included as part of a multimodal evaluation of seven corridors

Questions to Think About
Questions to Think About

- What is required for the TCQSM to be more widely used?
  - Content changes?
    - New and/or revised topics
    - Change in amount of emphasis given concepts versus methodologies
  - Format changes?
  - Greater industry awareness?
  - Other things?

- What would you like to use it for that you aren’t currently using it for?

We Want Your Input on the TCQSM!

- Take our online survey to help shape the 3rd Edition’s content
- Stay involved with the project
  - Give us your e-mail address after completing the survey and we’ll keep you informed of future opportunities to provide input
- Do you go to the Transportation Research Board’s Annual Meeting?
  - Attend the meeting of the Transit Capacity and Quality of Service Committee (AP015)