

# Support to Remove Restrictions on SES

The Subway Environment Simulation (SES) Computer Program, Version 4.1 is an important tool for mass transit systems and tunnels. This document requests the United States Government remove the restrictions on the SES program and associated documentation. Submitting my name indicates I personally support this request. I understand its capabilities and believe the SES program should become publicly available again.

## Background

The SES program analyzes tunnel environments. It is a one-dimensional airflow and thermodynamic solver, as schematically shown in Figure 1. As explained in the User's Manual, "SES ... is a designer-oriented tool which provides estimates of airflows, temperatures, and humidity, as well as air conditioning requirements, for both operating and proposed multiple-track subway systems." The program can also be used for road tunnels, passenger rail, and freight rail.



**Figure 1: SES 4.1 is a Solver**

Research and development for SES started in the 1960s with the United States Government distributing the program and source code in the 1980s and 1990s. Over the years, this program became the industry standard and is still the most widely used one-dimensional tunnel model.

Post 9/11, the United States Government started restricting the source code and program's distribution to new users because of perceived security issues. No official documentation explaining the restrictions appears readily accessible. Meanwhile, organizations use, distribute, or sell programs with capabilities derived from the SES's research and source code.

## Sample Data

The SES 4.1 solver does not contain any data except for general engineering constants and conversion factors. The program was distributed with two sample input text files that do not represent real-world systems.

## Other Programs

Below is a list of other solvers available. Reviewing academic literature suggests that all these programs are derivatives of the source code of SES 4.1 (except ThermoTun). Of the examples below, the most broadly available and used is a commercial software package, IDA.

1. IDA Tunnel is described at <https://www.equa.se/en/tunnel/ida-tunnel/overview>. This program's brochure advertises, "Import and SI conversion of SES input files". The company EQUA licenses this software for one year for about 11,000 USD.
2. STESS, "Subway Thermal Environment Simulation Software". The academic paper explains this program is based on the source code of SES.
3. SSES is created in Iran appears to be based on SES 4.1
4. ThermoTun described at <http://www.thermotun.com/thermotun/>.

## Open-Source Development

Removing restrictions gives all companies fair access to the program, regardless of past access. Also, the industry can benefit from program improvements from open-source development. The industry already benefits from the open-source development of other engineering programs, such as the [Fire Dynamic Simulator](#) by the National Institute of Standards and Technology (NIST).

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Table 1: Submitted Names

Name	City	Country
Ajay Soni	Faridabad	India
Adrian Edward Milford	Vancouver	Canada
Andrew Coles	Vancouver	Canada
Andrew Page	New York	USA
Argun Bagis	Sydney	Australia
Aymeric Raguideau	Nantes	France
Bernard Robert Smits	Oakland, California	USA
Chandan B Sejekan	Vancouver	Canada
Chermac Rolle	South Shields	United Kingdom
Conor Fleming	Vancouver	Canada
Eden Altura	London	United Kingdom
Ersin Ferad	The Hague	The Netherlands
Ertan Hataysal	London	United Kingdom
Etienne Lacroix	Montreal	CANADA
Ishaq Baha	Paris	France
Justin Matthew Edenbaum	Freehold	United States of America
Michael Chan	Sydney	AUSTRALIA
Magdalena Vasilovska	Sydney NSW	Australia
Marc Thaddeus Hodapp	Rockville, MD	United States of America
Mina Samimi	Vancouver	Canada
Mohammad Tabarra	London	United Kingdom
Mustafa Salih KORKMAZ	Istanbul	Turkey
Ozgur Ceylan	Sydney	Australia
Ritesh Kumar Singh	New delhi	India
SMH Adil	New Delhi	India
Samarth Joshi	Toronto	Canada
Samiyah Hemal Mustafa	Derwood	United States of America
Sandeep Upadhya	London	United Kingdom
Sean Erik Cassady	Bellevue, WA	United States of America
Sriram Ramasubramanian	Bangalore	India
Steven Mark Strege	Arnold	United States
Thomas P. O'Dwyer	East Rockaway, New York	United States
Tim Oliver Gilroy	Brisbane	Australia
Vejapong Juttijudata	Bangkok	Thailand
Vijay Kumar	Noida	India
Vinod Jalagam	Hyderabad	India
Yew Ting	Abu Dhabi	United Arab Emirates
Yinan Scott Shi	New York City	United States of America

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## Supporting Comments

Ever evolving underground mass transit systems, railroadbtunnels now require innovative solutions. In order to do that simulation tools such as SES play vital role. But this program remained undeveloped after 2001. I strongly urge to remove the restriction on SES and to distribute again in public domain.

**Free SES for the benefit of Science, Technology, Engineering and Mankind (STEM)!**

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Open sourcing SES program will allow the community to contribute in its further development and making it more stable solutions to in tunnel ventilation field as currently it's closed source and development is slow and audit is not possible from public due to inaccessibility of source code and documentations. Therefore, I support the removal of these on restrictions on SES program.

Removing the restrictions will allow a wider user of the program to new users. This, in turn, allows further development and refining of SES capabilities. Besides, different concepts of tunnel ventilation can be examined from a wider user group. With many other programs with similar capabilities (may in fact based on SES 4.1 released earlier), SES program should be released publicly for further development to compete with other programs.

Making SES open source would benefit all parties by allowing continued support and growth of the project allowing for improved use on infrastructure projects within the USA and internationally.

We are using SES for the design of the tunnel ventilation systems all around the world. This is an industry standard software, and all companies should have an access to it and its source to design safe underground networks.

SES 4.1 is the industry standard for subway ventilation analysis. The restrictions only generate further issues for large infrastructure projects where applicability of alternative software is debated and subject to disagreement.

Ever evolving underground mass transit systems, rail/road/tunnels now require innovative solutions. In order to do that simulation tools such as SES play vital role. But this program remained undeveloped after 2001. I strongly urge to remove the restriction on SES and to distribute again in public domain.

I am fully supportive of an free open source version of the SES program being developed by the tunnel ventilation and fire life safety community. This will allow the public's past investment in this widely used tool to continue to benefit all fairly.

Looking at the amount of underground metro works ongoing and planned in the near future, the need for Open SES is of high importance to designers such as myself.

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Open sourcing SES will allow benefits including accelerating the development and refinement of the program.

**Remove the restrictions**

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SES and the SEDH are essential tools in developing safe underground stations and tunnels. Limiting Engineers access to this material potentially reduces the level of safety that the public can expect from transit systems. This material should be available to any tunnel constructor, owner, or designer.

There is a flawed perception that keeping your technical tools to yourself improves business competitiveness.

This may be true for edge products for a short period, but not for a program that is more than 40 years old.

Sharing knowledge actually increases it; ask any teacher!

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